Aspects of the Phonology and Morphology of Classical Latin

András Cser

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Abbreviations, symbols

1	1st person	It	Italian
2	2nd person	MASC	masculine
3	3rd person	N	nasal consonant
ABL	ablative	NEUT	neuter
ACC	accusative	NOM	nominative
ACT	active	obs	obstruent
ADJ	adjective	Ons	onset of syllable
C	consonant	p. e.	personal ending
CL	Classical Latin	PART	participle
Co	syllable coda	PASS	passive
DAT	dative	PERF	perfective
DIMIN	diminutive	PIE	Proto-Indo-European
E	English	PLUR	plural
FEM	feminine	PRES	present
Fr	French	R	root node
FUT	future	Rh	syllable rhyme
GEN	genitive	Rum	Rumanian
Gmc	Germanic	SING	singular
Gr	Greek	Skt	Sanskrit
IMP	imperative	son	sonorant
IMPF	imperfective	SUBJ	subjunctive
IND	indicative	SUP	supine
INF	infinitive	TRS	transitive
INTERJ	interjection	V	vowel
INTRS	intransitive	X	skeletal slot

[…]	phonological representation
⟨…⟩	orthographic form
>	developed into
<	developed from
~	alternates with
*	reconstructed form
**	ill-formed or non-existent form
#	word boundary
→	is the morphological basis of
←	is morphologically based on
x.x	syllable boundary
{s}	extrasyllabic [s]
σ	syllable

Names of ancient authors and titles of their works, occasionally abbreviated in the main text, are listed in Appendix 2.

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1. Introduction

1.1. Aims, scope and outline

This work is a comprehensive corpus-based description of the synchronic segmental phonology of Classical Latin, and of those aspects of its morphology that interact with its phonological structure in important ways. The goal is not only to give a description; the goal is to highlight how the patterns and processes described and the new research results that they lead to contribute to phonological theory. This contribution is meant to work in two ways. The analyses presented here are informed by specific hypotheses about how phonological representations are structured and about how phonological rules work; and in that way my new findings corroborate these hypotheses. But the description to be presented also provides raw material — some of it new not only in terms of analysis but even in terms of data —, for researchers of phonology and morphology, regardless of what framework they work in at present or will work in in the future.

The scope of the work encompasses the complete segmental phonology, including patterns and processes, syllable structure and alternations; it does not cover strictly speaking prosodic issues, i.e. word stress and intonation. As regards word stress, what is commonly known will be taken for granted and mentioned where appropriate without argumentation; it was not among my goals to produce new research in that area.

The treatment of morphology is admittedly eclectic. I give a full description and analysis of the morphophonology of regular inflection, which omits on a principled basis the relationship between the three verb stems. I also discuss reduplication and prefixation because these show interesting phonological patterns. The discussion of liquids is given a full chapter because specific aspects of their phonological behaviour warrant it; this chapter touches on derivational suffixes, not otherwise discussed in this work.

The discussion is primarily not diachronic; this is not a historical phonology of Latin. Mention will be made of several preclassical and postclassical developments at certain points, but as a matter of principle, the focus is on Classical Latin, and my analyses are not informed by etymological considerations. There are, how-ever, two topics that receive a greater diachronic emphasis than the rest, the depletion of the class of reduplicating perfects and the development of original *gn*-initial stems in Latin. The reason for discussing them in that way — as I hope will be apparent to the reader — is that they both present isolated, non-sytematic features and what really makes these features interesting is the way they developed in time.

The organisation of the work is as follows. In the remaining part of this introductory chapter I give a brief overview of earlier general works on the topic, then clarify my object in terms of the language variety, the data and the general

form of writing used here, and I introduce the general aspects of the linguistic framework I assume. Chapter 2 describes the segmental inventory of Classical Latin, with a detailed description of basic distributional regularities and an analysis of controversial points (nasal vowels, diphthongs, labiovelars). The same chapter presents in detail the phonological representations used throughout this work. Chapter 3 is a phonotactic analysis, based mainly on the distribution of consonants in clusters, with a focus on non-nuclear syllabic constituents; the interaction between sonority, place of articulation and syllable contact is also explored here. Chapters 4 and 5 analyse consonantal and vocalic processes, respectively. Chapter 6 elaborates the structure of inflectional morphology (both nominal and verbal) in terms of morpheme variants and the phonological con-ditioning factors that define their distribution. Chapters 7 and 8 leave the domain of morphologically simplex forms entirely, to discuss the regularities and oddities of resyllabification, and the behaviour and distribution of prefixes, respectively. Chapter 9 takes a closer look at perfective reduplication and attempts to find a phonological motivation for the particular way in which this originally productive pattern shrank in Latin to a small class. Chapter 10 discusses liquids with a special focus on cooccurrence restrictions that obtain between identical liquids within a word as well as on the role these restrictions play in the morphology of the language. Chapter 11, which has a diachronic orientation similar to that of chapter 9, analyses the phonologically problematic initial cluster written ⟨gn⟩. Chapter 12 summarises the research results emerging from my work. An appendix provides data on the frequency of consonants in a corpus of Latin texts (described below in 1.3), another appendix lists the ancient authors and their works referred to.

1.2. Previous research

Research on Latin phonology was purely diachronic for many decades since the nineteenth century. The presentation of sound changes leading from Proto-Indo-European to Latin, and then from Latin to the Romance languages, encapsulated most of what there was to say about the phonological strcture of the language. The great historical grammars (Sommer 1902, Meillet 1928, Leumann 1977, Sihler 1995, Meiser 1998, Baldi 2002, Weiss 2009) of Latin include an immense wealth of information about how sounds and sound patterns developed, but they usually discuss synchronic regularities as remnants or consequences of diachronic changes. *A fortiori* the same is true of works dedicated solely to historical phonology (Niedermann 1906, Juret 1921, Kent 1932, Maniet 1955). The latter group partly overlaps in its content with works whose focus is on the reconstruction of the pronunciation of Latin (and, by implication, its sound system; Sturtevant 1920, Allen 1965). Other works focus on prosodic issues but discuss much of the segmental phonology of the language, especially those aspects that are connected to syllable structure, vowel length and phonotactics, largely in structuralist-type frameworks (Zirin 1970, Pulgram 1970 and 1975, Allen 1973, Devine and Stephens 1977, Ballester 1996, Lehmann 2005, Touratier 2005). In recent years two works stand out as treatments of aspects of the historical phonology of Latin informed by

the most current work on phonetics as well as phonology (Stuart-Smith 2004 and Sen 2015). Works whose topic is of a narrower scope are not listed here but are referenced at the appropriate points in the discussion.

My own research has focussed on Latin phonology for many years now, including my habilitation dissertation (Cser 2009a) on consonantal phonotactics. Much of what I have published over the past decade and a half can be seen as preliminary studies to what I am presenting here. I revisit several questions, and often find new answers to them; and even when the answer has not changed, the discussion is significantly updated and augmented with new data, new ways of description and modelling. I do not list specific bibliographic items here; they will be referenced at the appropriate points.

1.3. The language, the data and the form of writing

The subject of this work is the language referred to as Classical Latin. It is therefore appropriate to begin by delineating this object and defining to the necessary extent what is meant by it. Classical Latin is, of course, not a language in itself but a variety of a language: it is the (spoken as well as written) Latin of the Roman élite of the late Republic and the early Empire, the variety of Latin that emerged and crystallised by the 1st century BC, became, in a standardised form, the vehicle of a vast amount of literature as well as non-belletristic writing and was then transmitted in established forms of schooling for centuries. It can be delimited temporally as well as sociolinguistically, and this is, of course, most pertinent to the present discussion because it involves the delimitation of the data I use.

The beginning of Classical Latin in the strict sense of the word is traditionally placed in the first half of the 1st century BC. The grounds for this are provided basically by the public appearance of Cicero (dated 81 BC), a figure of paramount importance in the crystallisation of the linguistic norm. The Latin of the 3rd and 2nd century BC authors shows phonological, grammatical and lexical peculiarities that are absent from the middle of the first century on, either because the spontaneous course of language change replaced them, or because they fell victim to the conscious efforts of selection and elaboration on the part of Cicero and his influential contemporaries. Since, however, the language of official documents begins to show marked consistency already before the first century BC, it is "categorically not the case that the process of standardisation belongs exclusively to the final years of the Republic and the early Empire, even if this was a particularly important, even climactic, phase in the development of the language in its higher written forms" (Clackson and Horrocks 2007:90).[1]

In the other direction the cut-off-point is even more difficult to determine. Traditional histories of Latin, which refer to the first two centuries AD as the

[1] For the unfolding of this process and the emergence of the classical norm see Clackson and Horrocks (2007:77–228) and Rosén (1999), two recent comprehensive works. On the issue of dialectal divisions and regional diversity within Latin the authoritative work now is Adams (2007), on social variation Adams (2013).

"silver age" or the "postclassical period" establish these stages on literary rather than linguistic criteria (e.g. Palmer 1954:140 sqq.). The form of the language standardised by the 1st century BC was perpetuated in the written medium for centuries, and it is clear that it gradually drifted away from the realities of the spoken language. It is also clear that expectations and tastes changed in literary forms too, but that will not be my concern here. Highly schooled native speakers of Latin were able to write in Classical Latin well into the 6th century AD (such as Boethius). At the same time, we know for certain that important and far-reaching sound changes had been completed or progressed considerably by this time, e.g. the neutralisation of vowel length or the palatalisation of coronals and velars. Also, there are signs that some inflectional patterns and categories began to break down in later imperial times, and noticeable shifts were underway in derivational morphology too. These changes were, by and large, kept out of the more elevated styles of writing, which contributed to the widening gap between the standardised (by this time chiefly written) form of the language and its spoken varieties.

The collapse of the institutional background that had made the preservation of the linguistic norm possible was complete by the end of the sixth century AD all over the territory of the (Western) Roman Empire, including its last stronghold, Italy. Familiarity with Classical Latin vanished quickly, to be more or less restored by artificial measures in a process that began in Charlemagne's Frankish Empire in the late 8th century, by which time, it is argued by authorities, the Latin language of Antiquity, as preserved by the Church, had ceased to be understood in Gaul. It appears that comprehensibility broke down in Spain and Italy later, maybe only in the 10th century.[2]

In terms of data, the present work is based on volume 1 of the Brepols Corpus (CLCLT-5 – Library of Latin Texts by Brepols Publishers, Release 2002). In selecting the data I have by and large confined myself to the period between 100 BC and 400 AD. I do note data that are phonologically interesting and relevant from earlier, and occasionally from later times, but when making generalisations, I disregard these. This means not only individual words but also patterns such as the metrical structures of pre-classical (scenic) poetry. I further disregard loanwords that were, in all likelihood, not yet "naturalised" in the period under discussion, such as the *pn-* initial technical terms borrowed from Greek, which are found in e.g. Vitruvius's *De architectura* or Pliny's *Naturalis historia*. It goes without saying that it is impossible to be certain in all cases when a loanword has been fully incorporated into the vocabulary of the receiving language (and, by consequence, perhaps changed its phonological patterns). But there is a clear difference between loans like *brac(c)hium* 'arm' or *poena* 'punishment' on the one hand and *aer* 'air' or *pneumaticus* 'concerned with air pressure' on the other in that the latter two are not only more recent but also much more restricted in terms of register, and therefore they will not be cited as evidence that e.g. [pn] is a licit cluster in Latin or that it is usual for a long vowel (least of all [a:]) to be found before another vowel.

[2] For treatments of the question of the "end of Latin" see Herman (1996, 2000), Wright (2002), Clackson and Horrocks (2007:265–272).

There are two partial corpora that I also made use of. In order to calculate the textual frequency of consonants (reported in appendix 1) I created a selective corpus of 191 025 words (1 101 173 characters) representative of a variety of authors and genres. All the texts in this corpus date from the 1st century BC and the 1st century AD.[3] Finally, the term "poetic corpus" in this work refers to the entire corpus of the poets Lucretius, Catullus, Vergil, Horace, Propertius, Tibullus, Ovid, Silius Italicus, Persius, Lucanus, Martialis, Statius, Valerius Flaccus, and Juvenal.[4]

Naturally these aspects of the delimitation of the data can be criticised and, as I said above, in the absence of clear and well-defined boundaries I could not argue with equal force in each and every case for the — tacit or explicit — dismissal of certain forms. It is also well known to everyone who works with extinct literary languages that isolated and odd pieces of data can always turn up, whether in minor texts that one has accidentally overlooked or has not had access to, or in variants of better-known texts. I nevertheless hope that the overall picture that emerges does justice to the language and does not give a skewed presentation of its phonological and morphological patterns.

The next point to consider concerns the availability and the reliability of the data. It is only one part of the problem that data for Latin exist only in writing. The other part is that even the documents in which the language has been preserved come overwhelmingly from periods later than that in which Latin was actually spoken and in which the originals of these documents were composed.

The written sources of Latin thus fall into two major groups. A smaller part has remained from Antiquity without any mediation, since these texts were written on durable materials such as stone or metal, or were preserved due to extraordinary circumstances on some less durable material, such as papyrus, wax or wooden tablets. Texts of this kind, except papyri, are referred to as inscriptions. The larger part, by contrast, i.e. manuscripts in the narrower sense, do not physically date from Antiquity (with a handful of exceptions) but have been transmitted via copying by hand, the only method of transmission until the appearance of the printing press. The vast majority of extant Latin texts fall into the latter category and, by consequence, they do not always reflect faithfully the form of texts as originally produced by their authors. The changes introduced in the course of copying are studied and, if all goes well, detected and reversed by practitioners of textual criticism, who produce editions of texts from extant manuscripts (which editions, in turn, are incorporated into electronic databases). What follows from this is that the linguist who studies Latin (or the literary critic, or the historian) has to rely on a large corpus of texts that are burdened with

[3] This corpus includes the full text of the following works: *Res gestae divi Augusti* (also known as the *Monumentum Ancyranum*), Julius Caesar's *Commentarii de bello civili*, Cicero's *Brutus*, *De legibus*, *Pro Archia poeta* and *Pro Quinctio*, Ovid's *Amores*, Persius's *Saturae*, Sallust's *Bellum Catilinae*, Statius's *Silvae* and Vergil's *Georgica*.

[4] The poets are listed in chronological order of birth to the extent that it is known. Lucretius was born in the first years of the 1st century BC, Juvenal died some time in the first half of the 2nd century AD. In culling the data I consistently excluded works by these poets denoted as *dubium* or *pseudo-* in the Brepols Corpus.

varying degrees of uncertainty of an elementary kind. Of course most texts, especially from the classical era, have been restored with high fidelity and very good editions have been around for some time. But one always has to bear in mind that some of the data are conjectural, and some of the conjectures are not necessarily right, though most linguists (or literary critics, or historians) are not in a position to judge these for themselves, especially on a larger scale.

A case in point is here taken from Plautus (c. 254–184 BC).[5] In his famous play *Miles gloriosus*, l. 1180, a person is described with the phrase *exfafillato bracchio* in some manuscripts, in some *expapillato*, in some *expalliolato.* All the three readings can possibly go back to Antiquity (the earliest extant manuscript dates from the 4th century AD, that is, about six hundred years after Plautus's death), and the latter two can be easily interpreted as 'bared to the breast' and 'not covered by cloak', respectively. Textual critics, however, have settled for the first as the authentic reading. The word *exfafillato* presents interesting linguistic and philological problems. (i) This is its only occurrence in the extant corpus. (ii) Consequently its meaning is unclear, but it is generally interpreted as 'uncovered' or 'stretched out from under the cloak' (scil. *bracchium* 'arm') by modern authorities. (iii) It involves a phonological curiosity, namely a word-internal [f], which is very unusual in Latin. (iv) The reading is unassimilated ⟨exf-⟩ instead of the more usual ⟨eff-⟩ or ⟨ecf-⟩. The latter two are phonological issues I will discuss in some detail later (see chapters 2 and 8), and specific textual problems I encountered are mentioned at various places. The point I want to make here is simply that the set of data on which conclusions are based in any discussion of Latin is inevitably incomplete, partly conjectural and somewhat contingent.

The form of writing I use throughout this monograph is what can be regarded as the standardised writing of Latin as generally used in textual editions, textbooks and dictionaries. It is interesting to note that this writing does not originate from the high classical era (that is, the middle decades of the first century BC) but is somewhat later. It is based on the official practice of the late and post-Augustan era,[6] roughly the first century AD, also referred to in literary terms as the "silver age". Its distinguishing features include, among others, the consistent use of ⟨u⟩ for short [u] (as opposed to earlier ⟨o⟩ after ⟨u⟩ as in ⟨seruus⟩ vs. ⟨seruos⟩ 'slave', ⟨uultus⟩ vs. ⟨uoltus⟩ 'face'), the consistent use of ⟨qu⟩ for original [kʷ] instead of ⟨c⟩ before rounded as well as unrounded vowels (as in ⟨equus⟩ vs. ⟨ecus⟩ 'horse'), and the consistent use of ⟨i⟩ for [i:] instead of ⟨ei⟩ (as in ⟨pueri⟩ vs. ⟨puerei⟩ 'boys'). At the same time it must be borne in mind that there being no standardised spelling in the modern sense of the word, archaic spellings are attested in inscriptions and papyri well into the imperial period. Furthermore,

[5] See Reynolds and Wilson (1991:23).

[6] Perhaps the most emblematic representative of this style of writing is the text called *Res gestae divi Augusti,* composed in several stages probably during the last fifteen years or so of Augustus's reign (d. 14 AD), and then augmented with additions commissioned by his successor, Tiberius. This text was carved into the walls of several temples and public buildings all over the empire and, most notably, into bronze pillars (now lost) in front of Augustus's mausoleum. The best exemplar of the text is found in Ankara, Turkey, hence the alternative name *Monumentum Ancyranum*.

modern editorial practice departs even from this silver-age standard in at least two ways. One concerns the marking of length, which is systematically omitted from edited texts (except dictionaries and some elementary textbooks), though it was present in many inscriptions, albeit not very consistently. The other concerns the writing of the two glides [j w], which were not distinguished from the corresponding vowels [i u] until the sixteenth century.

The exclusively written sources, of course, lead to another question: how does one interpret the data phonetically? How does one know how the words actually sounded? With Latin we are in a relatively fortunate position, since the wealth of data of various sorts does not leave much unresolved.[7] First of all, given the fact, discussed in the previous section, that spelling was not standardised, and even in official use it only achieved comparative stability by the early 1st century AD, it can be safely assumed that writing was not so far removed from pronunciation as the ossified traditional spelling of many European languages, and the relation between the two was much more consistent and closer to an ideal of biuniqueness. The lack of a standardised spelling is a blessing in this case, because the vast amount of variation found in contemporary writing (inscriptions, papyri) is indicative of interesting details. Second, direct references in ancient grammarians' works are numerous, though not always easy to interpret.[8] Third, versification is indicative of vowel length and the syllabic affiliation of consonants (including their absence, such as that of word-final [s] in preclassical poetry). Fourth, puns and other kinds of poetic invention that crucially depend on sound shapes may also be of use. Fifth, transcriptions to and from Greek also provide invaluable information about the pronunciation of both languages.[9] Latin loanwords in other languages dating from ancient times give further insight into original sound shapes. Finally, the evidence of related languages as well as of the Romance languages also contributes to our understanding of the sound system of Latin.

1.4. The framework

The framework I chose for the description and the analysis may be called fairly conservative. The presentation is rule-based; not primarily because I believe that rule-based frameworks are more suitable for the description of natural languages than others, but because the results thus presented are interpretable for adherents of the most varied theories and can easily be reformulated in different frameworks if necessary. The few specific assumptions I make about how phonological rules work are those of "classical" Lexical Phonology,[10] all very basic: there is a distinction between phonological rules that interact with morphological structure and those that do not; different morphological domains may define different sets of phonological rules that operate in them; phonological rules are arranged sequentially and may operate on each other's output; and a subset of them are subject to

[7] The items in the list that follows will be exemplified at various points in the following chapters.
[8] See Vainio (1999:97–107) and Adams (2003:433–435).
[9] See Adams (2003:40–67).
[10] Kiparksy (1982a, 1982b), Mohanan (1986), Goldsmith (1990:217–273).

the Derived Environment Condition, i.e. they are not triggered by environments that emerged earlier in the derivation, including lexically given environments.[11]

The representations I assume are geometrically characterised, that is, segments have a hierarchical internal structure in which the terminal nodes are (binary) features. Root nodes attach to skeletal nodes (timing slots) and it is through these that segments are organised into syllabic constituents. Details of the specific feature geometry that I use are explained in section 2.3, including the fundamental assumption that the place features of vowels vs. consonants are organised differently; my analyses depend on this assumption crucially, and also corroborate it.

As regards morphological structure, my approach is, in a way, minimalist. The structures I discuss are all concatenative (including reduplication), with morphemes being realised in each case by phonologically specific, concrete entities (admitting the possibility of zero variants). My focus is on the phonological conditions that obtain in various morphological constructions, meaning both the phonological conditioning of allomorph choice and the phonological consequences of morphological operations. Various instances of lexically or grammatically conditioned morphological variation will also be presented, but these will not be in the focus in the same way as phonologically relevant variation. A fundamental dichotomy that is observed in the organisation of the material is that between simplex vs. non-simplex (or complex) forms. Simplex forms are not necessarily monomorphemic; indeed monomorphemic forms are relatively rare in Latin. They may have suffixes of any kind, may show fusional exponence within the stem, or may be reduplicated. Complex forms include prefixed words, cliticised words and compounds (the latter two discussed only tangentially).

It is important to realise that much of what is traditionally discussed under the rubric of Latin (inflectional or derivational) morphology is etymological information whose relevance to synchronic morphology is questionable.[12] Take the following example. In the verbal sub-paradigm *amamus, amatis, amant* 'love' 1PLUR, 2PLUR, 3PLUR, respectively, and corresponding sub-paradigms of any other verb, it is very easy to identify *-mus, -tis* and *-nt* as cumulative exponents of person and number. But how about the vowel *a* before them? Does it have morphological function, is it a separable morphological constituent? Since it appears in all forms of this particular verb, but does not appear in the related words *amor* 'love' and *amicus* 'friend(ly)', one could feel justified in calling it a verb-forming suffix. In the formally similar verb *secare* 'cut' → *secamus, secatis, secant* the same vowel is found only in the imperfective verb forms, not in the perfective forms or those based on what is called the third stem (e.g. *sectus* PASSPART), or in derivationally related words (e.g. *segmentum* 'segment, slice'). Thus the *a* in *secare* could be seen as an

[11] On the Derived Environment Condition see Cole (1995), more recently as Non-Derived Environment Blocking in Baković (2011:15) and Inkelas (2011:80–82); originally called Strict Cycle Condition, as in Mascaró (1976) and Kiparsky (1982a, 1982b).

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

imperfective suffix. In a third verb, *fugare* 'put to flight' → *fugamus, fugatis, fugant* the *a* appears in all verb forms as well as the noun *fuga* 'flight', but it is not found in the related verb *fugere* 'flee'. So, it may seem reasonable to say that the *a* in *fugare* is a noun-forming suffix and the verb is derived from a noun. Finally, in a verb like *nare* 'swim' → *namus, natis, nant* the same *a* is found in all forms of the verb and there is absolutely no derivationally related word that does not include it. Therefore the only viable option is not to regard it as a suffix — not to mention that fact that doing so would leave us with an absolute stem consisting of a single consonant, definitely not a desirable option. Now this *a*, which is shown to represent four different kinds of morphological entites, if one insists on an exhaustive morphological analysis of that kind, behaves in exactly the same way phonologically (it shortens before 3SING *-t*, 3PLUR *-nt* and drops before the 1SING suffixes *-o, -or* as well as before the *-e-* of the subjunctive, thus *amemus, secemus, fugemus, nemus* etc., and triggers the same allomorphies in each verb). How then does one analyse these forms? How many morphemes do they consist of and what exactly are those morphemes? In my view, these are largely lexical matters from a synchronic perspective and do not form part of productive morphology (certainly not inflectional morphology). As a consequence, many time-honoured terms of morphological analysis will not be found in this work (e.g. thematic vowel), simply because I have found them useless for my purposes.

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2. The segmental inventory

2.1. Consonants

The surface-contrastive inventory of Classical Latin consonants and their usual spellings are shown in Figure 1. The Classical Latin consonant system is typologically very simple and parsimonious. Voicing is contrastive only for stops; fricatives are redundantly voiceless, sonorants are redundantly voiced. Three places of articulation cover all consonants but one; [h] is the only glottal segment in the system, while there is no velar fricative in the language at all.[13] Whether the coronals [t d s n l r] were dental or alveolar is difficult to establish with certainty, and nothing hinges on it in this work. The glide [j] was phonetically palatal, and [w] was labiovelar.

There is a tradition of analysing glides as positional variants of the respective high vowels (see e.g. Hoenigswald 1949a, or more recently Ballester 1996, Touratier 2005 and Lehmann 2005). While their environments are partly predictable, cases of contrast are far too numerous to be dismissed. Some of these cases can be explained away with reference to morphological structure (*vol*[w]*it* 'he rolls' vs. *vol*[u]*it* 'he wanted' where the [u] is a perfective marker, or *s*[w]*avis* 'sweet' vs. *s*[u]*a* 'his/her', where the [a] of *sua* is a feminine marker), some cases clearly cannot: *bel*[u]*a* 'beast' vs. *sil*[w]*a* 'forest', *q*[w]*i* 'who/which' vs. *c*[u]*i* 'to whom/which', *ling*[w]*a* 'tongue' vs. *exig*[u]*a* 'small', *co*[i]*t* '(s)he meets' vs. *co*[j]*tus* 'meeting', or *aq*[w]*a* 'water' vs. *ac*[u]*at* '(s)he should sharpen'; or consider the possibilities of representing the difference between *inicere* [injikere] 'throw in' vs. *iniquus* [ini:kwus] 'inimical'.

The consonant [h] does not condition or undergo any phonological rule in Latin and this has led some linguists to the conclusion that a complete description would be equally feasible without it (as in Touratier 2005 or Zirin 1970; in the latter work /h/ is appropriated as a phonological symbol for hiatus). The phonological inertness of [h] may well be a sign that by classical times this sound was lost completely. Yet the morphological behaviour of two verbs (*trahere* 'drag' and *vehere* 'carry') militate against this conclusion. These verbs are inflected in the imperfective exactly as other consonant-stems (see chapter 6). If the putative [h] at the end of the imperfective stems (*trah-, veh-*) was completely inert, these verbs

[13] Since, however, the only reconstructible historical source of Classical Latin [h] is Proto-Indo-European *[g^{h}], it is probable that there was, at some point between the two stages, a velar fricative in the system which then developed into [h] (see e.g. Sihler 1995:158 sqq. for a classic handbook-type summary; Stuart-Smith 2004 is a work devoted in its entirety to the development of Proto-Indo-European aspirates in Italic, with the problems surrounding Latin [h] discussed on pp. 43, 47 and passim).

would be inflected as *a*- and *e*-stems, respectively.[14] Apart from this, the behaviour of (etymological) (V)[h]V is no different in any respect from that of plain (V)V.

			labial	coronal	velar	glottal
obstruents	**stops**	**voiceless**	p	t	k	
		voiced	b	d	g	
	fricatives		f	s		h
sonorants	**nasals**		m	n		
	liquids			l r		
	glides			j	w	

Segment	Spelling	Example
[p]	⟨p⟩	*pars* 'part', *quippe* 'naturally'
[t]	⟨t⟩	*tegere* 'cover', *caput* 'head'
[k]	⟨c⟩ mostly ⟨q⟩ _[w], i.e. ⟨qu⟩ = [kw] ⟨k⟩ in some words ⟨x⟩ = [ks]	*cicer* [kiker] 'pea', *hinc* 'from here' *aqua* [akwa] 'water', *quippe* 'naturally' *Kalendae* [kalendaj] '1st day of month' *dux* [duks] 'leader, guide', *rexi* 'I ruled'
[b]	⟨b⟩	*bibere* 'drink', *imber* 'rain'
[d]	⟨d⟩	*dare* 'give', *quod* 'which, that'
[g]	⟨g⟩	*gravis* 'heavy', *agger* 'heap'
[f]	⟨f⟩	*frangere* 'break', *fuit* 'was'
[s]	⟨s⟩ ⟨x⟩ = [ks]	*spissus* 'dense' *dux* [duks] 'leader, guide'
[h]	⟨h⟩	*homo* 'man', *vehere* 'carry'
[m]	⟨m⟩	*mensis* 'month', *summus* 'topmost'
[n]	⟨n⟩	*nomen* 'name', *annus* 'year'
[l]	⟨l⟩	*linquere* 'leave', *puellula* 'little girl'
[r]	⟨r⟩	*rarus* 'rare', *cruor* 'blood'
[j]	⟨i⟩ or ⟨j⟩ _V (depending on editorial tradition) ⟨e⟩ V_C and V_#	*iungere* or *jungere* [juŋgere] 'join', *ieiunus* or *jejunus* [jejjuːnus] 'hungry, fasting' *aes* [ajs] 'bronze', *stellae* [stellaj] 'stars'
[w]	⟨u⟩ or ⟨v⟩ _V (depending on editorial tradition) ⟨u⟩ V_C and V_#; #[s]_ and [k]_ (=⟨qu⟩)	*uelle* or *velle* [welle] 'want' *haud* [hawd] 'hardly', *suavis* [swaːwis] 'sweet'; *aqua* 'water', *quippe* 'naturally'

Figure 1: The Classical Latin consonants and their spellings

[14] It goes without saying that postulating an empty consonantal position or some other representational device in these two verbs could, in theory, give the same result. Since, however, the same empty position would not be required anywhere else in the phonology of Latin, I refrain from including it in the description and stay with [h] in a conservative manner. Nominal stems and other verb stems categorically do not end in [h].

There seems to be good evidence that the orthographic sequence ⟨gn⟩ denoted phonetic [ŋn] rather than [gn], at least word-internally.[15] The evidence is surveyed in Allen (1978:22–25) and most handbooks, and involves the general phonotactic patterns of Classical Latin (on which more will be in chapter 3), diachronic developments, and inscriptional as well as ordinary spellings. The major points are the following.

(i) In the prehistory of Latin, there was a tendency for stops to be nasalised before nasals (e.g. [pn] > [mn], as in **swepnos* > *somnus* 'sleep, dream', cf. Old English *swefn* or Greek *hupnos* 'dream', or [tn] > [nn], as in **atnos* > *annus* 'year', cf. Gothic *aþn*).

(ii) Inscriptional evidence includes several forms like ⟨INGNES⟩ for *ignes* 'fire(s)', attesting to the outcome of the nasalisation of [g] before nasals.

(iii) The sound change [e] > [i], which was conditioned by (especially velar) NC sequences (*[teŋg-] > *tinguere* 'dip', *[peŋkwe] > *quinque* 'five'), but by no other type of consonant cluster,[16] was also triggered by ⟨gn⟩: *[dek-n-] > *dignus* 'worthy' (scil. via *[deŋn-]).

(iv) The spelling of nasal-final prefixes provides additional evidence. For example, negative *in-* is optionally spelled ⟨im⟩ before the labial stops and [m] (as in ⟨im+politus⟩ 'unpolished', ⟨im+berbis⟩ 'beardless', ⟨im+mortalis⟩ 'immortal'), ⟨il⟩ before [l] (as in ⟨il+lepidus⟩ 'lacking refinement') and ⟨ir⟩ before [r] (as in ⟨ir+rasus⟩ 'unshaved'; for more details see chapter 8). As one would expect, it is written ⟨in⟩ before the velar stops, there being no distinct spelling for [ŋ] (as in ⟨in+celebratus⟩ [iŋkelebra:tus] 'unrecorded'). Before other consonants as well as before vowels, it is consistently written ⟨in⟩ (as in ⟨in+ermis⟩ 'unarmed', ⟨in+decens⟩ 'unseemly'). Before an original ⟨gn⟩-initial stem, however, the spelling of nasal-final prefixes involves the apparent (unparalleled) loss of an ⟨n⟩ as in ⟨ignoscere⟩ 'forgive' from ⟨in⟩ + ⟨gnoscere⟩ 'know', but this is easily explained if this written form represents [iŋno:skere] 'forgive'. Where the morpheme boundary actually falls is a tricky question but will be clearer after the discussion of such prefixed forms in chapter 11.

Thus [ŋ] was in almost complementary distribution with [n], scil. [ŋ] before velar stops, but note *annus* 'year' and *agnus* 'lamb' with contrast between [nn] vs. [ŋn]; but it was in almost complementary distribution also with [g], scil. [ŋ] before [n], but note *agger* 'heap' and *angor* 'constriction' with contrast between [gg] vs. [ŋg]).[17] The persistent spelling of the velar nasal with ⟨g⟩ instead of some other

[15] Word-initial ⟨gn⟩, which occurs in the name *Gnaeus* may have retained or regained the archaic pronunciation [gn]. The same spelling-pronunciation cannot be excluded word-internally either. The specific problem of word-initial ⟨gn⟩ will be discussed at some length in chapter 11.

[16] More precisely, a preconsonantal [ŋ] always triggered the change, preconsonantal [m] triggered it is some cases but not in others (e.g. *simplex* 'simple' vs. *semper* 'always', both from the Proto-Indo-European root **sem-* 'one'), whereas preconsonantal [n] never triggered it (e.g. *sentire* 'feel'). Other consonant clusters did not trigger the change (cf. *negligere* 'neglect', *lectus* 'bed', *consecrare* 'consecrate'). There was an unrelated [e] > [i] change in non-initial open syllables (**miletes* > *milites* 'soldiers', see chapter 5).

[17] It is because of its odd distribution that I consistently mark [ŋ] in my transcriptions, although, strictly speaking, it is not a surface-constrastive unit. Cf. also Zirin's (1970:26) description of the the velar nasal as "a classic case of partial phonemic overlapping".

symbol (including most inscriptions) is not surprising given this nearly complementary distribution with [g] as well as with [n]; furthermore, in Greek spelling also, the letter gamma was used for [ŋ], i.e. ⟨γγ⟩ = [ŋg], ⟨γκ⟩ = [ŋk] and ⟨γχ⟩ = [ŋkʰ] besides its standard value ⟨γ⟩ = [g].

There is further evidence that [l] displayed an allophony somewhat similar to that found in British English, *viz.* it was velarised before consonants and velar vowels, and unvelarised before palatal vowels and in gemination. The evidence, summarily discussed in Allen (1978:23–25) and Leumann (1977:85–87), and more recently in Sen (2012:472–473 and 2015:15 sqq.) and Meiser (1998:68–69) among others comes from grammarians' remarks, sound changes conditioned by [l] as well as its Romance reflexes. The phonology of this alternation is discussed in detail in 4.9.

2.1.1. General distributional regularities in simplex forms

All the consonants except [h] and [w] occur as geminates, though some of them mostly or only at prefix–stem boundaries. In simplex forms geminates are found only intervocalically (except for the final [kk] of the pronouns *hic* and *hoc* 'this'). Gemination is marked in spelling for all consonants except [j], which is rendered invariably with a single ⟨i⟩ or sometimes ⟨j⟩ in modern editorial practice, as in ⟨eius/ejus⟩ [ejjus] 'his/her'. The practice of writing single ⟨i⟩ for [jj] is based on what appears to have been the majority practice in Antiquity (see Kent 1912, Allen 1978:37–40)[18] and was definitely general usage in the Middle Ages. Phonologically this spelling can be seen as the reflection of a neutralisation, since intervocalic [j], alone of all consonants, is always a geminate in simplex forms, and thus there is no contrast between V[j]V vs. V[jj]V.[19]

All consonants occur word-initially and intervocalically. The fricative [h] occurs only in these two environments in simplex forms (*homo* 'man', *vehere* 'carry'). For [f] word-initial position is its almost exclusive environment (*ferre* 'carry', *fur* 'thief', *frangere* 'break' etc.; in simplex forms, non-initial [f] occurs only in a handful of words[20]). It appears that while intervocalic [f] and [h] are not particularly frequent lexically, there is a noticeable preference for [f] to follow a long vowel and for [h] to follow a short vowel.[21]

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[18] A remark found in Quintilian's *Institutio oratoria* (1.4.11) indicates that Cicero actually preferred spelling intervocalic [jj] with ⟨ii⟩ (*Ciceroni placuisse* aiio Maiiam*que geminata i scribere* 'that Cicero preferred to write *aiio Maiia* with double *i*'). Note further that the sequence [ji] is also regularly rendered with a single ⟨i⟩ regardless of the length of either segment, thus ⟨abicio⟩ [abjikio:] 'I throw away', ⟨reicio⟩ [rejjikio:] 'I throw back', ⟨Pompei⟩ [pompejji:] proper name GEN, and so on. This spelling practice is presented and discussed in detail in Kent (1912).

[19] Many dictionaries of Latin erroneously indicate a long vowel before intervocalic [jj] on the basis of the fact that the syllables whose nucleus is constituted by that vowel always scan as metrically heavy in poetry (but this is because they are *positione longa* rather than *natura longa*).

[20] *Āfer* 'black', *būfō* 'toad', *offa* 'bite, lump (of food)', *rūfus* 'red', *tōfus* 'tufa', *vafer* 'cunning' and their derivatives.

[21] For non-initial [f] see the previous note. Non-initial [h] is found in *incohare* 'start', *mihi* 'to me', *nihil* 'nothing', *trahere* 'drag', *vehemens* 'vehement', *vehere* 'carry'; the interjections *eho* (virtually

Word-final consonants are mostly inflectional suffixes or parts of inflectional suffixes; this follows from the morphological character of the language. Consonants that constitute or end suffixes are [t d s r j]. Word-final consonants that are not suffixal are found in the following cases:

(i) Neuter nouns belonging to the third inflectional class usually show the pure stem with a zero-suffix in the NOMACCSING, e.g. *opus* 'work', *os* 'bone', *pulvinar* 'pillow', *pecten* 'comb', *animal* 'animal'. Such nouns end in [s r n l], the only exceptions being *caput* 'head' and *lac* 'milk', whose stems end in stops.[22]

(ii) Masculine and feminine nouns belonging to the third inflectional class also assume the zero-suffix instead of the usual NOMSING suffix *-s* if their stems end in the same four consonants as in (i) ([s r n l]): *honos* 'honour, office', *consul* 'consul', *mulier* 'woman', *lien*[23] 'honeycomb'; some heteroclitic *o*-stem nouns also occur in the NOMSING in a zero-suffixed [r]-final form (*puer* 'boy'), as do some [r]-final adjectives in both the *o*-stem class (e.g. *aeger* 'ill') and the consonant/*i*-stem class (e.g. *celer* 'quick'; more on nominal declensions in chapter 6).

(iii) The majority of prepositions (*ab* 'from', *prae* [praj] 'for, before', *per* 'through', *penes* 'with, at') and conjunctions (*et* 'and', *ac* 'and', *seu* [sew] 'or').

(iv) Some interjections, such as *at(t)at, fafae, (ē)heu, vae.*

(v) The four imperatives *dic* 'say', *duc* 'lead', *fac* 'do', *fer* 'carry'. The last of these is a generally irregular verb in that some of its imperfective personal endings are not preceded by a vowel (e.g. *fert* 3SINGPRES).

The descriptive generalisation for word-final consonants appears to involve a marked preference for coronals. As was indicated above, suffixal final consonants include only [t d s r j], non-suffixal final consonants are mostly from the set [s r n l] with one noun ending in [t] (*caput* 'head'). It so happens that no stem ends in [h f j]; and stems ending in the consonants not listed above do not have zero-suffixed forms.

On non-coronal final consonants the following seem clear. Definitely no Classical Latin word ends in [p f h g m].[24] Word-final orthographic ⟨m⟩ merely

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only in Plautus and Terence) and *ēheu*; *cohors* 'cohort' and *prehendere* 'grab' should perhaps be assigned to the prefixed class. The preference for short vowels before [h] is simply an extension of the regularity that bans long vowels in the first position of a hiatus, i.e. the [h] behaves as if it did not exist. On hiatus see 2.2.3.

[22] In fact, the stem of *lac* is *lact-*, but [t], which is only allowed finally after vowels and the coronal consonants [s n l r], is dropped in the unsuffixed form. The phonotactic motivation will be explained in more detail in chapter 3.

[23] Non-neuter *n*-final stems that retain the [n] in the NOMSING are exceedingly rare (another example is *tibicen* 'flutist'). A large portion of feminine and masculine *n*-stems end in [o:] in the NOMSING (*homo,* stem *homin-* 'man', *multitudo,* stem *multitudin-* 'crowd' etc.). Only one of the masculine *n*-stems, *sanguin-* 'blood', assumes the *-s* suffix (*sanguis*).

[24] The word *volup* 'pleasur(abl)e' occurs only in Plautus and Terence and is hence preclassical. Moreover, in almost all of its occurences it is followed by *est* 'is' and may thus have been part of a lexicalised expression rather than a lexical item in its own right by that time. At any rate, by the 1st century BC this word was not only out of use but demonstrably the object of scholarly

indicates the nasalisation plus lengthening of the preceding vowel, rather than phonetic [m];[25] it is analysed here as a placeless nasal (see 2.1.3).

Final [b] only occurs in three prepositions (*ab* 'from', *sub* 'under', *ob* 'against, because of'), which are always proclitic, so this [b] is not at the end of a phonological word.

The token frequency of final [j] is very high, but its type frequency is extremely low, since it only occurs (apart from the preposition *prae* and a couple of interjections such as *vae* or *fafae*) in three inflected forms of *a*-stem nouns and adjectives. The genitive and dative singular and the nominative plural of such stems all end in [aj] (e.g. *puellae* 'girl' GENSING, DATSING, NOMPLUR).

Final [w] occurs in five words altogether (*seu* 'or', *neu* 'neither, and not', *ceu* 'as, like', *(e)heu* INTERJ, *hau* 'not'). *Seu* and *neu* are preconsonantal variants of the vowel-final (prevocalic) forms *sive* and *neve*, respectively. It is also a fact that *ceu* is only used preconsonantally;[26] before vowels other, functionally overlapping, conjunctions are used in its stead (*ut, sicut, velut, quasi*). It was probably proclitic[27] and thus not much more harmful to the coronal generalisation than the three *b*-final prepositions. Surprisingly, the interjections *heu* and *eheu* are, at least in their attested use, also confined to preconsonantal position.[28] *Hau* is the optional preconsonantal variant of *haud* and is overwhelmingly found in pre- and postclassical literature. The almost exclusively preconsonantal environment shows that in the few extant cases of final V[w]-sequences there was a strong tendency to avoid resyllabification at word boundary, which prevocalic position would have entailed.

explanations and antiquarian interest (as Festus's *Epitome* testifies, it was included and explained in Verrius Flaccus's *De Verborum significatu,* a now lost lexicographic work), hence clearly not part of Classical Latin.

[25] This has been established beyond doubt on the basis of ancient grammarians' remarks as well as metrical evidence (see Allen 1978:30). It is believed that one or two monosyllables may have retained the final nasal consonant in some form; this is conjectured from a handful of reflexes like French *rien* [ʀjɛ̃] 'nothing' with a nasal vowel < CL *rem* 'thing' ACC (but cf. *jà* [ʒa] < CL *iam* 'already' without any trace of the nasal).

[26] I established this from the Brepols corpus, which indicates that of its 493 occurrences in the entire volume 1 only three are prevocalic (0.6%), of which two are found in Pliny's *Nat. hist.* (10.182 *ceu Alpini*, 22.93 *ceu in ovo*), one in Paulinus Nolanus (26.255 hexameter-initial *ceu aliquando*), a Christian poet of the late fourth and early fifth centuries AD.

[27] In most of its occurrences it is followed by a noun, an adjective, occasionally an adverb or a verb; it is almost never followed by function words, which are likely to have been unstressed. This implies that *ceu* was probably much like a preposition prosodically.

[28] In the Brepols corpus *heu* occurs about 700 times, *eheu* 64 times. If one disregards listings in grammars and direct quotations (only a handful anyhow, e.g. Petronius *Sat.* 34.7 *complosit Trimalchio manus et 'eheu' inquit* 'Trimalchio clapped his hands and said "alas"') as well as the not infrequent *heu heu* type repetitions, *heu* is found in prevocalic position about 20 times, *eheu* only in a handful of instances. Many of the prevocalic occurrences of *heu* are made up by Ovid's stock phrase *heu ubi* 'alas, where is/are...?' (5 occurrences), which was imitated later by Statius (4 occurrences plus *heu ubinam* 'id.' once) and much later by Claudius Claudianus (once). Statius also has *heu iterum* 'alas, and again...' once. All these poetic examples are hexameter-initial (which, I think, underscores the formulaic nature at least of *heu ubi(nam)*) and thus *heu* scans as a heavy syllable. It is an interesting question how an interjection could be so sensitive to phonological environment, but this issue will not be pursued any further.

Final [k] is found in the three irregular imperatives *dic* 'say', *duc* 'lead', *fac* 'do', the noun *lac* 'milk', the conjunction *ac* 'and', plus a family of deictics ending in this consonant (*hic, haec, hoc* 'this', *illac* '(to) there', *hinc* 'from here', *illinc* 'from there', *nunc* 'now' and a handful of others).[29]

2.1.2. The question of the labiovelar(s)

In this section I revisit, in a comprehensive manner, a classic question about which much has been written, but even more has been taken for granted without discussion, *viz.* the question of labiovelar stops in Latin.[30] The so-called labiovelars of Proto-Indo-European were partly preserved as *some sort of* labiovelars in Latin, Anatolian and Germanic. In the other languages they developed into various other sounds. The interesting fact about these segments is that their phonological status is variable both historically and cross-linguistically. There are compelling reasons (taken from phonotactics and from patterns of alternation, not to be discussed here in detail) for assuming that labiovelar stops were monosegmental in Proto-Indo-European. But there are equally compelling reasons to assume that e.g. in English, a descendant of Proto-Indo-European, the only remaining "labiovelar" [kw] is not a segment but a sequence of two segments much like [pr] or [kl]. As for the reconstructed phonological system of Proto-Germanic, opinions differ. A look at the literature reveals that no consensus has been reached, though the monosegmental interpretation, parallel to that of Proto-Indo-European, appears to be somewhat more widespread (see Lehmann 1994:22–23, Ringe 2006:88 sqq., Seebold 1967, Stausland Johnsen 2009 among others).

I will now critically review the arguments for the monosegmental vs. the cluster interpretation of "labiovelar stops" in Classical Latin, an issue on which the literature has long been divided.[31] To anticipate the conclusion, the question cannot be settled definitively, which leads to two important problems, one practical, the other theoretical. The practical question is how one incorporates such information into phonological inventory databases. (Incorporating it into

[29] I have a vague suspicion that — in view of the characteristic deictic ending [k] — it is not entirely accidental that the only zero-suffixed imperatives in the so-called third verb class apart from the generally vowelless *fer* happen to end in [k]. In classical times, there were only four simplex verbs whose imperfective stems ended in V[k(i)]. In addition to *dic, duc* and *fac,* the fourth is *iacere* 'throw', whose imperative is regularly *iace*. Preclassical *specere* 'look' is not attested in the imperative form; its prefixed forms are regular (*respice* 'look round' etc.), but the same is true of *facere* (*confice* 'accomplish' etc.). Perhaps some odd kind of analogical pull is at work here. Nevertheless, I shall leave this question and not pursue it here.

[30] I discussed the issue recently in Cser (2013).

[31] Devine and Stephens (1977:13–104) is by far the most detailed discussion of the Latin labiovelars to date, followed by Ballester (1996:53–107); both works look at the basic phonotactic patterns to be discussed below, and both take a close look at ancient testimonia. For a classic summary of some of the arguments, to which later "phonemic" analyses hark back, see Sturtevant (1939). For a less thorough but astute survey see Zirin (1970:29–40). Important observations are found in Allen (1978), another classic. The issue was picked up again in Touratier (2005) and Watbled (2005). Of course, if any of the above papers had provided a definitive solution, I would not have been written about the issue as extensively as I have done.

descriptions *qua* descriptions is no problem since explanations can always be added.) The theoretical question is whether it is possible for a phonological entity to play an ambiguous role (segment or cluster) in a language's phonological system. These two questions, to which the discussion leads, are not pursued in the present work.

In this section the entities in question will be written ⟨qu⟩ and ⟨gu⟩ in order not to prejudge either conclusion regarding their phonological status (though, of course, I have prejudged it already by not including them in Figure 1). Note that while the former spelling in the generally accepted form of writing Latin unequivocally corresponds to the voiceless labiovelar entity in question, the latter can correspond to its voiced counterpart but also to the sequences [gu] and [gu:], as in *arguere* 'show' and *argutus* PASSPART of same), respectively.

The basic facts of distribution are the following. The voiceless labiovelar entity is found in word-initial and word-internal position, in all cases followed by a vowel. It can be preceded by [s] both initially (*squalor* 'dirt') and internally (*usque* 'until'). Internally it can also be preceded by [ŋ] [r] or [j] (*quinque* 'five', *torquere* 'turn', *aequus* 'flat', resp., though of these clusters only ⟨nqu⟩ occurs in more than one word). ⟨qu⟩ is never found in word-final or preconsonantal position and it is also not found in prefixes or suffixes.

The voiced labiovelar entity has an extremely restricted distribution phonologically and a correspondingly restricted lexical incidence. It is only found in the 11 words shown in (1) (and their derivatives), in all of them in the environment [ŋ]_V.

(1) Words including the voiced labiovelar entity

anguis 'snake'
inguen 'loin'
languor 'languidity'
lingua 'language/tongue'
ninguit 'it snows' (or *ningit*)
pinguis 'fat' ADJ
sanguis 'blood'
stinguere 'extinguish'
tinguere 'dip' (or *tingere*)
unguis 'nail (on hand and foot)'
unguere 'smear' (or *ungere*).

To these one may add *urguere,* a rare by-form of the verb *urgere* 'urge' [urg(w)e:re]. As is indicated in the list, in some words ⟨gu⟩ is in free variation with [g], e.g. *ninguit* ~ *ningit*. What these facts, *viz*. this very limited distribution and the very low lexical incidence mean for the phonological status of ⟨gu⟩ is discussed below.

2.1.2.1. The issue of frequency

Devine and Stephens (1977) claim that the textual frequency of ⟨qu⟩ is much higher than that of either [k] or [w].[32] This means, they argue, that it is better analysed as a single segment. But they also admit that the markedly high textual frequency of ⟨qu⟩ simply follows from the fact that it occurs in many of the interrogative and relative pronouns *quis* 'who', *quid* 'what', *qui/quae/quod* 'which, who', *quo* 'where' etc., as well as the clitic conjunction *-que* 'and' (1977:94). Actually my own calculations[33] bear out Devine and Stephens's generalisations only in part. In particular, the frequency of [w] is almost twice as high as that of [kw] (38 865 vs. 20 225 over the 191 025-word selective corpus), and it would be so even if one subtracted the number of tautosyllabic [aw] sequences (erroneously called diphthongs, see 2.2.2 and Cser 1999) from the number of [w] tokens (35 189 vs. 20 225). Thus their claim that "*kw* would be the only cluster which would be more frequent than all other occurrences of the second consonant of that cluster: f(kw) > f(w)" (Devine and Stephens 1977:49) does not seem to be correct.

On the other hand, it is true that if [kw] is a cluster, [k] occurs in clusters more frequently than without an adjacent consonant. In my corpus [k] occurs in clusters (not including geminates but including [kw]) 39 062 times, in gemination 924 times, in neither clusters nor gemination 29 694 times. Furthermore, [kw] is more frequent than all the other [k]-clusters combined (20 225 vs. 18 837). By contrast, the stop [p], whose distribution is in other respects broadly similar to that of [k], occurs in clusters (not including geminates) 13 314 times, in gemination 703 times, in neither clusters nor gemination 16 364 times. The proportions will be similar if we analyse [kw] as a segment rather than a cluster, because in that case [k] occurs in clusters 18 837 times (vs. 29 694 times not in clusters). Whether other consonants are generally like [p] remains to be verified, but there is a likelihood that Devine and Stephens's claim is right on that count. In sum, however, the frequency arguments are not conclusive.

2.1.2.2. Phonetic issues

There is some indication that the vocalic element in ⟨qu⟩ was different, less "noisy", than the [w] in other positions. Allen (1978:17) points to direct evidence for this from the early 2nd century AD grammarian Velius Longus, and Modern Italian seems to have preserved precisely such a pattern. While ancient grammarians' and orthographers' remarks on phonetic details are often unreliable and hard to interpret, the passage cited by Allen (1978:17) can, indeed, be plausibly understood as saying that the [w] element in ⟨qu⟩ was less consonant-

[32] "[I]f *qu* and *gu* are biphonemic, then *k* would be the only consonant which would be more frequent in clusters than in single occurrences: f(kw) + f(kC) > f((V)k(V))… and *kw* would be the only cluster which would be more frequent than all other occurrences of the second consonant of that cluster: f(kw) > f(w)" Devine and Stephens (1977:49).

[33] The textual frequency of consonants was calculated from the selective corpus described in appendix 1.

like than other [w]'s.[34] The conclusion Allen draws is that ⟨qu⟩ was a segment rather than a cluster. But even if there existed a phonetic difference between the two realisations of the labial element, and even if their distribution was [k]_ vs. elsewhere (which is not clear), it may mean no more for a phonological analysis than a simple case of allophony of some sort.

Allen (1978:16–17) also makes the point that the spelling of words like *tamquam* 'just as', with ⟨m⟩ before the ⟨q⟩ instead of an assimilated ⟨n⟩=[ŋ], indicates that lip rounding was simultaneous with the closure and regards this as another piece of evidence in favour of the monosegmental interpretation. But in fact the ancient grammarians make it clear that the nasal before ⟨qu⟩ and ⟨gu⟩ was velar (see the relevant testimonia in Devine and Stephens 1977:37). The spellings with ⟨m⟩ were etymological spellings used in compounds, not at all to the exclusion of ⟨n⟩ (*tanquam, nunquam* 'never' etc.).

Thus the meagre phonetic indications that we have certainly do not support the monosegmental interpretation — though they also do not contradict it. They simply do not add up to a critical amount of really relevant information and are thus inconclusive.

2.1.2.3. Geminates

Turning now to static phonotactic issues (more fully treated in chapter 3), let us consider geminates first. While all stops occur as geminates in simplex forms, ⟨qu⟩ does not. Furthermore, it does not even occur in a [kkw]/[kk^{w}] sequence (which could, in theory, be analysed as the phonetic representation of geminate [k^{w}] but also as a [k] + [k] + [w] sequence). This squares neatly with the fact that geminates do not occur next to another consonant (in this case [kk] before [w]). It also squares neatly with the fact that [kkw] can emerge (though rarely does) at prefix–stem boundaries, as in *acquirere* 'get' and *acquiescere* 'acquiesce' from *ad*+⟨qu-⟩. It is only at such boundaries that geminates can be adjacent to consonants. Note, however, that if this particular sequence was analysed as a [k + k^{w}] cluster, the lack of [kk^{w}] could be explained with reference to the fact that in two-stop clusters the second stop can only be [t] (i.e. only [pt] and [kt] are found, apart from

[34] *…v litteram digamma esse…non tantum in his debemus animadvertere in quibus sonat cum aliqua adspiratione ut in valente et vitulo et primitivo et genetivo sed etiam in his ⟨in⟩ quibus ⟨cum q⟩ confusa haec littera est ⟨ut⟩ in eo quod est quis…* 'we need to be mindful that the letter v is digamma [i.e. [w] — A. Cs.] not only in those [words] in which it is accompanied by a certain noisiness, as in *valente* and *vitulo* and *primitivo* and *genetivo*, but also in those in which that letter merges ⟨with q⟩, as in *quis*' (Velii Longi *De Orthographia*, Keil 1855–78, vol. 8:58, translation mine). The parts in ⟨ ⟩ are missing from the most important manuscript as well as the first printing of this work. The contrast the grammarian gives is between *adspiratio*, here probably best translated as 'noise', and *littera confusa*, the technical term for vocal forms that cannot be precisely rendered with letters, here probably meaning roughly a sound (scil. [w]) that is fused with the preceding stop ⟨q⟩, i.e. [k]. But note that the examples he gives for the "noisy" ⟨v⟩ are initial and intervocalic, and he contrasts these with ⟨qu⟩ only; he is silent about postconsonantal [w] in general.

geminates), and thus the gap in question would be compatible with a monosegmental interpretation too.

2.1.2.4. Positional restrictions and stop + glide sequences

Sequences of an obstruent and a glide are virtually non-existent in Classical Latin. In word-medial and word-final position no such clusters are found unless one regards ⟨qu⟩, which occurs medially in many words, and the few occurrences of ⟨gu⟩, all medial, as clusters. Apart from ⟨qu⟩ (and ⟨gu⟩), medial [w] can be preceded only by [l r j] (e.g. *silva* 'forest', *parvus* 'small', *laevus* 'left', respectively). In word-initial position [kw] [sw] and [skw] (as in *quis* 'who', *suavis* 'sweet' and *squalor* 'dirt', respectively) would be the only obstruent+glide clusters.[35] Furthermore, when occasional desyllabification in poetry produces a stop+glide cluster internally,[36] scansion shows that such a cluster is heterosyllabic, which indicates that a stop+glide cluster generally cannot be tautosyllabic.

This seems to tilt the balance towards the monosegmental interpretation. But the fact is that the phonotactic patterning of ⟨qu⟩ under a monosegmental interpretation is at least as irregular as under a cluster interpretation (and perhaps more irregular). In addition to the absence of gemination (see above), ⟨qu⟩ and ⟨gu⟩ cannot be followed by any consonant in any position, which would be most untypical for a stop (monophonemic in Proto-Indo-European, the labiovelars could be followed by sonorants without neutralisation[37]). Under a cluster interpretation this fact receives a very simple explanation. Since in Classical Latin the medial member of a three-consonant cluster can never have higher sonority than either of the flanking consonants,[38] a cluster [kw] could possibly only be followed by [j], nothing else. But since [j] never follows a consonant in Classical Latin, [w]-medial clusters are not found.

Note, however, that the restriction of ⟨qu⟩ to the environment _V again does not absolutely preclude a monosegmental analysis. Phonetically oriented (functional) approaches explain such phenomena with reference to the perceptual strength of cues that help identify segments, e.g. Boersma (1998), Steriade (1999), Côté (2000), Kiss (2007). A following consonant effectively masks such cues and so certain types of consonants, such as labiovelars, will be dispreferred in preconsonantal position.

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[35] The argument in Watbled (2005:43 sqq.) is based on these considerations, and so is in part Ballester (1996:53–107). One of the advantages Watbled sees in a monophonemic analysis for both labiovelars is that it makes it easier to establish the putative complementary distribution of [u] and [w]. But as the works devoted to this latter goal generally show, this feat can only be achieved through laboured and counterintuitive analyses anyhow (e.g. Touratier 2005:70; on this, see also Zirin 1970:80–87).

[36] Vergil's *abiete* 'fir' ABL scanned as three syllables, i.e. [abjete] instead of [abiete] in all of its four occurrences: *Aen*. 2.13, 5.662, 8.597, 11.665.

[37] E.g. *$k^{w}jeh_1$- > La *quies* 'rest, repose', cf. Rix et al. (2001:393), De Vaan (2008:508–509).

[38] With the exception of [kst] [pst], in which the [s] is extrasyllabic, see chapter 3.

The fact that ⟨qu⟩ and ⟨gu⟩ never occur word-finally can also be seen from two different perspectives and can be explained on the basis of both. Under a cluster interpretation it is because of sonority sequencing, to which Latin rather strictly adheres, that rising sonority clusters are never found in that position.[39] But it was also seen in 2.1.1 above that in Latin there is a marked preference for final coronal consonants. Of the non-coronal consonants some occur marginally and some not at all, so the lack of word-final labiovelars is also consistent with the monosegmental assumption and falls under a very simple segmental distributional generalisation. Furthermore, the weakness of stop place cues in final position can also be invoked just as in the case of preconsonantal position above.

As for the poetic license of the *abiete* → *abjete*-type, it is indeed true that it produces heterosyllabic clusters. It remains a question, however, to what extent this is informative with respect to the status of ⟨qu⟩ (and ⟨gu⟩). While natural classes are expected to display more or less uniform behaviour, the distribution of the two glides in Latin is different in at least three ways, independently of the labiovelar issue. In particular, while postconsonantal [j] does not exist at all, C[w] is found not only in the *sw*-initial words like *suāvis* 'sweet', but also in the clusters [lw] [rw] [jw] (e.g. *solvere* 'solve', *parvus* 'small', *saevus* [sajwus] 'raging') irrespective of how one analyses ⟨qu⟩ and ⟨gu⟩. Furthermore, [w] is never geminated, while intervocalic [j] always is. Combination with the corresponding vowels also reveals two different patterns: **#[ji] vs. #[wu] (*vulgus* 'crowd', *vultus* 'face').

2.1.2.5. The question of [sw]

Another static structural argument impinges on [sw], the only other cluster including an obstruent + [w]. If ⟨qu⟩ and ⟨gu⟩ are taken to be segments rather than clusters, the environments of [w] shrink so radically that one is practically compelled to regard [sw] as a single segment (i.e. [sʷ]) rather than a cluster. This is because under such an analysis, [w] is never found in complex onsets (except initial [sw]) and, independently of this, [s] is never found before voiced consonants in simplex forms (again except for initial [sw]). That this logically follows was realised by Devine and Stephens: "syllabification and system congruity… point to /sʷ/" (1977:80), but they add a disclaimer on the very next page: "It might be thought that monophonemic assessment of Lat. *kw* almost compels the same for *sw*. But this is arguable…" — importantly though, they give no arguments apart from the hardly relevant point that the Tarascan language "very likely" has monophonemic [kʷ] and cluster [sw], and the somewhat more relevant point that Proto-Indo-European is usually analysed as having the same combination. Given that they do not recognise coda glides and analyse [aw(C)]-type sequences as diphthongs, they are all the worse off, since then absolutely the only position in which [w] is found is as a solitary onset consonant, unless one still

[39] Again except for [ps] [ks], which include extrasyllabic [s].

analyses initial [sw] as a cluster.[40] Thus the parallel of [sw] appears to be a solid argument for the cluster status of the labiovelars.

2.1.2.6. Verb root structure

A point Devine and Stephens make (1977:48, where it is attributed to Robert Godel) is that verb roots do not end in three consonants, but they do end in ⟨Cqu⟩ at least in *linquere* 'leave' and *torquere* 'turn' (and to these one may add the [ŋgw]-final *tinguere* 'dip' and *ninguit* 'it snows').

This point is valid only diachronically, not structurally. How is one to make a principled distinction between what could be described as the root of *torquere* 'turn' and that of *monstrare* 'show', another verb with a heavy consonant cluster before the inflectional endings? It will not do to argue that *monstrare* has a more complex morphological structure than *linquere* or *torquere* (and derives from the primary root attested in *monere* 'warn') because this is more of a statement about the etymology than the structure of these forms. Historically, of course, the claim that verb stems do not end in three consonants makes perfect sense in view of two generally accepted details of reconstruction: (i) Proto-Indo-European *[kʷ] as a single consonant, and (ii) the well known Proto-Indo-European root structure constraints on intramorphemic consonant clusters, *viz*. the maximal root being sCCVCC with CC portions that strictly adhere to sonority sequencing, e.g. **streng^{h}-* 'pull together'. But this only underscores the point that the argument would be valid only if roots and stems could be consistently distinguished in Classical Latin, and the statement is made about a linguistic unit (the root) which, strictly speaking, no longer exists in the language.

2.1.2.7. Voicing contrast in clusters

Consonant clusters including at least one obstruent are found relatively frequently in Latin. Since stops (but not fricatives or sonorants) are contrastive for voice, it is an interesting question how this contrast is present in consonant clusters. The data (listed in tables 4 through 6 in chapter 3) clearly show that the possibility for voice to be contrastive depends on the size of the cluster. Notably, voicing contrast for stops is found only in CC clusters, e.g. [VndV] ≠ [VntV], as in *quando* 'when' vs. *quantus* 'how much', or [VlbV] ≠ [VlpV], as in *albus* 'white' vs. *culpa* 'sin'; no voicing contrast is found in CCC clusters, e.g. [VntrV], as in *antrum* 'cave' but **[VndrV], [VmplV], as in *simplex* 'simple' but **[VmblV]. If one analyses the clusters found in e.g. *linquam* 'I leave' SUBJ vs. *linguam* 'tongue' ACC as CCC rather than CC, these will be the only instances of CCC clusters with contrastive stop voicing ([VŋkwV] ≠ [VŋgwV]). If, however, one analyses these as CC clusters, they

[40] Actually, the structural parallelism between ⟨qu⟩ and [sw] was hinted at already in Brandenstein (1951), cited in Zirin (1970:38). But there is an evident reluctancy on the part of all the authors mentioned to take seriously the consistency of the analysis at this point and say that *if* ⟨qu⟩ is a single segment *then* so is the labialised fricative [sʷ].

pattern as expected ([Vŋk^{w}V] ≠ [Vŋg^{w}V]). This is certainly a fact that points towards the greater plausibility of the monosegmental interpretation of labiovelars.

2.1.2.8. Alternations

The entity denoted by ⟨qu⟩ alternates with [k] just like [g] does, e.g. *coquere* ~ *coctus* 'cook' INF ~ PASSPART much like *agere* ~ *actus* 'do' INF ~ PASSPART. As Devine and Stephens (1977:50) point out, the parallel alternation in identical environment suggests that ⟨qu⟩ is a single consonant just like [g], since both alternate with [k]. As for ⟨gu⟩, in some words it is in free variation with [g] (*ninguit* ~ *ningit* 'it snows'); in some verbs it seems to parallel the *coctus*-type alternation (*unguere* or *ungere* ~ *unctus* 'smear' INF ~ PASSPART). This seems to imply the same for the voiced as for the voiceless entity, i.e. monosegmental status. The issue of alternations, however, is a complicated one and the fuller picture is less than unambiguous with respect to the phonological status of the entities involved.

First, it is important to note that the apparent ⟨qu⟩ ~ [k] alternations are practically restricted, at least in inflectional morphology, to two environments. One is second declension nouns and adjectives (*ecus* ~ *equī* 'horse' NOMSING ~ NOMPLUR),[41] the other the environment exemplified above, where ⟨qu⟩ occurs in the imperfective stem of a verb, while [k] in the third stem and its derivatives (such as the PASSPART). The voicing alternations like [g] ~ [k] are found in a somewhat broader range of forms, such as *rex* ~ *regis* 'king' NOMSING ~ GENSING, *fingere* 'shape' ~ *finxi* 'I shaped' ~ *fictus* 'feigned' (or the isolated *secare* 'cut'~ *segmentum* 'slice'). In the second declension the closest parallel to the *ecus* ~ *equi* type alternations, so far as I can judge, is the apparently short-lived pattern of *dius* ~ *divi* 'godly' NOMSING ~ NOMPLUR, where a segment is clearly lost.[42] By contrast, the alternations in verb stems are rather varied and generally show little phonological regularity apart from *a*-stems such as *amare*:[43]

[41] The analogical levelling of the type *ecus* ~ *equi* > *equus* ~ *equi* became general only during the 1st century AD, and modern editorial practice on this particular point is based on a tradition that postdates even Augustan times (see Buck 1899).

[42] The form *dius* replaced earlier *divos*, and was itself analogically replaced by *divus* already in the early 1st century AD (Buck 1899).

[43] These pairs are all INF (*-(e)re*) and PASSPART (*-tus*). Some details of such affixed forms are explained in chapter 6. Apart from the first example, which is an *a*-stem, all the others are consonant- or *i*-stems (third conjugation), as are all the stems involving supposedly alternating ⟨qu⟩ except for *torqueo* (second conjugation). In an informal sense, the list is meant to represent an increasing distance between the alternants.

(2) Imperfective vs. third stem alternations

amare ~ *amatus* 'love' (no alternation)
facere ~ *factus* 'do' (no alternation)
dīcere ~ *dictus* 'say' (vowel length)
agere ~ *āctus* 'do' (voicing and vowel length[44])
vincere ~ *victus* 'win' (presence vs. absence of nasal)
fingere ~ *fictus* 'shape' (voicing and nasal)
spernere ~ *sprētus* 'despise' (vowel length, nasal and [r]-metathesis)
sternere ~ *strātus* 'lay down' (vowel length and quality, nasal, [r]-metathesis)
solvere ~ *solūtus* 'solve' ([w] ~ [u:] alternation)
fluere ~ *fluxus* 'flow' ([k] plus [s] instead of more usual [t])
ferre ~ *latus* 'carry' (suppletion)

Those imperfective stems that end in ⟨qu⟩ show two patterns. In the third stem either [k] or [ku:] appears:

(3) Imperfective vs. third stem alternations involving ⟨qu⟩

relinquere ~ *relictus* 'leave'
coquere ~ *coctus* 'cook'
loqui ~ *locūtus* 'speak'[45]
sequi ~ *secūtus* 'follow'

Given the great variety of formal differences between the two verb stems (IMPF vs. third stem), which can perhaps best be captured as a continuum with no alternation at one extreme and suppletion at the other, how does one decide how these patterns (*coquere* vs. *loqui*) support the argument for either interpretation of ⟨qu⟩?

The tendency is for *-ūtus* to correspond to [Cw] or [Cu] in the imperfective stem, as the examples in (4) show:

(4) Imperfective vs. third stem alternations involving *-ūtus*

solvere ~ *solūtus* 'solve'
volvere ~ *volūtus* 'roll'
acuere ~ *acūtus* 'sharpen'
arguere ~ *argūtus* 'show'
tribuere ~ *tribūtus* 'distribute'

[44] Note that the length alternation is just the other way round than for *dīcere*. The *agere* ~ *āctus* type exemplifies the lengthening referred to as Lachmann's Law in historical grammar (discussed in detail in 5.3.2).

[45] *Loqui* and *sequi* are formally passive in almost all their forms. This is immaterial to the status of ⟨qu⟩.

On this basis it is reasonable to say that *loqui* and *sequi* point to ⟨qu⟩ being a cluster rather than a single segment, since it parallels the [lw] of *solvere* and *volvere*.[46] But then what does one do with the case of *relinquere* and *coquere*? The point here is that there is no way of telling, in a synchronic grammar of Latin, which of the types in (2) they should be seen as belonging to.[47] Is *coctus* parallel to *āctus*? If yes, then this would be an argument for ⟨qu⟩ being a single segment. But what if we say that *coctus* is parallel to *fictus* or *sprētus*, where a consonant is lost?

If we look at stems whose relevant portion ends specifically in [w], we see the following. The passive participle forms of the verbs *favēre* 'favour', *cavēre* 'be on one's guard', *movēre* 'move' and *vovēre* 'vow'[48] are *fautus, cautus, mōtus* and *vōtus*, respectively. This means no alternation in the first two (*fautus, cautus*),[49] and loss of [w] with vowel lengthening in the others (*mōtus, vōtus*). This shows that it is possible for [w] to alternate with zero (cf. also *bos* ~ *boves* ~ *boum* 'ox' NOMSING, NOMPLUR, GENPLUR) just as it is possible for it to alternate with a vowel, as in *solūtus*. The morale of this point is that the *loqui* ~ *locūtus* type points to a cluster interpretation rather than the opposite, whereas the *coquere* ~ *coctus* type does not point conclusively in either direction. Given this, plus the fact that these alternations are highly restricted anyhow, one cannot conclude from these facts that ⟨qu⟩ is a single consonant in Classical Latin rather than a cluster.

As for the alternations outside inflectional morphology (e.g. *inquilinus* 'tenant' ~ *incola* 'inhabitant'), they do not unequivocally support the monosegmental analysis for basically the same reason. Alternation of [w] with zero before consonants and round vowels is an attested phenomenon in Latin, as has been exemplified above.

2.1.2.9. *Ad*-assimilation

As a minor point let me anticipate a fact discussed in 8.2.4.5. It is indicated in Prinz (1949–50:91) and corroborated by my own corpus research that the [d] of the prefix *ad-* tends to assimilate to stem-initial stops if these are followed by vowels, but this tendency extends very weakly to forms in which the stem-initial stop is followed by a consonant (thus *ad*+*petere, ad*+*capere* → *appetere* 'try to reach', *accipere* 'receive',

[46] Clearly one could not argue that ⟨qu⟩ parallels — in the relevant sense — a CV sequence on account of the *arguere*-type.

[47] This is not to say that comparative linguistics has not established with a fair amount of certainty the original morphological composition and the phonological history of all the forms adduced here. Everyone with at least a little familiarity with Indo-European linguistics knows that the nasal in *relinquere* used to be an imperfective infix and the [k] in *relictus* results from the neutralisation of PIE *[kʷ] and *[k] in preconsonantal position, the length difference in *dīcere* ~ *dictus* goes back to ablaut, and so on. But the point is that these pieces of information do not impinge on how Classical Latin verb forms are synchronically related or whether ⟨qu⟩ is a cluster or not.

[48] These verbs belong to the second conjugation, not the third, which means that in the imperfective forms an [eː] appears before the endings.

[49] Note that these spellings stand for [fawtus] and [kawtus].

but more typically *adprehendere* 'grasp', *adclamare* 'shout'; this generalisation is most evidently true of stem-initial [k]).

My own counts show the following. The ratio of assimilation with [k]V-initial stems is 98%; with [kl] it is 33%, with [kr] 25%, and with ⟨qu⟩ 16%. Two points of comparison are particularly edifying: with [p]-initial stems the numbers are [p]V: 88%, [pl]: 44%, [pr]: 38%; and with the only prefixed [sw]-initial stem (*adsuescere* 'get used to') the ratio of assimilation is 24%. As can be seen, assimilation is rarely attested in ⟨qu⟩-initial stems (it is even rarer than with [kl] and [kr]-initial stems), thus e.g. *adquirere* 'acquire' is much more frequent than *acquirere*, which means that *ad*-assimilation treats ⟨qu⟩ as a cluster rather than a stop.

2.1.2.10. Diachronic considerations

Both the prehistory and the later history of Latin arguably point to a single segment. In PIE *[kʷ] can be reconstructed as a stop, which is, interestingly, in contrast with the cluster [kw]. This is clear from the phonotactic patterns that are reconstructed and also from the alternations involving these entities (primarily ablaut, see Rix et al. 2001 for the lemmata e.g. on pages 374–376 vs. 377 sqq.). In the Romance languages, the continuation of Classical Latin ⟨qu⟩ is frequently a single stop again, either [k] as in French (CL *qui* > Fr *qui* [ki] 'who') or [p] as in Rumanian (CL *aqua* > Rum *apă* [apə] 'water').

Note, however, that while these considerations certainly have diachronic interest, they are of no import in terms of a phonological analysis. Restructuring is possible with or without concomitant phonetic change. The history of English shows a parallel development of PIE *[kʷ] > (Old) English [hw] and *[gʷ] > English [kw], as in *which* and *queen*, respectively, where stops developed into what are analysed as clusters on phonological grounds independently of their provenance. Furthermore, the later history of Classical Latin ⟨qu⟩ is far from uniform: in Italian, for instance, it developed intervocalically into [kkw], as in *acqua* [akkwa] 'water', which can be seen as a diachronic reflection of its cluster nature (though, admittedly, in Vulgar rather than Classical Latin).

2.1.2.11. Further remarks on the voiced labiovelar

As was shown in (1) above, the voiced labiovelar entity ⟨gu⟩ is found only in eleven lexical items and their derivatives, in all of them internally, following a velar nasal. This does not make it easy to argue for either position. If ⟨gu⟩ is a single segment, it is odd that it should be restricted to this particular position and not be found elsewhere (though, of course, the same could be said of [f], which practically only occurs word-initially in Latin). If, on the other hand, it is regarded as a cluster, the phonotactic restrictions seem to pattern somewhat less surprisingly: [ŋg] is an attested word-internal cluster and postconsonantal [w] can occur in the internal clusters [lw] [rw] [jw] [kw] [ŋkw] [rkw] [jkw] [skw] [ŋgw] (plus initial [sw]). Admittedly this is still far from a very good-looking

generalisation, but it is perhaps less counterintuitive than having a single segment restricted to a very narrowly defined environment.[50]

If one turns to other phonological regularities, there are not many of them involving ⟨gu⟩. As was again noted above, in some words it is in free variation with [g] (*ninguit* ~ *ningit* 'it snows'); in some verbs it seems to parallel the *coctus*-type alternation (*unguere* or *ungere* ~ *unctus* 'smear' INF ~ PASSPART). This entity does not take part in any other type of alternation.[51] With this free variation and this alternation the balance seems to be tilting towards the monosegmental interpretation. But bear in mind that the *coctus*-type of alternation was argued to be inconclusive (see 2.1.2.8) on account of the generally highly varied formal relations between imperfective and third stems. Also note that the handful of examples of the ⟨gu⟩ ~ [g] free variation do not necessarily point to ⟨gu⟩ being a single segment. Free variation between [w] and zero is not unheard of in Classical Latin (again see 2.1.2.8): in the perfective of many verbs stem-final [w] is optional (*scivit* or *sciit* 'he knew' etc., see chapter 6), but also note forms like *antiquus* or *anticus* 'old'. Thus it appears that the patterns involving ⟨gu⟩ are also inconclusive, though perhaps they point very weakly towards a cluster with a relatively low incidence.

2.1.2.12. Summary of the labiovelar question

Many of the arguments I have surveyed proved to be inconclusive. One argument can be adduced quite clearly in favour of the monosegmental interpreation, two arguments for the cluster interpretation, and another two arguments weakly also for the cluster interpretation. This is summarised in Table 1:

	C	CC	inconclusive
Frequency (2.1.2.1)			X
Phonetics (2.1.2.2)			X
Geminates (2.1.2.3)		(X)	
Positional restrictions, stop + glide sequences (2.1.2.4)			X
[sw] (2.1.2.5)		X	
Verb root structure (2.1.2.6)			X
Voicing contrast (2.1.2.7)	X		
Alternations (2.1.2.8)		(X)	
Ad-assimilation (2.1.2.9)		X	
⟨gu⟩ distribution, variation (2.1.2.11)			X

Table 1: Summary of the labiovelar question

[50] *Pace* Watbled (2005:45 sqq.).

[51] If one disregards the totally idiosyncratic *ning(u)it* 'it snows' ~ *ni*[ks] 'snow' NOMSING ~ *nivis* 'snow' GENSING.

The upshot is that we have a balance that tilts slightly — but not very convincingly — towards the cluster interpretation, and at least half of the arguments reviewed are inconclusive. Indeterminacy of this kind is not untypical of the world's languages. It is a fact to bear in mind whenever data are collected from descriptions and are processed for higher-level use, as in databases or in theoretical argumentation. Many analytical decisions go into the description of any language. But the farther one moves away from the primary data the less accessible and the more consequential the empirical bases of these decisions are.

With that in mind, the present work assumes (as does Ballester 1996) that both ⟨qu⟩ and ⟨gu⟩ are clusters and Classical Latin does not have labiovelar stops.

2.1.3. The placeless nasal

An investigation of the distribution of the nasal consonants and the nasal vowels (see 2.2.1) in Classical Latin reveals that a phonological analysis needs not only the consonants [m] and [n] plus the non-contrastive velar nasal [ŋ], whose distribution was explained above, but a further nasal segment that manifests itself sometimes as a nasal consonant ([m], [n] or [ŋ]), sometimes as nasalisation and length on a vowel, and is sometimes deleted, all depending on phonological environment. This segment is a placeless nasal consonant which is not interpretable in itself and thus needs to undergo either phonological modification via assimilation or merger with the preceding vowel, or deletion.[52] Details of processes involving the placeless nasal will be explained later at various points of the discussion (mainly 4.6 and 5.3.4); here I list where this segment is found in Classical Latin.

The placeless nasal is

- the suffix of the accusative singular after all masculine and feminine vowel-final nominal stems and after one class of neuter stems (see chapter 6)
- found in final position in a number of adverbs that developed historically from nominal accusatives (*statim* 'immediately', *palam* 'in public')
- the suffix of the first person singular after all vowel-final extended verb stems (see chapter 6)
- the final segment of the prefix *con-* 'with' (see 8.2.3.2)
- often found before the fricatives [s] [f], where it results in most cases from [n] via loss of its place node (see 4.6).

The spelling for the placeless nasal is ⟨m⟩ word-finally, ⟨n⟩ word-internally and can be either ⟨m⟩ or ⟨n⟩ in *con-/com-*. When it merges with the preceding vowel, resulting in nasalisation, the spelling remains; when deleted without vowel nasalisation, the spelling does not retain any consonant letter (*coarguere* 'prove',

[52] The placeless nasal is not entirely unlike the moraic nasal in Japanese (see Labrune 2012:133–135, also called placeless nasal in Japanese linguistics, e.g. Benua 1995:42, Itô and Mester 1993:208–209), though its distribution and behaviour in phonological processes differs from that of its Japanese counterpart in significant ways.

coire ‘meet’). The phonological representation of the placeless nasal is shown in 2.3.

2.2. Vowels

The surface-contrastive set of vowels and their usual spellings with examples are given in Figure 2.[53]

	short		long		nasal	
	front	**back**	**front**	**back**	**front**	**back**
high	i	u	iː	uː	ĩː	ũː
mid	e	o	eː	oː	ẽː	õː
low		a		aː		ãː

Segment	**Spelling**	**Example**
[i], [iː]	⟨i⟩ (⟨ei⟩)	*vir* ‘man’, *vīs* ‘force’
[e], [eː]	⟨e⟩	*venit* ‘he comes’, *vēnit* ‘he came’
[a], [aː]	⟨a⟩	*manē* ‘stay’ IMP, *māne* ‘in the morning’
[o], [oː]	⟨o⟩	*fortis* ‘brave’, *fōrma* ‘shape’
[u], [uː]	⟨u⟩ (⟨o⟩ / w_)	*furor* ‘rage’, *fūr* ‘thief’ (*volt* ~ *vult* ‘he wants’)[54]
nasal vowels	⟨Vn⟩ internally ⟨Vm⟩ finally	*consul* ‘consul’, *amans* ‘loving’, *inferus* ‘lower’ *puerum* ‘boy’ ACCSING, *palam* ‘in public’

Figure 2: The Classical Latin vowels and their spellings

The Classical Latin vowel system consists on the surface of three parallel sets of five vowels. Minimal pairs or quasi-minimal pairs are not difficult to find, see (5) in addition to those given in Figure 2 above. Grammarians’ remarks and Late Latin developments indicate that the short vowels (with the exception of [a]) may have been lower than their long counterparts, i.e. [ɪ ɛ ɔ ʊ]. This well-known phonetic detail will be disregarded in the representations throughout. Furthermore, vowel length will be indicated only where strictly relevant.

[53] Length distinctions were marked in three different ways: double letter (for ⟨a e o u⟩), the so called *I longa*, a tall ⟨i⟩, and a diacritical called *apex*, which resembles the modern acute, and which mostly replaced the previous two methods towards the middle of the 1st century BC. However, the use of all of these methods was somewhat restricted and inconsistent, and medieval manuscripts as well as modern editions systematically omit all marking of length. For further details see Flobert (1990).

[54] The spelling ⟨o⟩ for [u] after [w] — perhaps in order to avoid having to write the same letter twice — persisted into the 1st century AD, see Buck (1899) and Anderson (1909).

(5) Minimal pairs for vowel length and nasality

latrō 'robber' vs. *lātrō* 'I bark'
dēs 'you give' SUBJ vs. *dens* [dẽːs] 'tooth'
puella 'girl' NOMSING vs. *puellā* ABLSING vs. *puellam* -[ãː] ACCSING
leporēs 'rabbits' vs. *lepōrēs* 'niceness'
gemitus 'sigh' NOMSING vs. *gemitūs* GENSING
potes 'you are able' vs. *pōtēs* 'you drink' SUBJ

2.2.1. The nasal vowels

While nasal vowels contrast with oral vowels, their distribution is partly predictable with respect to the two nasal consonants [m n]. Nasal vowels occur in two environments, finally and before fricatives (certain other environments may be hypothesised for the prefix *con-*, see 8.2.3.2). Before fricatives no nasal consonant appears on the surface;[55] final [n] is found in many words (e.g. *pecten* 'comb', *forsan* 'perhaps', *lien* 'honeycomb', *non* 'no(t)'); final [m] is not expected, given the general ban on labial and velar consonants word-finally (see 2.1.1 above).

The overwhelming majority of the nasal vowel + [f] cases are prefixed forms consisting of *in-* or *con-* plus an *f*-initial stem (*conferre* 'collect', *infamis* 'disreputable'), but see also the simplex *inferus* [ĩːferus] 'lower' and its derivatives. Since the incidence of [s] is much higher than that of [f], nasal vowels are also much more frequently found before [s] (*ensis* 'sword', *anser* 'goose', *quotiens* 'how many times', *monstrum* 'omen'). A large part of the nasal vowel + [s] cases are made up of two classes: (i) *in-* and *con-* plus an *s*-initial stem (*inscius* 'unaware', *conscius* 'privy'), and (ii) [Vnd] and [Vnt] sequences alternating with a long nasal vowel when followed by [s] across a morpheme boundary, as in *frons* [frõːs] 'foliage' NOMSING ~ *frondis* [frondis] GENSING and *dens* [dẽːs] 'tooth' NOMSING ~ *dentis* [dentis] GENSING. The [t] ~ ∅ and [d] ~ ∅ alternation before [s] is independent of the nasal and does not in itself involve compensatory lengthening (e.g. *milĕs* 'soldier' NOMSING ~ *militis* GENSING, see the discussion in 4.3). Vice versa, the alternating nasal vowels in simplex forms generally alternate with [Vn] followed by a coronal stop. An exception is *manere* ~ *mansum* [mãːsũː] 'stay' INF ~ SUP with alternation but no stop.[56] The third fricative, [h] does not occur postconsonantally or after nasal vowels in Classical Latin. There are [h]-initial

[55] The only word that comes close to being an exception is *hiems* 'winter', a *m*-stem noun affixed with the nominative singular suffix *-s,* often found in manuscripts as *hiemps* with epenthetic [p]. Other cases of a stem ending in [m] combined with an *s*-suffix include perfective verb forms like *sum+s+i* → *sumpsi* 'I took', where an epenthetic [p] consistently appears, thereby breaking up the [m] + fricative sequence (see 4.7). Other *m*-stem nominals are all heteroclitic *m-/mi*-stems, and their singular nominative forms end in *-mi-s,* e.g. *comis* 'affable'. On heteroclisy see chapter 6.

[56] The alternation in *sanguis* 'blood' NOMSING ~ *sanguinis* GENSING is irregular on at least two counts: (i) it involves a short and, by all appearances, non-nasal vowel; (ii) it is the only *n*-stem noun that takes the *-s* suffix, see above the discussion of final consonants and note 23. *Sanguis* also has a neuter by-form *sanguen*, without the *-s* suffix, mainly preclassical in its occurrences.

stems that are prefixed with *in-* and *con-*, but these behave identically to vowel-initial stems (see chapter 8) and no nasal vowel emerges.

The two rounded nasal vowels [ũː] and [õː] are in almost complemetary distribution in that the former tends to occur finally, the latter internally (neither occurs initially).[57] Examples are *pons* 'bridge', *consul* 'consul' vs. *manum* 'hand' ACCSING, *nondum* 'not yet'. Since, however, there is one perfect minimal pair: *tonsus* [tõːsus] 'shear' PASSPART vs. *tunsus* [tũːsus] 'shove' PASSPART, strictly speaking they cannot be regarded as positional variants.

I assume that nasal vowels are not lexical; they can all be derived from a sequence of a non-nasal vowel and the placeless nasal consonant (see 5.3.4). This explains the invariable length of nasal vowels and a considerable part of their incidence. The placeless nasal can represent two different morphemes in itself (cf. 2.1.3 above), and these account for the vast majority of word-final nasal vowels: ACCSING forms such as [puellãː] from the stem [puella-] 'girl' and 1SING verb forms such as [fuerĩː] from the extended perfective stem [fueri-] 'be' SUBJPRESPERF (see chapter 6). Word-internally (*mansum* and *frons*-type) and at prefix–stem boundary (*inscius*-type) the placeless nasal consonant results from the loss of place of [n] before fricatives (for detailed discussion see 4.6 and 5.3.4), but with the prefix *con-* it is lexically given. Where a word-internal nasal vowel never alternates with an oral vowel + [n] sequence (i.e. *ensis*-type), considerations of economy recommend postulating the same sequence of an oral vowel and a placeless nasal, but in these words the placeless nasal is possibly lexical, unlike in the *mansum/frons*-type.

It must be noted here that the realisation of the nasal vowels may well have been subject to a great deal of variation. It is possible that for many speakers they were not nasal at all by Classical Latin times (for these speakers *dens* and *dēs* would be homophonous). It is also possible that in educated circles a spelling pronunciation (or some analogy-based norm in the case of the alternating instances) gained some currency in which [n] was pronounced before [s], perhaps with the retention of the long vowel. The details will, in all likelihood, remain in the dark, and the evidence is far from unequivocal.

2.2.2. The question of diphthongs

Virtually all discussions of the Classical Latin vowel inventory include a number of complex entities referred to as diphthongs traditionally. These are ⟨ae⟩ [aj] ([a͡i] etc.), ⟨oe⟩ [oj] ([o͡i]), ⟨au⟩ [aw] ([a͡u]), for some also ⟨ei⟩ [ej] ([e͡i]), ⟨eu⟩ [ew] ([e͡u]), ⟨ui⟩ [uj] ([u͡i]), even ⟨ou⟩ [ow] ([o͡u]). This practice goes back to a terminological and notational tradition in which a glide (in the Indo-European languages [w] and [j]) that is tautosyllabic with a preceding vowel is said to form a diphthong with it.

[57] The word-final spelling ⟨om⟩ (probably [õː]) does not occur in Classical Latin except as a deliberately archaising variant of ⟨um⟩ after [w] in some authors, e.g. Vergil (*aequom, divom* for *aequum* 'equal' ACCSING, *divum* 'divine' ACCSING). It is also possible that the ⟨uo⟩ spelling was merely an orthographic device to avoid ⟨uu⟩, as the grammarian Velius Longus surmises (see above, Keil 1855–78, vol. 8:58).

Such an approach is not only dated now but was already inconsistent before the appearance of modern phonological analysis not least because it introduced an unwarranted distinction between prevocalic and postvocalic glides.

A consistent phonological analysis can hardly support a view of the Classical Latin vowel system that postulates diphthongs in the strong sense of the word, i.e. complex entities that are functionally equivalent to "pure" vowels, or at least a significant subgroup of them, e.g. long vowels.[58] Functional equivalence involves two aspects: (i) the entity in question is phonotactically equivalent to a vowel, i.e. it only occupies the syllable nucleus; (ii) it is equivalent to a vowel in terms of alternation patterns and generally in terms of triggering and undergoing phonological rules.

Before I embark on the arguments for and against diphthongs, the status of the entities ⟨ei⟩ ⟨eu⟩ ⟨ui⟩ ⟨ou⟩ (not always listed as diphthongs in traditional descriptions) needs to be addressed. Of these four ⟨ou⟩ is found in the words *prout* 'accordingly', a compound, and *boum* 'ox' GENPLUR. The poetic corpus unequivocally and consistently indicates a disyllabic scansion for the latter in its more than 40 occurrences; *prout* has but a single occurrence in the poetic corpus (Hor. *Sat.* 2.6.67) and is a monosyllable there. Thus ⟨ou⟩ is at best a marginal candidate for diphthonghood.

The sequence ⟨ei⟩ is tautosyllabic in the word *deinde* and its shorter variant *dein* 'thereafter'.[59] This word, especially in the longer form, was fairly popular with the poets and the scansion unequivocally yields a single heavy syllable for *dein*(-) in spite of the transparent composition (*dē* + *inde* 'from here'; cf. 8.2.1.1 for *de*-prefixed forms). This lexical item would then be one instance of a diphthong written ⟨ei⟩. The other one is a compound based on this word, *deinceps* 'consecutively', which occurs only twice in the poetic corpus, and it scans as two heavy syllables on both occasions (Lucr. *De rerum nat.* 2.333, Hor. *Sat.* 2.8.79).

The tautosyllabic sequence ⟨eu⟩ occurs in the four strictly preconsonantal words discussed earlier (*seu* 'or', *neu* 'neither, and not', *ceu* 'as, like', (*e*)*heu* INTERJ). While *(e)heu* could easily be dismissed as an interjection, a cross-linguistically not always well-behaved type of word, the remaining three words are still there. In Greek names ⟨eu⟩ is monosyllabic by rule in poetry (e.g. *Theseus* is a spondee), but in Latin words, apart from the four above, this spelling represents a hiatus (e.g. *purpureus* 'purple' is four syllables).[60]

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[58] If one is inclined to say that "diphthong" is to be understood phonetically, i.e. a vocalic entity that involves movement along a trajectory in terms of articulation (and also in acoustic terms), then one also has to claim that entities like that at the beginning of *vafer* ([wa-]) 'cunning', the mirror image of the [aw] in *fauce* [fawke] 'throat' ABLSING, are also diphthongs. If a phonetic difference is found between [wa] and [aw], talking of a diphthong in one case may be warranted phonetically, but the phonological relevance of that difference does not follow.

[59] Note that here I am not talking about the archaising ⟨ei⟩ (=[i:]) or the ⟨ei⟩ involving geminate [j], as in ⟨eius⟩ 'his'.

[60] I see no compelling evidence that the word *neuter* includes the same phonological sequence as *neu, seu, ceu* and *heu*. Lehmann (2005:177) asserts that *neuter* is always disyllabic, but the data do not unequivocally imply this. In the entire poetic corpus, this word (and all its inflected forms) occurs 14 times altogether (Ov. *Am.* 1.14.10, *Metam.* 5.91, *Trist.* 2.114, Hor. *Sat.* 2.2.66, Sil. It. *Pun.*

The sequence ⟨ui⟩ [uj] occurs in three words altogether, *huic* 'to him' and *cui* 'to whom', and the interjection *hui*. Of these, only the first two are used by poets, and they are practically always monosyllabic.[61]

The arguments that can be adduced for a diphthongal interpretation are the following:

(i) The glides in postvocalic position may have been phonetically different from those in prevocalic position. The Classical Latin spelling of [aj] as ⟨ae⟩ instead of earlier ⟨ai⟩ indicates that the [j] in that position was replaced by a more open variant.[62]

(ii) The point in (i) is underscored by the diachronic development of pre- vs. postvocalic glides. Classical Latin prevocalic glides tend to appear in Romance languages as strengthened consonants (basically [w] > [v], [j] > [dʒ] /_V), while postvocalic glides tend to coalesce with the preceding vowel ([aj] > [ɛ], [oj] > [e], [aw] > [o], the first quite early in some dialects of Latin[63]).

(iii) Word-final [aj] is elided in poetry just like any vowel (including the nasal vowels) before a vowel-initial word, thus *puellae etiam* 'girls also' is scanned [puelletiã:]. The sequence [oj] does not occur word-finally; [au] only occurs in *hau*, which is not found before vowel-initial words; [ew], whose behaviour was discussed earlier (*neu, seu, ceu, heu, eheu*), is studiously avoided before vowel-initial words, and *cui*, the only remaining word with a final glide is absolutely never found before vowel-initial words in poetry. This may in theory indicate that these glide-final words patterned differently than words ending in [aj], though perhaps a more natural explanation would refer to the morphological peculiarity of [aj]-final words and the highly improbable

2.386, 14.109, Luc. *Phars.* 2.63, 2.231, 5.466, 5.794, Stat. *Theb.* 9.257, 10.408, Mart. *Epigr.* 3.38.6, 10.46.2). In each case, the first half of the word is the second half of a foot, which allows a heavy (i.e. [new.t-]) as well as a light–light (i.e. [ne.u.t-]) scansion. But the fact that the first syllable of *neuter* is never found in the first half of a foot, a position reserved for heavy syllables, makes it highly likely that it was not actually a heavy syllable, that is, the scansion [ne.u.t-] is implied more strongly by the metrical evidence, and thus *neuter* simply presents a case of hiatus just like *deus* or *purpureus*. This confirms Kent's (1932:50) description of *nĕŭter* as a trisyllabic word.

[61] In theory, some occurrences of *huic* could also be scanned as two light syllables. When in the second half of a foot in a hexameter and followed by a vowel-initial word, metrically both a single heavy syllable and two light syllables are possible (see also the previous note on *neuter*). There are not many of these ambiguous cases and, significantly, this word never occurs in the second half of the fifth foot of a hexameter, where two light syllables would be the norm. Interestingly, not a single instance of *cui* is found in prevocalic position in the entire poetic corpus, though in prose this constellation was not avoided.

[62] Safarewicz (1974), for instance, claims that this lowering of [j] is the criterial point at which [aj] and [oj] diachronically became monophonemic — a clear case of *non sequitur*.

[63] It is believed by several scholars that ⟨ae⟩ represented a monophthong generally rather than dialectally already in the 2nd century BC (see e.g. Deroy 1980 for the arguments, also Väänänen 1981, as opposed to e.g. Sturtevant 1916). The fullest and most recent treatment of the issue, which arrives at the opposite conclusion, and which I find much more convincing, is Adams (2007:78–88).

scenario of GENSING, DATSING and NOMPLUR *a*-stem nouns and adjectives being generally avoided in certain phonological positions.[64]

(iv) If one dismisses ⟨ei⟩, ⟨eu⟩, ⟨ou⟩ and ⟨ui⟩ as marginal, one can argue that postvocalic [w] can only follow [a], and [j] can only follow [a] and [o], thus their distribution is not independent of the preceding vowel. There is also no length contrast before postvocalic glides, unlike before postvocalic [r] or [l] (see *fortis* 'brave' vs. *fōrma* 'shape' above or *silva* 'forest' vs. *mīlvus* 'hawk', *ille* 'he/that' vs. *mīlle* 'thousand' etc.).

By contrast, the arguments in favour of a bisegmental interpretation are the following:[65]

(i) With respect to (i) under the diphthongal interpretation, while it may well be true that pre- and postvocalic glides were phonetically different in Classical Latin, this appears to have been a simple case of allophony with no obvious implications for a phonological analysis. A parallel that comes to mind is English [l], which has different pre- and postvocalic variants, the latter highly vocalic in many dialects, without this necessarily affecting the phonological status of [l] or that of the preceding vowel.

(ii) With respect to (ii) under the diphthongal interpretation, these diachronic facts are beyond doubt, but their relevance for an analysis of Classical Latin is not. The fact that certain phonic entities developed in certain ways over time simply indicates that the phonological system of Classical Latin transformed into another system. An analysis of Middle English [r], for instance, cannot take into consideration the fact that pre- and postvocalic [r] developed differently in many dialects of (Early) Modern English; that is simply another phonological system (or systems).

(iii) With respect to (iv) under the diphthongal interpretation, it is undoubtedly true that single postvocalic glides mostly occur after [a] (plus [j] after [o] in a few words, after [u] in three, after [e] in two, and [w] after [e] in four). This is, however, no reason to analyse any or all of the set ⟨ae⟩ ⟨au⟩ ⟨oe⟩ ⟨ui⟩ ⟨ei⟩ ⟨eu⟩ as phonological units in themselves. Segments with very restricted distribution are not unknown in many languages; Classical Latin [h] [f] or [g] are cases in point. Furthermore, geminate [j] occurs not only after [a] but after [e] and [u] as well: *maior* 'bigger', *eius* 'his', *cuius* 'whose'. The lack of a length contrast before postvocalic glides, including geminates, appears to be a fact, whose significance remains to be evaluated in view of the larger pattern (and vowel length in closed syllables is not always known for sure in Classical Latin). Note that if one analyses the entities in question as VC sequences rather than diphthongs, the fact that there are many instances of ⟨ae⟩ ⟨au⟩ as opposed to the fewer including ⟨oe⟩ and the very few

[64] As Sturtevant and Kent (1915) convincingly argue, elision in general (not just of [aj] but of all vowels) was a feature of prose as well as of the spoken language, at least within phrases.

[65] For an earlier elaboration see Cser (1999).

including ⟨eu⟩ ⟨ui⟩ ⟨ei⟩ simply ceases to be a problem: these are all licit environments for glides with different lexical incidences.[66] Also, [VjjV] sequences will not need to be treated as something inherently different from sequences including ⟨ae⟩ etc.[67]

(iv) The glide [w], like all consonants, is syllabified as onset whenever immediately followed by a vowel. This is clear also in the three cases involving ⟨au⟩:[68] *cavere* ~ *cautus* 'be on one's guard' INF ~ PASSPART, *lavare* ~ *lautus* 'wash' INF ~ PASSPART and *favere* ~ *fautus* 'favour' INF ~ PASSPART. If one looks beyond the misleading modern spelling conventions (⟨v⟩ vs. ⟨u⟩), these forms are a perfect parallel to *facere* ~ *factus* 'do' INF ~ PASSPART. The case of [j] is complicated by the fact that in simplex forms it is always a geminate intervocalically and hence immune to resyllabification, and it also never occurs stem-finally. But the [j] of *prae*, the only glide-final prefix, is clearly resyllabified before vowel-intial stems (e.g. *praeacutae* 'sharpened to a point' beginning with two light syllables in Ovid's *Metam.* 7.131; for details of prefixed forms see chapters 7 and 8). These facts certainly do not support a diphthongal analysis.

(v) The entities ⟨ae⟩ ⟨oe⟩ ⟨au⟩ ⟨eu⟩ ⟨ui⟩ ⟨ei⟩ do not take part in alternations that simple vowels often enter into: *pecten* ~ *pectinis* 'comb' NOMSING ~ GENSING, *amor* ~ *amōris* 'love' NOMSING ~ GENSING, *agere* ~ *āctus* 'do' INF ~ PASSPART, *dīcere* ~ *dictus* 'say' INF ~ PASSPART, *cinis* ~ *cineris* 'ash' NOMSING ~ GENSING (see chapter 5). The only alternations that involve two of them, ⟨ae⟩ and ⟨au⟩, are those encountered in prefixed forms, e.g. *caedere* 'cut' ~ *recīdere* 'cut back/up', *claudere* 'close' ~ *reclūdere* 'id.' For details of this alternation (called weakening), see 5.1.1; the immediately relevant points are the following. Given that short vowels tend to alternate in simplex vs. prefixed forms, e.g. *facere* 'do' ~ *reficere* 'do again' etc., one could, in theory, argue that the *caedere* ~ *recīdere* type alternation nicely parallels the *facere* ~ *reficere* type except that the former involves long vowels and the latter short vowels. But the fact is that long vowels absolutely never take part in this kind of alternation: *clāmāre* 'shout' ~ *reclāmāre* 'shout back', *cēdere* 'go' ~ *recēdere* 'withdraw' etc. What we see, then, is this: (i) short vowels alternate with short vowels; (ii) long vowels do not alternate at all; (iii) ⟨ae⟩ ⟨au⟩ alternate with long vowels and are thus unlike short vowels as well as unlike long vowels. Hence, even if one wishes to include prefix-induced stem-vowel alternations in the synchronic phonology of Classical Latin

[66] For some reason the issue of ⟨ui⟩ appears to have been especially vexing for a long time, see Husband (1910) and Sturtevant (1912), more recently Biville (1994) and Ballester (1996:86–7) and the literature cited in the last reference.

[67] See, for instance, Hoenigswald (1949a), where an extremely complicated phoneme subsystem is set up simply in order to avoid having to analyse the different occurrences of [j] as representing the same phonological entity.

[68] As said earlier, the four *eu*-words *neu, seu, ceu, (e)heu* do not occur before vowel-initial words, and neither does *hau*.

(which I explicitly do not, see 5.1.1), I see no way in which an argument for the diphthongal status of ⟨ae⟩ ⟨au⟩, let alone the other candidates, could rest on these alternations.[69]

(vi) For the last (and, to my mind, strongest) point we need to anticipate a detail of phonotactics to be discussed at length later. It is an established fact of Classical Latin that a syllable coda can support at most one sonorant; sequences like [lm] [rw] etc. are always heterosyllabic.[70] It is also abundantly clear from the data that ⟨ae⟩ ⟨au⟩ ⟨oe⟩ (and, for that matter, ⟨ui⟩ and ⟨eu⟩) are never followed by a tautosyllabic sonorant; in Classical Latin there are no forms like ***poentor*, ***caelsum*, ***laur*. This is evidence that the glide is itself the coda sonorant and hence not part of the nucleus.[71] The phonotactic structure involving the entities in question yields the following parallels (for details see chapter 3):

(6) Phonotactic parallels involving coda glides

caedit 'he cuts' ≈ *pandit* 'he extends' ([j.d] ≈ [n.d])
auctus 'increased' ≈ *emptus* 'taken' ([wk.t] ≈ [mp.t])
laus 'praise' ≈ *pars* 'part' ([ws] ≈ [rs])
faex 'dregs' ≈ *falx* 'scythe' ([jks] ≈ [lks])
poena 'punishment' ≈ *pulmo* 'lungs' ([j.n] ≈ [l.m]) etc.

This very strong generalisation is contradicted only by three items, *proin(de)* 'therefore', *dein(de)* 'thereafter' and *deinceps* 'consecutively', which are exceptional on several counts: (i) *dein(de)* and *deinceps* are the only words with a tautosyllabic sequence of [ej] apart from those with geminate [j]; (ii) they are the only instances of a tautosyllabic sequence of two sonorants ([jn]# or [jn.C]); (iii) *proin(de)* is the only instance of [oj] consistently spelled ⟨oi⟩ rather than ⟨oe⟩ (cf. *poena* 'punishment', *coetus* 'meeting' etc.).

The net result of the arguments is that there are no diphthongs in Classical Latin. The sequences ⟨ae⟩ ⟨au⟩ etc. are all VC sequences and do not represent phonological units.[72] Of the arguments in favour of a diphthongal interpretation (i,

[69] I note it here that the historical emergence of prefix-induced alternations unequivocally points to, and is crucially dependent on, [aj] etc. being VC sequences in that (Old Latin) period. Since this is, strictly speaking, irrelevant to the phonological analysis of Classical Latin, I do not rehearse the explanation here, but see Cser (1999:190–1) or the literature cited in 5.1.1.

[70] See chapter 3, also Cser (1999, 2012a) and Lehmann (2005).

[71] Another way of formulating the same observation is that a sonorant in Latin is always adjacent to at least one vowel, but no sonorant is ever found between ⟨ae⟩ ⟨oe⟩ ⟨au⟩ and a consonant (in this order), hence ⟨ae⟩ ⟨oe⟩ ⟨au⟩ are demonstrably not vowels.

[72] Zirin (1970) and in his wake Moralejo (1991) and Ballester (1996) appear to be saying something similar, but in fact they are not. While Zirin analyses the diphthongs as VC sequences, he analyses all long vowels in the same way. Ballester (1996:108) draws a parallel between diphthongs and long vowels similarly to Zirin, but in a slightly different way: "a long vowel is analysed as two adjacent short vocalic phonemes of the same timbre, with the second phoneme in a non-syllabic function, /ee/ → [e̯e]; two vowels of different timbre are, when adjacent, in

ii, iv) were shown to be irrelevant or at best of dubious value. The third argument is the only one that cannot be dismissed: word-final prevocalic elision in poetry indeed treats [aj] as if it were a vowel, whereas [ew] and the [uj] of *cui* are systematically avoided in the relevant position. Formally, however, this is not an intractable issue. Poetic elision may have operated on an asymmetrical basis: in what is informally called a two-vowel sequence, the left half had to be a structurally vocalic segment (i.e. a segment with no Consonant Place node), whereas the right half had to be a "prosodically vocalic" segment (i.e. a syllable nucleus) in order for elision to operate.

The other problem that remains is the set *proin(de)*, *dein(de)* and *deinceps*. But this is, I think, precious little in the light of the counterarguments and of the significant simplification of the entire vowel system: not only have we got rid of the entities previously thought to be part of the inventory, we have also got rid of fake problems like whether ⟨ui⟩ or ⟨eu⟩ or ⟨ou⟩ are part of the vowel system, or marginally part of it, or exceptions, and so on.

2.2.3. Hiatus

Two heterosyllabic vowels may be adjacent in simplex forms under certain restricted circumstances. Two constraints are very general and almost exceptionless: (i) the first vowel is short (and non-nasal); (ii) the second vowel alternates.[73] To the first constraint there are three sorts of exceptions: one involves the disyllabic forms of the verb *fieri* 'become, happen', e.g. *fiō* 1SING, *fiunt* 3PLUR, another the pronominal genitive suffix *-īus* (as in *illīus* 'his'),[74] the third a handful

principle syllabic, /eo/ → [eo], with three restrictions: 1) /ae au oe/ → [ae̯ au̯ oe̯], 2) /#iO/ → [#i̯O], and 3) /uO/ → [u̯O]" (translation mine). It is clear that Ballester's analysis boils down to a recapitulation of the traditional view, *viz.* that ⟨ae oe au⟩ are really just long vowels. While this analysis neatly predicts prevocalic shortness via "resyllabification", it runs into problems at least on two counts: (i) it is forced to assign two different representations to forms like *suit* 'he sewed' vs. *fuit* 'he was': to use Moralejo's notation, /suwit/ because of forms like *sūtūra* (i.e. /suw.tuw.ra/) 'stitches' vs. /fuit/ because of *futūra* (i.e. /fu.tuw.ra/); (ii) it renders the general syllable template inconsistent with respect to those forms in which a long vowel is followed by a sonorant, such as *fōrma*, because in these one is practically forced to assume two sonorants in coda position (/foo̯r.ma/), which is impossible in Latin. I note it here that Eichner (1992) also claims that the "diphthongs" are biphonemic, though he gives no arguments either for or against this position. Pulgram (1975:91) says "a diphthong, consisting of a vowel followed by a semi-vowel, like *ae* [ai̯], *au* [au̯], *oe* [oi̯], produces a closed syllable since it ends in a segment which, though phonetically related to a vowel, is functionally a consonant". This seems to imply the same analysis as that presented above, but Pulgram's own analysis of the syllabification of diphthongs (1975:155) blatantly contradicts what was said earlier, among others by denying the resyllabification of [j] and disregarding that of [w].

[73] The second restriction translates the traditional dictum that hiatus only occurs across morpheme boundaries. This is diachronically obviously true; as a synchronic statement I prefer the formulation given above for reasons explained in the introduction, *viz.* that reference to morphological structure is in many cases problematic.

[74] Godel (1953:93) argues that the *fiō*- and *illīus*-type exceptions can be explained away if we assume a phonological representation involving [ijjV]. While this could work for the second type, the problem with the proposal is that the absence of the same [j] is unexplained in the longer

of genitive-dative forms belonging to the fifth declension, most notably *diēī* 'day'.[75] Exceptions to the second restriction consist in a handful of words with [ie] and [ue] (*hiems* 'winter', *puer* 'boy', *puella* 'girl', *duellum* 'war').[76] As for the melodic content of the vowels in hiatus, restrictions only apply to the first vowel, the second being governed mostly by paradigmatic regularities. The first vowel can be [u i e]; of the remaining two vowels, [o] is never found on the left of a hiatus, [a] is found in *aeneus* [ae:neus] 'bronze' ADJ and *ait* 'he said'. Vowels separated by [h] show exactly the same regularities, with a single word, *trahere* 'drag' having [a] in hiatus, and the interjection *ēheu* a long vowel before ⟨h⟩.

To anticipate things that will be seen in more detail later, hiatus rules largely prevail in prefixed forms and compounds too. Vowels are shortened, as in *prŏavus* 'forefather' (vs. *prōmittere* 'send forth'), *dĕhinc* 'from here' vs. *dēsinere* 'cease'.[77] As the former example shows, melodic restrictions are somewhat looser in prefixed forms (cf. the vowel [o] in the first position). Note further that one prefix (*re-*) has a prevocalic allomorph with a hiatus-filler (*red-ire* 'go back' as opposed to *re-mittere* 'send back'); a prevocalic *d*-variant is also found with the prefix *pro-* (*prōdire* 'go forward'). A detailed discussion of prefixed forms and phonological processes at prefix–stem boundaries will be the topic of chapters 7 and 8.

forms of *fieri*. Safarewicz (1974:231 sqq.) generalises differently: he argues that the [i] of *fieri* is long when followed by a heavy syllable, which is true only if isolated forms are considered, since the SUBJ3SING form *fīat* can be a heavy–light sequence when followed by a vowel-initial word, cf Ovid's hexametre line (*Epistulae ex Ponto* 3.1.97): "numen adorandum est, non ut mihi fiat amicum" 'a deity is to be worshipped not in order that they be friendly to me'.

[75] The well-known rule is that in these genitives the [e] is short if preceded by a consonant, as in *rĕī* 'thing', but long if preceded by a vowel (in fact always [i]), as in *diēī* 'day'. This phenomenon may be thought of as a ban on the double application of the short-vowel-in-hiatus rule (*viz.* short [e] because of the following [i:], and then short [i] because of the following [e]). Note that Latin fifth-declension nouns apart from *res* and *dies* were few and far between, and in poetry the genitive-dative forms in *-iēī* were avoided in particular. The only such form used in poetry is *diei*, which Lucretius used without reservation (11 occurrences), but apart from his work only two occurrences are found in the entire poetic corpus (Verg. *Aen.* 9.156, Hor. *Sat.* 1.9.35). All the 13 occurrences of *diei* are hexameter-final. The other *-iēī* forms (*faciei* 'face', *speciei* 'appearance', *perniciei* 'danger', *scabiei* 'scab(ies)', *rabiei* 'ferocity', *aciei* 'edge') are used only in prose texts.

[76] In *abies* 'fir-tree' and two other words the vowel shows length alternation, but there is no morpheme boundary: *abiēs* NOMSING ~ *abietis* GENSING. More on this in 5.3.5.

[77] Vowels may also be deleted as in *cōgere* 'coerce' < *co* + *agere*, but this process is not synchronically systematic. The realisation of the word *quoad* 'to what/that extent' must have involved some sort of contraction or desyllabification, but the details will remain in the dark. Evidence shows avoidance of this word in poetry, its three occurrences in the poetic corpus (Lucr. *De rerum nat.* 5.1213, 1433 and Hor. *Sat.* 2.3.91) are all monosyllabic, and there is at least one epigraphic attestation written ⟨QUOD⟩ (=[kwo:d]).

2.3. The phonological representations

The representations I assume for the Classical Latin segmental inventory involve the features (in square brackets) and nodes (capitalised) in Tables 2 and 3.[78]

		l	r	j	w	m	n	b	d	g	p	t	k	f	s	h
place	Coronal	✓	✓				✓		✓			✓			✓	
	Dorsal			✓	✓					✓			✓			
	[high]			+	+					+			+			
	[back]			–	+					+			+			
	Labial				✓	✓		✓			✓			✓		
manner	[son]	+	+	+	+	+	+	–	–	–	–	–	–	–	–	–
	Laryngeal	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	[voice]	+	+	+	+	+	+	+	+	+	–	–	–	–	–	+
	[nas]	–	–	–	–	+	+	–	–	–	–	–	–	–	–	–
	[cont]	+	+	+	+	–	–	–	–	–	–	–	–	+	+	+
	[lat]	+	–				–		–			–			–	

Table 2: Distinctive features for Classical Latin consonants

		a	e	i	o	u
place	Dorsal	✓	✓	✓	✓	✓
	[high]	–	–	+	–	+
	[back]	+	–	–	+	+
	Labial				✓	✓

Table 3: Distinctive features for Classical Latin vowels

As regards manner, all vowels are redundantly [+son], [+voice], [+cont], and underlyingly [–nas]. On the surface, however, there is a contrast between [–nas] and [+nas] vowels, as was explained in 2.2.1. The featural composition of the glides [j w] is the same as that of [i] and [u], respectively. The difference between glides and vowels is encoded in their syllabic position rather than their subsegmental structure.[79] The difference between short and long vowels is encoded in the association between the root node and one vs. two skeletal nodes.

[78] The feature set is based on Hall (2006). While the system presented there is not without problems, as Hall duly points out, it embodies a fairly standard set of assumptions about feature inventories and certain aspects of subsegmental structure. I depart from Hall's system in the treatment of [j] as dorsal (see next note). I also depart from it in treating [l] as [+continuant], though this is immaterial for the argumentation presented here.

[79] While not uncontested, this assumption is fairly widespread among phonologists. For an excellent overview, counterarguments and an alternative proposal, see Padgett (2008). In contemporary phonology the idea seems to go back to the early 80's (Clements and Keyser 1983, Steriade 1984, Levin 1985) though, of course, the idea of the structural correspondence between

As regards place features, I follow the assumption embodied in recent work on feature geometry that the place features of consonants and those of vowels are organised under two different nodes. Generally speaking vowels and glides only have a V-place node, whereas consonants only have a C-place node.[80] Exceptions involve secondary place in consonants, which is found in Latin only in predictable environments (velarised [ɬ] in preconsonantal position and before back vowels, to be discussed in 4.9). The figures (3) through (6) illustrate the three basic configurations.

Having established the segmental inventory of Classical Latin and having provided the analytical framework for its segmental phonology I proceed to a discussion of consonantal phonotactics in chapter 3.

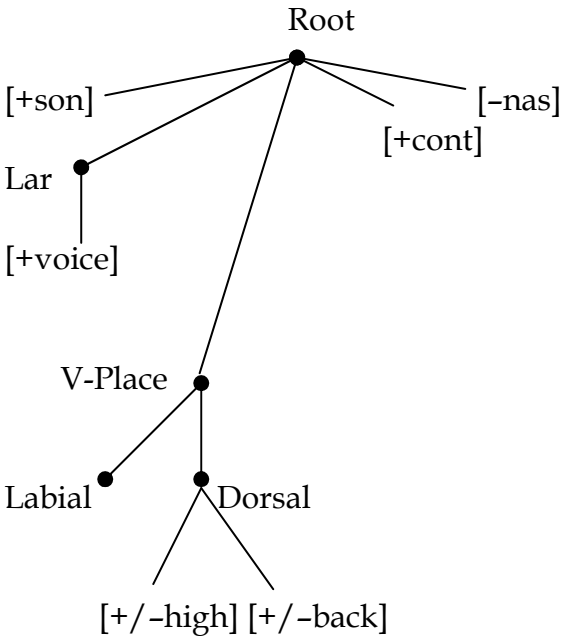

Figure 3: The structure of vowels and glides

high vowels and glides was central already to ablaut theory in nineteenth century Indo-European linguistics.

[80] Arguments for such a model of feature geometry come mainly from cross-linguistic patterns of interactions between vocalic and consonantal place features, the distribution and behaviour of secondary place features in consonant systems and various phonological processes affecting place. Clements and Hume (1995) give a detailed exposition of such a model, though in their geometry only the intermediate nodes differ in consonants and vowels, the trees converge at the bottom on the same features on the same tiers. This makes their model extremely powerful since the interaction between vocalic and consonantal place features can be described with reference to the features, which are identical, but lack of interaction between vocalic and consonantal place features can be described just as well, scil. as long as reference is made to the intermediate nodes, which are not identical. Morén (2003) elaborates a more restricted model based on a very similar assumption, *viz.* that a V-Place node is subsumed under the C-Place node and dominates the place features of vowels which are identical to the secondary place features of consonants. In Cser (2003) I worked out a substantially simpler geometrical model of subsegmental structure in which vowel and consonant place elements are on different tiers and the former can also function as secondary place elements in consonants.

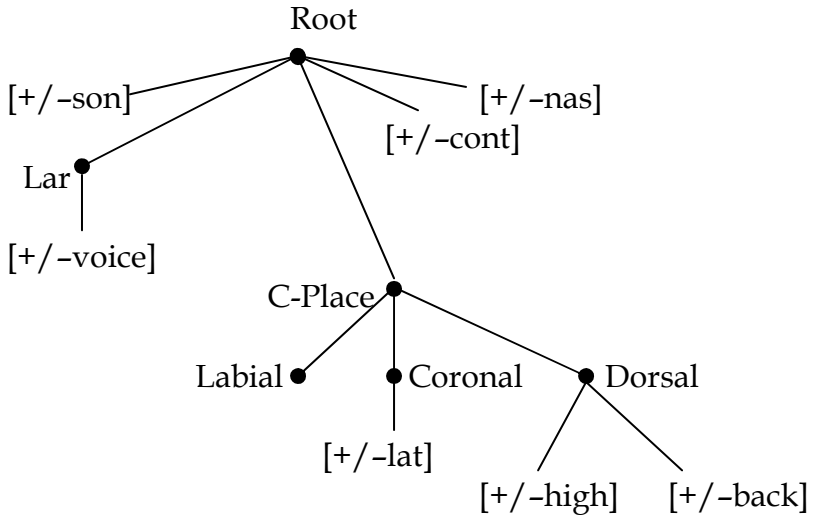

Figure 4: The structure of consonants

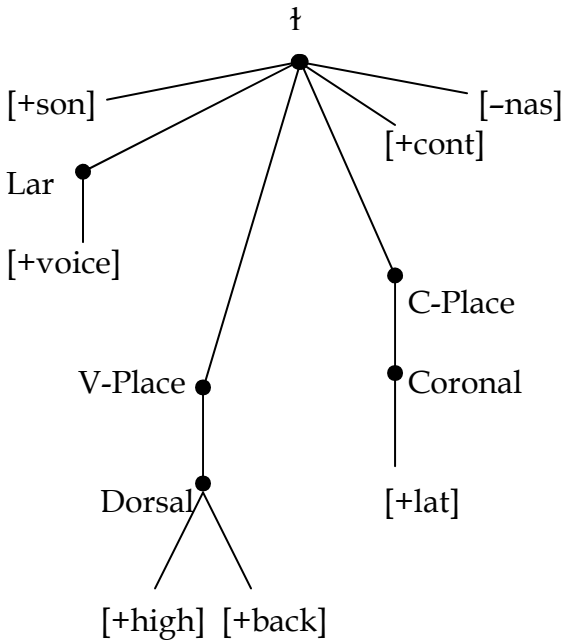

Figure 5: The structure of a consonant with secondary articulation (velarised [l])

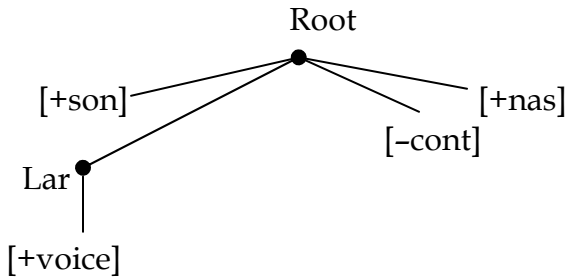

Figure 6: The structure of the placeless nasal

3. The phonotactics of simplex forms

3.1. Introductory remarks

In this chapter the consonantal phonotactics of simplex forms is presented in detail and analysed in a framework organised around sonority, a scalar property, and the syllable, a structural unit. The three focal points are (i) syllable structure, especially with respect to the non-nuclear constituents (onset and coda), where consonants are found, and the way the Sonority Sequencing Principle[81] manifests itself; (ii) the regularities governing the distribution of consonants in heterosyllabic clusters in simplex forms and the way the Syllable Contact Law[82] manifests itself; (iii) the interaction of sonority with place of articulation, to which I give a semi-formal expression in the Place Condition and its ramifications.

I assume what may be called a traditional constituent-based notion of the syllable (a hierarchical structure consisting of Onset, Nucleus and Coda, the latter subsumed under Rhyme), including the possibility of certain segments being extrasyllabic (e.g. [s] in *stare* 'stand'). In being syllable-based, my analysis departs from some current theories of phonotactic analysis which are based on the assumption that the phonological properties of a higher-than-segmental order, such as syllables, are epiphenomenal and can be derived from the low-level phonetic properties and syntagmatic relations of segments. On this latter approach, phonotactic regularities reflect articulatory and perceptual constraints and do not presuppose higher phonological constituents like the syllable.[83]

As I see it, there are at least three practical reasons for presenting an account of Latin phonotactics in the former, more strictly structural way, in which the syllable is the organising principle.

(i) The alternative — non-syllable-based — approach hinges crucially on a detailed phonetic investigation of the language in both its articulatory and its perceptual aspects. Needless to say this is unfeasible for a dead language like Latin. While it is true that a lot can be conjectured with certainty about the phonetic details of Latin as it was spoken in Antiquity, the fine-grained empirical evidence that has to be accumulated in order to build up a serious phonetically based argument (the precise nature of formant transitions, the timing relations of articulatory gestures, the amount of overlap etc.) is, and will be, lacking. Admittedly, however, a general typological knowledge of phonetic processes can bridge this gap to a certain extent (see Sen 2015 for several analyses of this kind).

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[81] Hooper (1976), Steriade (1982), Selkirk (1984), Clements (1990), Zec (2007), Parker (2011) amongst others.

[82] Hooper (1976), Murray and Vennemann (1983), Vennemann (1988), Zec (2007), Seo (2011).

[83] For arguments and exemplary analyses, see e.g. Steriade (1999), Côté (2000), Kiss (2007) or Hayes et al. (2004).

(ii) Much of what we know about the phonology, and specifically the phonotactics, of Latin comes from analyses of the vast amount of poetry produced in Antiquity. The formal nature of classical poetry has always been understood in terms of the syllable as a basic unit of prosody. If an analysis assumes the syllable as a phonological unit, it will, in some sense, be closer to the data as we have them,[84] and will also be more readily comparable to previous analyses.

(iii) A phonotactic analysis couched in terms of the syllable can be fairly easily reinterpreted in other frameworks, whereas the opposite is not necessarily true.

Sonority will be made use of here as a classificatory notion, a scalar property of segments. I assume without discussion, and in line with much of the relevant literature,[85] that (i) sonority is a property based on some physical characteristics of speech sounds, most probably intensity (loudness or the amount of acoustic energy), the openness of the vocal tract, formant structure (resonance) and voicing; (ii) there exists a scale along which segments or segment types can be arranged as a function of their particular sonority value. While there is no *a priori* reason for the sonority scale to be linear, i.e. non-branching, I will work with a traditional linear scale, *viz.* Vowels >> Glides >> Liquids >> Nasals >> Fricatives >> Stops. What will be examined here is to what extent such a scale is helpful in making generalisations about syllable structure and the distribution of consonants in Classical Latin.

The role of sonority will be taken up again at two points. In section 6.5 the sonority of vowels is taken under scrutiny in the context of its role in conditioning allomorphy. In chapter 8 prefixed forms are discussed and the phonological processes affecting consonants are analysed. It is shown there that sonority plays a crucial role in when and how these processes operate; it is also shown that the interaction between sonority and place of articulation follows the same general pattern as in simplex forms, albeit differently in certain respects.

In what follows, after a brief excursus on the basics of metrical evidence, I first give a descriptive taxonomy of the consonant clusters attested in Latin; then I extract the observable patterns and relate them to syllable structure, arriving at the general syllable template, which is organised around the Sonority Sequencing Principle. The details of the operation of the Syllable Contact Law and the Place Condition are then presented.

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[84] Naturally I do not claim that syllables as such are a given in the data. What I mean is that the data *as we have them* include strict metrical patterns that impinge on some native intuition concerning the structure of the language, which can be conveniently described as a distinction between light and heavy syllables, but the same data do not include a lot of phonetic detail, which would be self-explanatory for a living language.

[85] See Parker (2002, 2003, 2008 and 2011), Clements (2009), Lodge (2009: 77–79), Clements and Hume (1995), Blevins (1995: 210–212), Cser (2003: 28–43), Jany et al. (2007), Szigetvári (2008). In Parker (2011) and (2008) a very detailed scale is given with flaps higher, and trills lower, in rank than laterals (see also Parker 2002:255–257). It will be seen later that there may be some reason to assume that in Latin [r] had higher sonority than [l] (as Steriade 1982 also claims), although it is uncertain whether it was a flap or a trill. Another aspect of the scale in Parker's works is the ranking of voiced obstruents above voiceless ones in general, thus the ranking of voiced stops higher than voiceless fricatives, though the author admits that "the ranking of voiced stops over voiceless fricatives is harder to justify than most aspects of this hierarchy" (Parker 2011:1179). Here I assume that stops are generally less sonorous than fricatives.

3.1.1. Excursus on metrical evidence

A brief note on metrical evidence is in order here, since much of this chapter is concerned with syllable structure and syllabification, for which evidence comes mainly from scansion. The poetic metres used in the Classical Latin period have been researched for centuries and are well known at the empirical level (see e.g. Raven 1965, Halporn, Ostwald, and Rosenmeyer 1963 or Boldrini 2004; see further Allen 1973), and they have also been the object of theoretical inquiry (e.g. Fabb and Halle 2008). Everything I presuppose here in terms of metrical interpretation can be found even in introductory textbooks; the outlines are the following.

Latin metre is based on systematic alternations of heavy (-V:., -VC(C)., -V:C(C).) and light (-V.) syllables. There were many patterns in use in the Classical period, all modelled on Greek precursors (for which see West 1982 and Devine and Stephens 1994). The metrical patterns reveal unambiguously in most cases which syllables are heavy and which are light (the exceptions include e.g. line-final syllables, which are not strictly delimited by the metre). In the overwhelming majority of cases the length of vowels is known too on independent grounds. Thus in many configurations the syllabic affiliation of consonants can be detected on the basis of the relation between vowel length and syllable weight.

For example, the last foot in a hexametre always consists of two syllables, the first of which is heavy, the second indeterminate. If such a foot includes the word *pŏntēs* 'bridges', the only possible syllabification of the cluster is [n.t] with a syllable boundary between the two consonants, because the first syllable of the word is heavy, although its vowel is short, thus the [n] has to be its coda. If a word like *ĭmpĕtrō* 'I achieve' is found to constitute a heavy–light–heavy sequence, this shows that the cluster [m.p] is heterosyllabic but [.tr] is a complex onset to the third syllable because the second syllable of the word, being metrically light, cannot have a coda.

3.2. The presentation of the consonant clusters

In the following tables all attested consonant clusters are shown and exemplified, arranged according to the three basic positions, i.e. word-initial, medial and word-final. For each cluster I indicate whether the list of examples is exhaustive or not. If the list is not marked as exhaustive, it is to be understood that there are at least five derivationally unrelated lexemes containing the cluster. In the last column of the tables I indicate if a certain cluster also occurs in either of the other two positions. Note that clusters occurring at prefix–stem boundaries are not included in the list that follows; the discussion of such forms is found in chapter 8.

cluster type			example + gloss	exh	remark
1.1.	**#CC-**				
	1.1.1.	**s+stop**			
		[sp]	*spirare* 'breathe', *spargere* 'strew', *spondere* 'promise'		Medially 3.1.1
		[st]	*stare* 'stand', *studium* 'assiduity', *stipendium* 'tribute'		Medially 3.1.1 Finally 2.1.1
		[sk]	*scire* 'know', *scalpellum* 'knife', *scelus* 'sin'		Medially 3.1.3
	1.1.2.	**obs+son**			
		[pr]	*primus* 'first', *premere* 'press', *prurire* 'stick out'		Medially 3.1.3
		[br]	*brac(c)hium* 'arm', *bruma* 'winter solstice', *brevis* 'short'		Medially 3.1.3
		[fr]	*frater* 'brother', *frigidus* 'chilling', *fructus* 'fruit'		Medially 3.1.3
		[tr]	*trahere* 'pull', *tristis* 'sad', *truncus* 'mutilated'		Medially 3.1.3
		[dr]	*(Drusus)*	yes	only in one proper name; Medially 3.1.3
		[kr]	*crines* 'hair', *cruor* 'blood', *crescere* 'grow'		Medially 3.1.3
		[gr]	*gravis* 'heavy', *grex* 'flock', *gradus* 'step'		Medially 3.1.3
		[pl]	*plenus* 'full', *plus* 'more', *planta* 'sprout'		Medially 3.1.3
		[bl]	*blandus* 'cajoling', *blatta* 'cockroach', *blaterare* 'babble'	yes	Medially 3.1.3
		[fl]	*flamma* 'flame', *fluere* 'flow', *flos* 'flower'		
		[kl]	*claudere* 'close', *cliens* 'personal dependant', *clemens* 'gentle'		Medially 3.1.3
		[gl]	*gladius* 'sword', *globus* 'sphere', *gliscere* 'swell'		Medially 3.1.3
		[kw]	*quantus* 'how large', *querela* 'altercation', *quies* 'repose'		Medially 3.1.3
		[sw]	*suadere* 'persuade', *suescere* 'be/get accustomed', *suavis* 'sweet'	yes	
1.2.	**#CCC-**				
		[spr]	*spretus* 'disdained'	yes	Medially 3.2.1
		[str]	*stridor* 'hissing noise'		Medially 3.2.1
		[skr]	*scribere* 'write'		
		[spl]	*splendor* 'shining'	yes	
		[skw]	*squalor* 'dirt', *squama* 'scales (of fish)', *squilla* 'lobster'	yes	Medially 3.2.1

Table 4: Initial clusters

cluster type		example + gloss	exh	remark
2.1.	**-CC#**			
	2.1.1.	**obs+obs**		
		[ps]	*ops* ‘help’, *trabs* ‘beam’, *plebs* ‘people’		Medially 3.1.1 *s* always NOMSING suffix
		[ks]	*rex* ‘king’, *grex* ‘herd’, *audax* ‘daring’		Medially 3.1.1 *s* always NOMSING suffix
		[st]	*est* ‘is’, *ēst* ‘eats’, *ast* ‘but’, *post* ‘after’	yes	Initially 1.1.1 Medially 3.1.1
	2.1.2.	**son+obs**		
		[nt]	*ferunt* ‘they carry’	(yes)	Medially 3.1.5 = 3PLUR suffix
		[lt]	*vult* ‘he wants’	yes	Medially 3.1.5 *t* = 3SING suffix
		[rt]	*fert* ‘he carries’	yes	Medially 3.1.5 *t* = 3SING suffix
		[wt]	*aut* ‘or’	yes	Medially 3.1.5
		[wd]	*haud* ‘not’	yes	Medially 3.1.4
		[ŋk]	*hinc* ‘from here’		Medially 3.1.5 only [k]-final deictics
		[jk]	*istaec* ‘this’, *haec* ‘this’, *illaec* ‘those’, *huic* ‘to this’	yes	Medially 3.1.5 only [k]-final deictics
		[ms]	(*hiems* = *hiemps* ‘winter’)	yes	*s* = NOMSING suffix; the only non-heteroclitic *m*-stem noun, also frequently *hiemps*
		[ls]	*puls* ‘porridge’, *uls* ‘beyond’	yes	Medially 3.1.5
		[rs]	*pars* ‘part’, *misericors* ‘merciful’, *iners* ‘incompetent’		Medially 3.1.5 *s* always NOMSING suffix; all *t*- or *d*-stem nouns/adjectives
		[js]	*aes* ‘bronze’, *praes* ‘guarantor’	yes	Medially 3.1.5
		[ws]	*laus* ‘praise’, *fraus* ‘deceit’	yes	Medially 3.1.5 *s* = NOMSING suffix; both *d*-stem nouns
	2.1.3.	**son+son**		
		[jn]	*dein* ‘thereafter’, *proin* ‘therefore’	yes	Medially 3.1.2

Table 5: Final clusters

cluster type		example + gloss	exh	remark
2.2.	**-CCC#** (*s* always NOMSING suffix)			
	[mps]	*siremps* 'same', *hiemps* (=*hiems*) 'winter'	yes	Medially 3.2.2
	[rps]	*urbs* 'city', *stirps* 'root'	yes	Medially 3.2.2
	[jps]	(*saeps* 'enclosure' by-form of more frequent *saepes*)	yes	Medially 3.2.2
	[ŋks]	*coniunx* 'spouse', *lanx* 'dish', *quincunx* '5/12', *septunx* '7/12', *deunx* '11/12'	yes	Medially 3.2.2
	[rks]	*arx* 'fortress', *merx* 'price'	yes	
	[lks]	*falx* 'scythe', $calx_1$'heel', $calx_2$ 'lime'	yes	
	[jks]	*faex* 'dregs'	yes	cf. plural *faeces* in 3.1.5
	[wks]	*faux* 'throat'	yes	Medially 3.2.2

Table 5 continued

cluster type			example + gloss	exh	remark
3.1.	**-CC-**				
	3.1.1.	**obs+obs**			
		[pt]	*aptus* 'fit(ted)', *optare* 'choose', *scriptus* 'written'		
		[kt]	*actus* 'done', *octo* 'eight'		
		[ps]	*ipse* 'himself', *lapsus* 'fallen'		Finally 2.1.1
		[ks]	*vexi* 'I carried', *fluxus* 'flown'		Finally 2.1.1
		[sp]	*hospes* 'host', *crispus* 'having curled hair'		Initially 1.1.1
		[st]	*hostis* 'enemy', *crista* 'crest', *honestus* 'respectable'		Finally 2.1.1 Initially 1.1.1
		[sk]	*crescere* 'grow', *fiscus* 'basket', *musca* 'fly'		Initially 1.1.1
	3.1.2.	**son+son**			
		[mn]	*amnis* 'river', *somnus* 'dream', *temnere* 'despise'		
		[ŋn]	*agnus* 'lamb', *dignus* 'worthy', *pugna* 'battle'		
		[lm]	*ulmus* 'elm-tree', *almus* 'nourishing', *pulmo* 'lung(s)'		
		[rm]	*forma* 'shape', *sermo* 'speech', *arma* 'arms'		
		[ln]	*ulna* 'elbow', *vulnus* 'wound', *alnus* 'alder'		
		[rn]	*cernere* 'see', *lucerna* 'oil-lamp', *aeternus* 'enduring'		
		[lw]	*silva* 'forest', *alvus* 'belly', *solvere* 'solve'		
		[rw]	*parvus* 'small', *larva* 'mask', *servus* 'slave'		
		[jm]	*aemulus* 'rival', *caementum* 'quarry-stone'	yes	
		[wn]	*Faunus* Proper name	yes	
		[jn]	*poena* 'punishment', *paene* 'almost', *moenia* 'walls'		Finally 2.1.3
		[wl]	*aula* 'court', *paulum* 'small'	yes	
		[jl]	*caelum* 'sky', *caelebs* 'unmarried', *proelium* 'battle', *paelex* 'concubine'	yes	
		[wr]	*aura* 'air', *aurum* 'gold', *laurus* 'laurel', *taurus* 'bull'	yes	
		[jr]	*quaerere* 'ask, search', *maeror* 'grief', *aereus* 'bronze'		
		[jw]	*aevum* 'age', *saevus* 'raging', *laevus* 'left', *scaevus* 'left', *naevus* 'birth-mark'	yes	

Table 6: Medial clusters

cluster type		example + gloss	exh	remark
3.1.3.	**obs+son**			
	[pr]	*capra* 'she-goat'		Initially 1.1.2
	[br]	*febris* 'fever'		Initially 1.1.2
	[fr]	*afra* 'black', *vafra* 'cunning', *infra* 'below', *mufrius* (term of abuse, hapax)	yes	Initially 1.1.2
	[tr]	*patres* 'fathers', *impetrare* 'achieve'		Initially 1.1.2
	[dr]	*dodrans* '3/4', *quadratus* 'rectangular'	yes	Initially 1.1.2
	[kr]	*acris* 'sharp'		Initially 1.1.2
	[gr]	*agrum* 'field'		Initially 1.1.2
	[pl]	*poples* 'knee'		Initially 1.1.2
	[bl]	*publicus* 'public', *scriblita* 'cake', *tablinum* 'balcony'	yes	Initially 1.1.2
	[kl]	*periclitari* 'try'	yes	Initially 1.1.2
	[gl]	*figlina* 'pottery', *iuglans* 'walnut', *fraglare* 'emit a smell' (variant *fragrare*)	yes	Initially 1.1.2
	[kw]	*sequi* 'follow'		Initially 1.1.2
	[gm]	*agmen* 'train'		only with deriv. suffix *-men(tum)*
3.1.4.	**son+voiced obs**			
	[mb]	*cumbere* 'lie'		
	[nd]	*quando* 'when'		
	[ŋg]	*pungere* 'puch'		
	[lb]	*albus* 'white', *balbus* 'stutterer', *galbeus* 'armbend'	yes	
	[rb]	*verbum* 'word'		
	[ld]	*valde* 'very'	yes	
	[rd]	*tardus* 'slow'		
	[lg]	*vulgus* 'crowd'		
	[rg]	*mergere* 'sink', *largus* 'abundant', *ergo* 'on account of'		
	[jb]	*glaeba* 'clog'	yes	
	[wd]	*audire* 'hear', *claudere* 'close'		Finally 2.1.2
	[jd]	*caedere* 'cut'		
	[wg]	*augere* 'grow', *augur* 'bird-watching oracle'	yes	
	[jg]	*aeger* 'ill'	yes	

Table 6 continued

cluster type		example + gloss	exh	remark
3.1.5.	**son + voiceless obs**			
	[mp]	*rumpere* 'break'		
	[nt]	*ante* 'before'		Finally 2.1.2
	[ŋk]	*mancus* 'lacking'		Finally 2.1.2
	[lp]	*culpa* 'sin'		
	[rp]	*carpere* 'pick'		
	[lt]	*vultus* 'face'		Finally 2.1.2
	[rt]	*parte* 'part'		Finally 2.1.2
	[lk]	*sulcus* 'furrow'		
	[rk]	*parcere* 'mercy'		
	[ls]	*pulsus* 'beaten'		Finally 2.1.2
	[rs]	*arsit* 'burned'		Finally 2.1.2
	[wp]	*pauper* 'poor'	yes	
	[jp]	*saepe* 'often', *coepi* 'I began'	yes	
	[wt]	*autem* 'however'		Finally 2.1.2
	[jt]	*taeter* 'ugly'		
	[wk]	*paucus* 'few'		
	[jk]	*saeculum* 'age', *caecus* 'blind', *faeces* 'dregs'	yes	Finally 2.1.2
	[ws]	*causa* 'cause'		Finally 2.1.2
	[js]	*caesus* 'cut'		Finally 2.1.2

Table 6 continued

cluster type			example + gloss	exh	remark
3.2.	**-CCC-**				
	3.2.1	**sonorant-final**			
		[spr]	*aspritudo* 'harshness'	yes	Initially 1.2
		[lpr]	*scalprum* 'chisel'	yes	
		[mbr]	*umbra* 'shadow'		
		[mpr]	(*Sempronius*)	yes	only in one proper name
		[ptr]	*receptrix* 'who receives'		almost all with deriv. suffix *-trix*
		[ktr]	*victrix* 'winner'		almost all with deriv. suffix *-trix*
		[str]	*castrum* 'camp', *monstrum* 'omen'		Initially 1.2
		[ntr]	*antrum* 'cave'		
		[ltr]	*ultro* 'by own will'		
		[jtr]	*taetra* 'ugly', *caetra* 'shield'	yes	
		[wtr]	*fautrix* 'who favours'	yes	deriv. suffix *-trix*
		[ŋkr]	*cancri* 'crabs'	yes	
		[lkr]	*sepulcrum* 'grave', *pulcrum* 'beautiful', *fulcrum* 'post of couch'		
		[jgr]	*aegra* 'ill'	yes	
		[mpl]	*amplus* 'large', *templum* 'temple', *exemplum* 'example'		
		[ŋkl]	*vinclum* 'bond'	yes	*vinculum* more frequent
		[ŋkw]	*quinque* 'five'		
		[rkw]	*torquere* 'turn'	yes	
		[jkw]	*aequus* 'flat'	yes	
		[skw]	*usque* 'until', *usquam* 'somewhere', *sesqui-* '1½'	yes	Initially 1.2
		[ŋgw]	*inguen* 'loin', *lingua* 'tongue'		
		[wgm]	*augmen(tum)* 'increase'	yes	

Table 6 continued

cluster type		example + gloss	exh	remark
3.2.2	**sonorant + 2 obstruents**			
	[mpt]	*emptus* 'taken'		
	[ŋkt]	*cinctus* 'girdled'		
	[mps]	*sumpsi* 'I took'		Finally 2.2
	[ŋks]	*iunxi* 'I joined'		Finally 2.2
	[rpt]	*carptus* 'picked', *absorptus* 'swallowed'	yes	
	[lpt]	*sculptus* 'shaped', *scalptus* 'cut'	yes	
	[jpt]	*saeptus* 'hedged', *coeptus* 'begun'	yes	
	[rkt]	*herctum* 'inheritance', *ferctum* 'cookie'	yes	
	[lkt]	*mulctus* 'milked'	yes	
	[wkt]	*auctus* 'increased'	yes	
	[jst]	*maestus* 'grieving', *quaestus* 'asked', *aestus* 'summer', *caestus* 'boxing gloves'	yes	
	[wst]	*faustus* 'favourable', *haustus* 'swallowed', *Auster* 'southerly wind'	yes	
	[wsk]	*auscultare* 'listen'	yes	
	[jsp]	*caespes* 'lawn'	yes	
	[wsp]	*auspicium* 'divination'	yes	
	[lps]	*sculpsi* 'I shaped', *scalpsi* 'I cut'	yes	
	[jps]	*saepsi* 'I hedged'	yes	Finally 2.2
	[rps]	*carpsi* 'I picked', *serpsi* 'I crawled', *absorpsi* 'swallowed'	yes	Finally 2.2
	[wks]	*auxi* 'I increased', *auxilium* 'help', *pauxillum* 'little'	yes	Finally 2.2
3.2.3	**three obstruents**			
	[pst]	*depstum* 'pastry', *subrepsti* 'you crawled'	yes	*subrepsti* short PERF[86]
	[kst]	*dexter* 'right', *duxti* 'you led'		*duxti* short PERF

Table 6 continued

[86] On short perfective verb forms of this kind see 6.2.3.2.2.

cluster type			example + gloss	exh	remark
3.3.	**-CCCC-**				
	3.3.1.	**including two sonorants**			
		[lktr]	*mulctra* 'milking bucket'	yes	
		[wstr]	*plaustrum* 'waggon', *Austrum* 'southerly wind', *claustrum* 'latch'	yes	
		[mptr]	*contemptrix* 'who contempts'		all with deriv. suffix *-trix*; preclassical *amptruare* 'dance'
		[ŋktr]	*coniunctrix* 'who joins', *expunctrix* 'who deletes'	yes	both words postclassical (St Augustine), with deriv. suffix *-trix*
	3.3.2.	**including one sonorant**			
		[kstr]	*extra* 'outside', *textrix* 'seamstress', *dextra* 'right', *commixtrix* 'who mixes'	yes	postclassical *commixtrix* (St Augustine)
		[mpst]	*consumpsti* 'you consumed'	yes	short PERF
		[ŋkst]	*extinxti* 'you extinguished', *depinxti* 'you painted'	yes	preclassical *adiunxti* 'you joined', *intinxti* 'you dipped', *emunxti* 'you blew (nose)'; all short PERF-s

Table 6 continued

3.3. The analysis of the consonant clusters

The picture that first emerges does not seem to offer intuitively obvious generalisations. The phonological classes apparently cross-classify elementary distributional categories, as is shown in Figure 7.

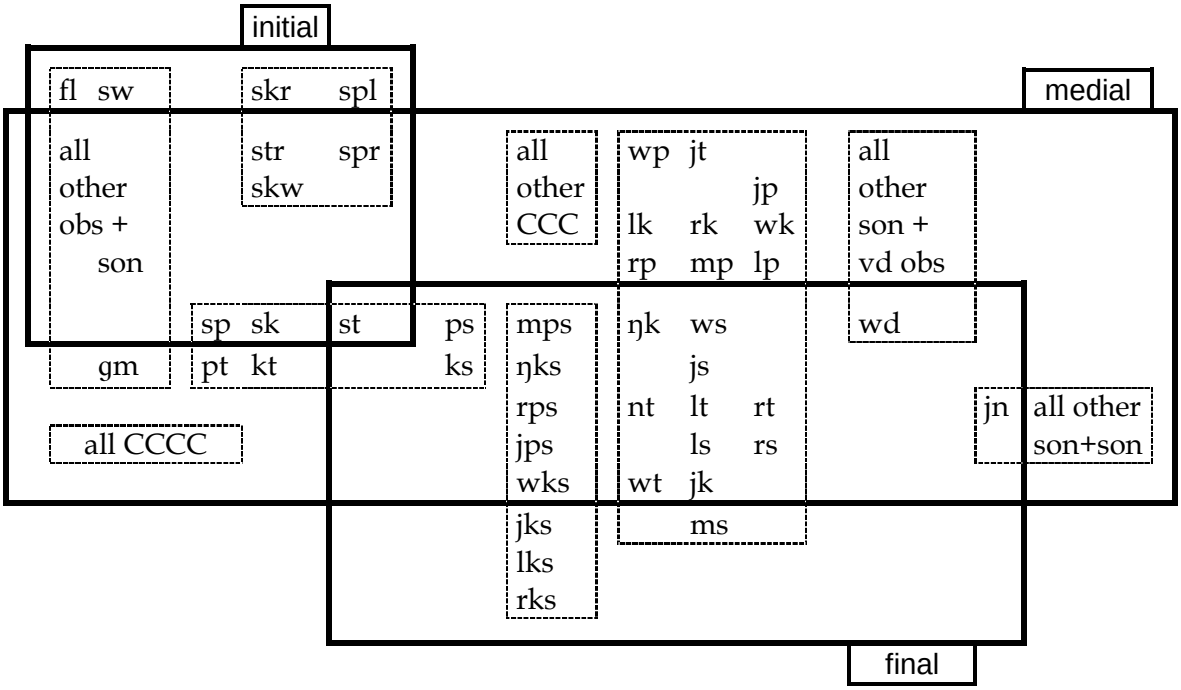

Figure 7: First classification of clusters

What we see is the following.

- Obstruent + sonorant clusters belong to the intersection of initial and medial clusters except for [fl] and [sw], which are only found initially, and for [gm], which is only found medially.
- CCC clusters belong to the exclusively medial class if they neither begin nor end in [s] (in the chart this is the "all other CCC" field); [s]-initial clusters are found initially, some of them also medially; [s]-final clusters are found finally, some of them also medially.
- Of the two-obstruent clusters, [s]-initials are found both initially and medially, [s]-finals are found both finally and medially. Two-stop clusters are only found medially. The only cluster in the language that occurs initially, finally as well as medially is [st].
- Sonorant + voiceless obstruent clusters are evenly distributed between the medial and the medial–final classes with the marginal [ms] of *hiems/hiemps* spilling over into the final class.
- Sonorant + voiced obstruent clusters consistently belong to the medial class except for [wd], which marginally occurs in final position.

- Sonorant + sonorant clusters consistently belong to the medial class except for [jn], which marginally occurs in final position.
- All CCCC clusters are medial.

The first step in a more thorough analysis of the consonant clusters will be the assignment of syllable boundaries. The initial heuristic that I am going to use relies on the identification of syllable onsets word-internally. Since it is well known that word edges often show irregular phonotactic effects,[87] word-initial or word-final position cannot be taken as a safe indication of syllabic constituency. Word-internally, however, onsets can be identified when they follow a short vowel since the weight of the preceding syllable is evidenced by poetry.[88] Thus, if one contrasts the two words in (7) with vowel length and usual scansion indicated, one sees that two clusters that occur both initially and medially may behave differently:

(7) Scansion of *patres* vs. *hostes*

	pătrēs	*hŏstēs*
scansion:	∪ —	— —

On the basis of metrical evidence, [tr] thus turns out to be an onset cluster, whereas [st] turns out to be — at least internally — a heterosyllabic cluster, since the metrical difference between the two words can only be explained with the syllabification *pă.trēs* vs. *hŏs.tēs*. More generally, the following points have long been beyond dispute:[89]

- CCC (and *a fortiori* CCCC) clusters are always heterosyllabic medially (though where the syllable boundary falls may be a matter of debate).
- The so-called stop + liquid clusters are overwhelmingly tautosyllabic.[90]

[87] For a classic discussion see Piggot (1999) or Lowenstamm (1981), more recently Gussmann (2002:91 sqq.), specifically for Latin e.g. Pulgram (1975:137) but note that even such a well-informed discussion as Devine and Stephens (1977) misses this point (p. 125) .

[88] I will not be concerned with syllable weight as a phonological category in general; I will simply assume the well-documented binary disctinction between heavy and light syllables, which distinction manifests itself in poetic metrics, stress assignment as well as a couple of minor morphophonological phenomena (diachronic rather than synchronic). The standard reference for the general phonological and phonetic aspects of syllable weight is now Gordon (2006) as well as two shorter discussions by the same author (Gordon 2002 and 2004). For a survey of earlier literature, specifically with an eye to Latin, see Zirin (1970:42–80). I will also not be concerned with the metrical phonology of Latin as such (see Mester 1994 and Parsons 1999).

[89] Note that these points are valid for simplex forms only. The basic patterns of syllable division presented here are corroborated by ancient inscriptions too, a kind of evidence I will not present in detail, but see Dennison (1906).

[90] The qualification *overwhelmingly* refers to token-level variation in poetic practice rather than type-level differences, though it is true that clusters including a voiced stop are more prone to heterosyllabic scansion than clusters including a voiceless stop. The history of this variation has been well researched and the consensus is that the heterosyllabic scansion of stop+liquid clusters was introduced in the wake of Greek models (for a good summary see Corte 1984–91 s.v. *Muta cum liquida*; in a different context, see Hoenigswald 1992, who argues that morphological structure played a part in the syllabification of such clusters at least in early Latin; Sen 2006 and

- The cluster [kw] is always tautosyllabic (but is regarded as a single consonant by many Latinists, see 2.1.2).
- All other CC clusters are heterosyllabic.

This yields unequivocal results for most CC clusters. For CCC clusters the rule of thumb I apply here will be that, starting from the right, the longest sequence of consonants (i.e. either one or two consonants) that is evidenced to be tautosyllabic in the environment V_V will be assigned as onset to the following syllable.

In terms of the taxonomy set out in 3.2 above, the evidence shows the following in detail. The numbers in this list all refer to sections of Table 6.

- In the two-obstruent clusters in 3.1.1 the syllable boundary falls between the two consonants, thus [Vp.tV], [Vk.tV], [Vp.sV], [Vk.sV], [Vs.pV], [Vs.tV], [Vs.kV]. The fact that [sp st sk] also occur initially does not seem to affect their medial syllabification.
- In the two-sonorant clusters in 3.1.2 the syllable boundary again falls between the two consonants, thus [Vm.nV], [Vŋ.nV], [Vl.mV], [Vr.mV], [Vl.nV], [Vr.nV], [Vl.wV], [Vr.wV], [Vj.mV], [Vw.nV], [Vj.nV], [Vw.lV], [Vj.lV], [Vw.rV], [Vj.rV], [Vj.wV].
- In the obstruent+sonorant clusters in 3.1.3 the syllable boundary is usually before the cluster, thus [V.prV], [V.brV] or [Vb.rV], [V.trV], [V.drV] or [Vd.rV],[91] [V.krV], [V.grV], [V.frV] or [Vf.rV],[92] [V.plV], [V.blV], [V.klV],[93]

2015:87–120 presents an excellent summary, with a focus on Archaic Latin and historical development). See below for further discussion.

[91] The evidence for the syllabification of [dr] is, in fact, controversial. This cluster was exceedingly rare in simplex forms, the diachronic reason being the devoicing of [d] to [t] before [r] (i.e. [dr] > [tr], see Weiss 2009:163). Actually, the only Latin words containing medial [dr] attested in poetry are derivatives and compounds based on *quădr-* (e.g. *quadratus* 'divided into four parts', *quadrupes* 'four-legged', *quadriiuga* 'drawn by four horses'). Such words occur 127 times in the entire poetic corpus. Out of the 127, 113 (= 89%) scan with a heavy first syllable, indicating a heterosyllabic cluster (e.g. Cat. 58.4, Verg. *Aen.* 3.541 vs. Verg. *Aen*. 8.642, Verg. *Ecl.* 5.24, Juv. *Sat.* 14.326). This may result from the fact that apart from the *quadr-* family the vast majority of words including [dr] are either Greek names/loans (e.g. *Hadria, cedrus* 'cedar', *hydrus* 'water serpent'), where heterosyllabicity of any stop+liquid cluster is the (borrowed) norm, or prefixed forms (e.g. *adripere* 'grasp'), where heterosyllabicity is a phonological rule of Latin (see chapters 7 and 8). The rarity of [dr] in simplex forms, its absence from word-initial position coupled with the pull of the Greek pattern and the syllabification of prefixed forms apparently led to a preference for a heterosyllabic analysis of this cluster even in simplex native words.

[92] The cluster [fr] is only attested medially after a short vowel in a couple of proper names and the word *vafra/-um* 'cunning' and its derivative noun *vafritia*. The shortness of the stem vowel in *vafra/-um* is evidenced by the masculine form *vafer*, invariably scanned with a light first syllable (e.g. Hor. *Sat.* 1.3.128 or Ovid. *Her.* 20.27). In the case of the proper names *Rufras* and *Safroni* a tautosyllabic cluster is evidenced in poetry (Verg. *Aen*. 7.739 and Mart. *Epigr*.11.103 respectively, cf. Allen 1978:90). The word *vafritia* is not attested in poetry; *vafra/-um* is attested only four times in classical poetry, all of which show a heavy first syllable and thus a syllabification [waf.rV-] (Ovid. *Ars Am.* 3.329; Hor. *Sat*. 2.2.130; Mart. *Epigr*. 6.64.24 and 12.66.3). The two preclassical occurrences of the word are indecisive (Pomponius Bononiensis fragments 87 and 139). There is a later occurrence in poetry (Prudentius *Liber Peristefanon* 5.265), which also suggests a light first syllable, but since it was composed around 400 AD and in an altogether different metrical system, it should not be taken as very strong evidence for the syllabification of the cluster [fr]. It thus seems that we have to do with an indeterminacy similar to that of [dr] (see previous note).

[V.glV], [V.kwV]. The only truly heterosyllabic cluster in this category is [gm], thus [Vg.mV].[94]

- All the sonorant+obstruent clusters in 3.1.4 and 3.1.5, irrespective of the voicing value of the obstruent, are heterosyllabic in all cases, thus [Vm.bV], [Vn.dV], [Vŋ.gV], [Vl.bV], [Vr.bV], [Vl.dV], [Vr.dV], [Vl.gV], [Vr.gV], [Vj.bV], [Vw.dV], [Vj.dV], [Vw.gV], [Vj.gV] and [Vm.pV], [Vn.pV], [Vŋ.kV], [Vl.pV], [Vr.pV], [Vl.tV], [Vr.tV], [Vl.kV], [Vr.kV], [Vl.sV], [Vr.sV], [Vw.pV], [Vj.pV], [Vw.tV], [Vj.tV], [Vw.kV], [Vj.kV], [Vw.sV], [Vj.sV].
- Most of the sonorant-final CCC clusters in 3.2.1 end in a stop+liquid sequence or [kw], which are evidenced to be tautosyllabic (i.e. complex onsets). Thus the syllabification of these is [Vs.prV], [Vl.prV], [Vm.brV], [Vp.trV], [Vk.trV], [Vs.trV], [Vn.trV], [Vl.trV], [Vj.trV], [Vw.trV], [Vŋ.krV], [Vl.krV], [Vj.grV], [Vm.plV], [Vŋ.klV], [Vŋ.kwV], [Vr.kwV], [Vj.kwV], [Vs.kwV]. The cluster [ŋgw] includes the sequence [gw], which only occurs in this particular cluster (see 2.1.2), so its tautosyllabic nature is not evidenced in the same way as it is for other stop+liquid sequences and for [kw]. However, on the analogy of [Vŋ.kwV] I will assume the syllabification [Vŋ.gwV] without further ado. The marginal, lexically and phonologically *hapax* cluster [wgm] is problematic under any analysis. Since I began by identifying possible onsets, I will assume [Vwg.mV]. This cluster will then be the only sonorant-final CCC-cluster where the syllable boundary falls between C_2 and C_3 rather than C_1 and C_2.
- In 3.2.2 all the clusters have the syllable boundary between the two obstruents. This is simply because no CC sequence is ever evidenced to be an onset if both consonants are obstruents. Thus we have [Vmp.tV], [Vŋk.tV], [Vmp.sV], [Vŋk.sV], [Vrp.tV], [Vlp.tV], [Vjp.tV], [Vrk.tV], [Vlk.tV], [Vwk.tV], [Vjs.tV], [Vws.tV], [Vws.kV], [Vjs.pV], [Vws.pV], [Vlp.sV], [Vjp.sV], [Vrp.sV], [Vwk.sV].
- About the three-obstruent clusters in 3.2.3 let me just note at this point that since they also evidently end in two obstruents, only the last obstruent can

In Bakkum (1989:26) it is said that the heterosyllabic scansion of [f.r] "may reflect the fact that metrical conventions did not provide for /fR/ groups [i.e. [fr] and [fl] — A. Cs.], which were *Fremdkörper* in Latin and absent from Greek at the time metrical conventions were established". I think something like this stands for [dr], as I explained above, but [fr] and [fl] actually occurred word-initially in several words, so their *Fremdkörper* status is dubious. (Note further that Bakkum demonstrates the heterosyllabic scansion of [fr] with the heavy initial syllable of *Africa* — a word that proves nothing because of its initial long vowel).

[93] The only word with medial [kl], *periclitari* 'try' does not actually occur in classical poetry. Clusters of the form C[l] appear to be generally rare, and are somewhat problematic because of the widespread diachronic vacillation between CV[l] and C[l] forms (e.g. *periculum* ~ *periclum* 'danger'), which resulted from the conflict between the early tendency to insert a short vowel in the environment C_[l] and the somewhat later tendency to syncopate unstressed vowels in internal open syllables. For a good discussion see Ward (1951) and Sen (2006) and (2015: 121–171) and the references above in note 90.

[94] The cluster [gm] is (i) the only consistently heterosyllabic *and* rising sonority cluster, (ii) the only instance of a coda voiced stop apart from the word-final [d] of neuter pronouns and (iii) the only instance of post-obstruent nasal.

be assigned as onset to the second syllable, thus [Vps.tV], [Vks.tV]. More will be said about these clusters a little later.

- Those CCCC-clusters which include two sonorants in 3.3.1 end in the sequence [tr], which is unproblematic as an onset, thus [Vlk.trV], [Vws.trV], [Vmp.trV], [Vŋk.trV].
- Those CCCC-clusters which include one sonorant in 3.3.2 are not uniform. The cluster [kstr] ends in the identifiable onset [tr] just like those in 3.3.1, so [Vks.trV] can be assumed (the reason for not including [kstr] under 3.3.1 will be seen shortly). The other two clusters cannot be so analysed: the last consonant being an obstruent it has to be a solitary onset consonant, thus [Vmps.tV] and [Vŋks.tV].

Note that here I have not divided clusters syntagmatically into onset-portions and coda-portions: I have divided them into onsets and non-onsets. The difference between codas and non-onsets is of course crucial, and will be explained in due course. But before I embark on that, let me summarise where we are now in a chart similar in appearance to, but also substantially different from, that in Figure 7 above. In Figure 8 I distinguish initial clusters, final clusters, medial hetero-syllabic clusters and medial non-onset clusters. The last of these means clusters that are found as parts of larger clusters, thus e.g. [mp] in [mp.s], [ps] in [ps.t], [mps] in [mps.t] and so on.

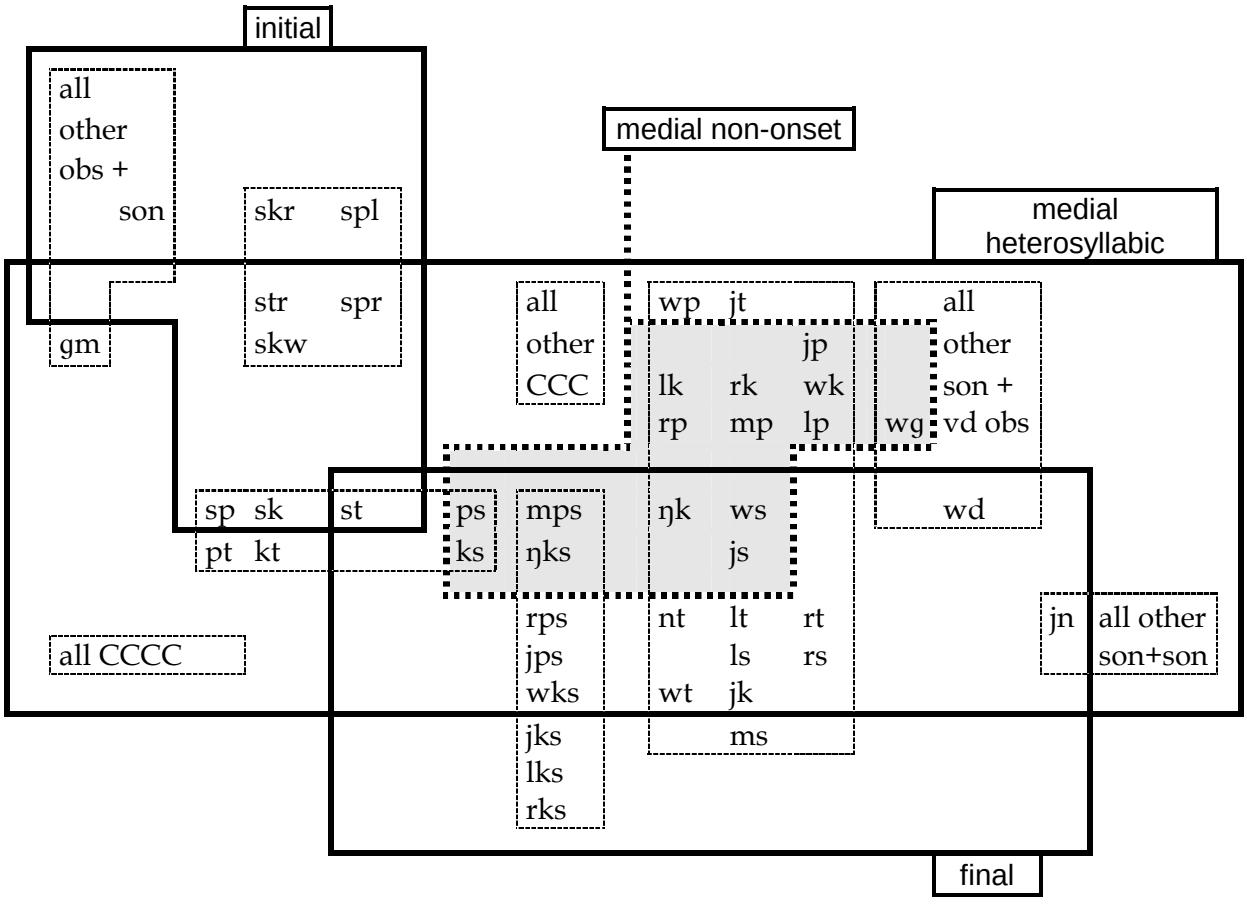

Figure 8: Second classification of clusters

The points of interest in Figure 8 are the following.

- Since initial clusters are now distinguished from medial heterosyllabic clusters rather than from just medial clusters, all the obstruent+sonorant clusters except [gm] have moved into the purely initial field.
- Of the [s]-initial CCC clusters, [spl] and [skr] simply do not occur medially; if they did, there is little doubt that they would be heterosyllabic. Thus the split status of the [s]-initial CCC clusters is phonologically probably uninteresting.
- Medial non-onset clusters are a proper subset of medial heterosyllabic clusters. What this means is that there is no cluster that occurs before a medial onset but does not occur medially without an onset following.
- Medial non-onset clusters all end either in a non-coronal obstruent or [s].
- Sonorant+sonorant clusters can only be heterosyllabic, never initial or final (except [jn]), but they also cannot be medial non-onset.
- Sonorant + voiced obstruent clusters can also only be heterosyllabic, never initial or final (except [wd]), and they also cannot be medial non-onset (except [wg], which has therefore been factored out of the "all other" category *vis-à-vis* the chart in Figure 7).
- Sonorant + coronal obstruent clusters are mostly final and/or heterosyllabic and cannot be medial non-onset clusters.
- The intersection of medial non-onset and final clusters is fairly small. Many final clusters do not occur as medial non-onset clusters and vice versa. With the exception of [ŋk] all the clusters in the intersection end in [s].

To arrive at a more precise characterisation of syllable constituents we have to focus now on clusters consisting of [s] and another obstruent. The problematic status of such clusters, especially at word edges, has long been noticed in the general phonological literature (e.g. Lowenstamm 1981). Specifically in Latin, the problematic clusters are initial [s] + stop (+ sonorant), i.e. 1.1.1 and 1.2 in Table 4, final (sonorant +) stop + [s], i.e. 2.1.1 and 2.2 in Table 5, and medial (sonorant +) stop + [s] + stop (+ sonorant), i.e. 3.2.3 and 3.3.2 in Table 6. These clusters show the following peculiarities.

- They are the only clusters that do not conform to the Sonority Sequencing Principle. The [s] represents a relative sonority peak between two stops as well as between a stop and a word boundary in any order.
- Final (sonorant +) stop + [s] clusters are highly restricted in that they only appear when a specific inflectional suffix (nominative singular -*s*) is added to stop-final stems.
- Initial [s] + stop (+ sonorant) clusters are paralleled by medial clusters of the same segmental composition which are clearly heterosyllabic (see the example *hos.tes* 'enemies' vs. *stare* 'stand' above) .
- If a vowel-final prefix is added to a simplex form with initial [s] + stop (+ sonorant), leftward resyllabification takes place and the [s] becomes the coda of the preceding syllable. This never happens when obstruent + sonorant initial simplex forms are prefixed (e.g. *re*+*stare* → *res.tare* 'remain' but *re*+*trahere* → *re.trahere* 'pull back'). Unambiguous evidence for this

comes from poetic metre, e.g. *restant* 'they remain' always scans as two heavy syllables, while *retrahunt* 'they pull back' as light–light–heavy.

- Three verbs with initial [s] + stop have a reduplicated perfect, which other CC-initial verbs never have. The three verbs are *stare* ~ *steti* 'stand', *spondere* ~ *spopondi* 'promise'and *scindere* ~ preclassical *scicidi* 'cleave'. Notice that reduplication only copies the stop portion of the cluster, not the [s].[95]
- When the prefixes *ex-* and *sus-* are added to stems beginning with [s] and [s]+stop, respectively, the resulting geminate [ss] is degeminated (*ex*+*salire* → *exilire* 'jump out', *sus*+*spirare* → *suspirare* 'sigh', see chapter 8). This is in line with the general rule that mandates degemination whenever the consonants cannot be syllabified (see 4.5), and thus proves that the syllabifications [eks.si-] and [sus.spi-] are impossible.

The evidence is, I believe, compelling enough to regard these (but only these) occurrences of [s] as extrasyllabic, a solution I suggested earlier (Cser 1999:178 sqq.).[96] What this means for the specific types of clusters involved is the following:

- For those in 1.1.1 (Table 4) the syllabification is #[*s*.pV], i.e. [*s*[$_{Ons}$ p]] etc.
- For those in 1.2 (Table 4) the syllabification is #[*s*.prV], i.e. [*s*[$_{Ons}$ pr]] etc.
- For those in 2.1.1 (Table 5) the syllabification is [Vp.*s*]#, i.e. [[$_{Co}$ p]*s*] etc.
- For those in 2.2 (Table 5) the syllabification is [Vmp.*s*]#, i.e. [[$_{Co}$ mp]*s*] etc.
- For those in 3.2.3 (Table 6) the syllabification is [Vp.*s*.tV], i.e. [[$_{Co}$ p]*s*[$_{Ons}$ t]] etc.
- For those in 3.3.2 (Table 6) the syllabification is either of the kind [Vk.*s*.trV], i.e. [[$_{Co}$k]*s*[$_{Ons}$tr]], or of the kind [Vmp.*s*.tV], i.e. [[$_{Co}$ mp]*s*[$_{Ons}$ t]].

And with this I have arrived at the final analysis. Everything except extrasyllabic [s] is syllabified as coda or onset (and vowels as nucleus, obviously). Codas as well as onsets can consist of at most two consonants, an obstruent and a sonorant in the linear order dictated by the Sonority Sequencing Principle. The classification of consonant clusters is therefore significantly simplified, as is shown in Figure 9.

The generalisations captured in Figure 9 are the following:

- All CCC and CCCC clusters are now exclusively heterosyllabic clusters. Note that at this stage these labels no longer subsume the clusters in 1.2 (Table 4), 2.2 (Table 5), 3.2.3 and 3.3.2 (Table 6), that is, the long clusters including an extrasyllabic [s]. As has already been explained, the remaining CCC clusters are syllabified as C.CC if they end in a (non-nasal) sonorant and CC.C if they end in an obstruent (plus [wg.m]).
- The set of onsets is totally disjunct from all the other cluster types. Since onset clusters are all rising sonority clusters, whereas coda and hetero-syllabic clusters tend to be equal or falling sonority clusters (see section 3.4

[95] Also note the historical imperfective reduplication *sistere* 'stop' from the same root as *stare*.

[96] In Lehmann (2005:168) and passim the same position is called pre-initial and post-coda. An advantage of referring to them as extrasyllabic is that in internal [pst] [kst] one does not have to decide whether the trapped [s] is pre-initial or post-coda, which would be possible only on an ad-hoc basis. Word-initial (but not final or internal) [s] of the same distribution was called extrasyllabic in Jacobs (1992:57). Steriade (1982) and (1988) analyses the same initial [s] with the help of stray adjunction, which means practically the same.

below), the intersection of onsets and other clusters is indeed expected to be empty.

- Medial coda clusters are generally of the shape sonorant + non-coronal voiceless obstruent. Exceptions are [ws js], which end in a coronal, and [wg], which ends in a voiced obstruent.
- Apart from the exceptions listed in the previous two points, obstruent + obstruent clusters cannot be onsets or codas, neither can clusters consisting of two sonorants or a sonorant followed by a voiced obstruent.
- Both medial coda clusters and final coda clusters are proper subsets of the heterosyllabic clusters (but for the isolated final [ms] of *hiems/hiemps* 'winter').
- The set of medial coda clusters and final coda clusters is almost completely disjunct.

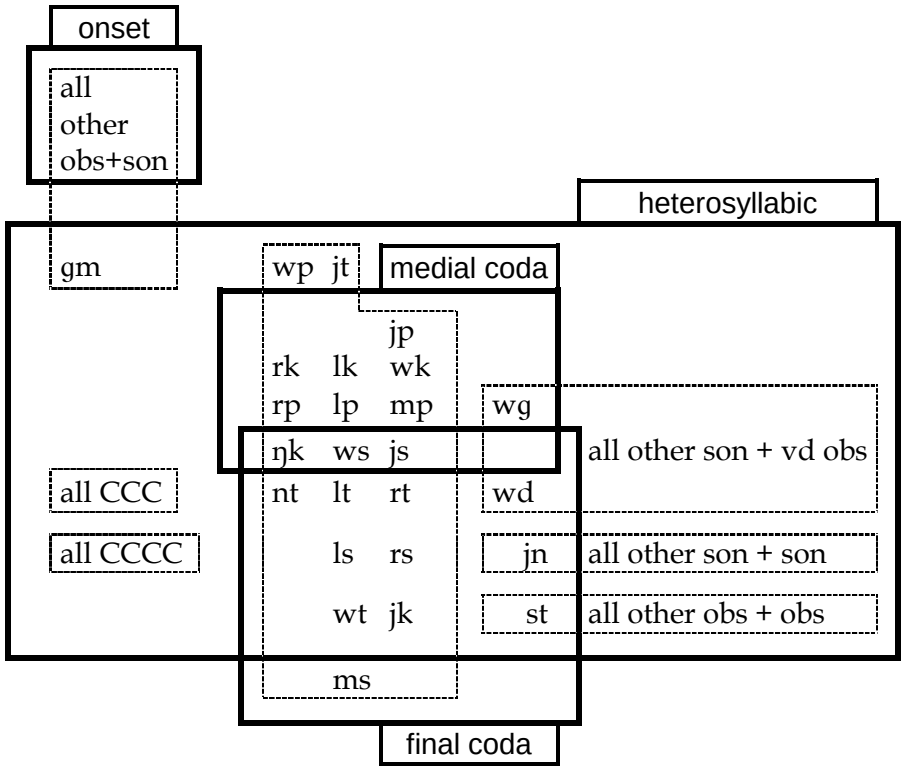

Figure 9: Final classification of clusters

This last point perhaps deserves more than passing mention. It is not immediately obvious why coda clusters should not be more alike in different positions within the word. The criterion appears to be the place of articulation of C_2; and this, in fact, squares well with the distribution of single consonants in different syllabic positions (Figure 10):[97]

[97] In Figure 10 the three places of articulation (plus the vocalic dorsality of [j]) are indicated separately, as is placeless [h], and the dotted line separates obstruents and sonorants. The chart does not indicate the typicality of individual segments in the various positions (e.g. final [d] only figures in neuter pronouns, final [j] only in three affixes of *a*-stem nouns and adjectives) and, as

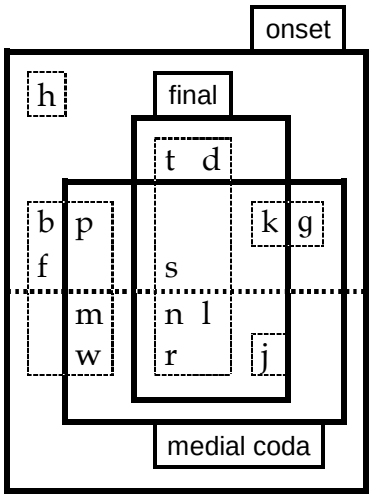

Figure 10: Distribution of single consonants

As was explained in detail elsewhere (2.1.1), final consonants are coronal (except for the deictic and imperative [k], and for [j], which has no consonantal place and is always a morphological marker). We can now add that medial codas are either voiceless and non-coronal (except for the marginal [g]), or sonorant (except for [s]). And as a perusal of the consonant clusters in 3.2 above quickly shows, post-consonantal onsets show the preponderance of coronality: if a post-consonantal consonant is an obstruent, it is overwhelmingly [t] or [s]. What this means is that final clusters bear more resemblance to heterosyllabic clusters than to medial coda clusters, which is equivalent to saying that final consonants bear more resemblance to onset consonants than to coda consonants.[98]

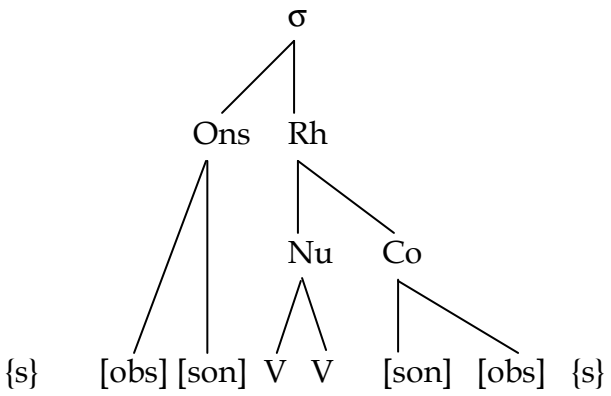

Figure 11: The general syllable template

elsewhere in this chapter, geminates are disregarded. Surface [ŋ] only figures as medial coda but is a positional variant of [n] or [g].

[98] This point has been made with respect to other languages, see Harris (1994:73–74) on English as well as French. In Goverment Phonology and some other models it is explicitly argued that final consonants *are* onsets. For a survey of these arguments see Gussmann (2002:91 sqq.). Note that in Latin final [t] cannot follow stops, whereas internally it can (**[pt]# **[kt]#).

The general syllable template that can be distilled from the above considerations is shown in Figure 11. The following points need to be added to flesh out the template.

- Coda obstruents are voiceless stops or [s].
- The peripheral[99] fricative [h] is not found in any cluster. The other peripheral fricative [f] is only found in the onset clusters [fr] [fl].
- Coda consonants and clusters are mostly coronal finally.
- Internal codas prefer sonorants, non-coronal and voiceless obstruents. More specifically, all seven sonorants [m n ŋ l r j w] are found as single coda consonants word-internally, but of the obstruents systematically only [p k s]. The voiced obstruents, the coronal stops, [f] and [h] are generally incompatible with the coda position.
- Complex internal codas are sequences of a sonorant and [p] or [k] (e.g. *carp.tus* 'picked', *mulc.tus* 'milked', *emp.tus* 'taken', *sculp.si* 'I shaped'), but [js] and [ws] are also found (*caes.pes* 'lawn', *faus.tus* 'favourable') and the badly irregular hapax cluster [wg.m] of *aug.men(tum)* 'growth' includes the single occurrence of coda [wg].
- The only exception to the sonorant+obstruent structure (but not to the Sonority Sequencing Principle) is the final coda [st] found in four words altogether (e.g. *est* 'is').
- A complex onset always consists of an obstruent and a non-nasal sonorant; more specifically, these clusters include stop+liquid sequences (*plenus* 'full', *a.cris* 'sharp', but note that stop+[l] is much rarer than stop+[r][100]), [fr] and [fl] (*frater* 'brother', *a.fra* 'black', *flamma* 'flame' the latter only initially), [sw] (*suadere* 'persuade', only initially), [kw] (*quis* 'who', *a.qua* 'water') and [gw] (*san.guis* 'blood', only internally after [ŋ]). Nasals are not found in complex onsets at all.
- Extrasyllabic [s] may not be adjacent to any segment except a voiceless stop in the same word, which can only be non-coronal to the left, coronal to the right medially and any of the three initially.
- Two adjacent obstruents are always voiceless (regardless of syllabic constituency) and at least one of the two has to be coronal.
- Coda [s] is never followed by a voiced consonant. Initial [s] can only be followed by [w] of all voiced consonants.
- Out of the 182 hypothetically possible[101] CC clusters 50 (=27.5%) are attested in at least five words each.
- In CCC clusters no two consonants may be the same.

[99] Throughout this work the term *peripheral* refers to non-coronal consonants, i.e. labials and velars, and occasionally to the "virtual" consonant [h]. In 6.5, where vowel sonority is discussed, peripheral is the opposite of central (with respect to vowels).

[100] The asymmetry between [l]-final and [r]-final clusters may be due to a difference in the respective sonority values of the two liquids combined with the Minimal Sonority Distance effect, which is suggested in Steriade (1982), and also in Parker (2008 and 2011), though in Parker's sonority scale this would only work if [r] was a flap rather than a trill since trills have a lower sonority value than [l].

[101] I.e. 14×13, not counting geminates.

- Out of the 2184 hypothetically possible[102] CCC clusters 15 (=0.68%) are attested in at least five words each ([mbr] [ptr] [ktr] [str] [ntr] [ltr] [lkr] [mpl] [ŋkw] [ŋgw] [mpt] [ŋkt] [mps] [ŋks] [kst]). In these clusters redundancy is very high. It is not a gross oversimplification to say that in C_3 virtually only manner is contrastive ([w] vs. [r] vs. [s] vs. [t]), in C_2 virtually only place ([p] vs. [t] vs. [k]),[103] in C_1 neither, since it is almost invariably a nasal with redundant place specification. Thus, CCC clusters carry roughly the same amount of information as single segments, but distribute it over a span of three segments.[104] For instance, the structure of the cluster [ŋks] with the contrastive features highlighted is shown in Figure 12. As can be seen, in terms of contrastivity, this cluster carries exactly the same amount of information as a voiceless velar fricative [x].

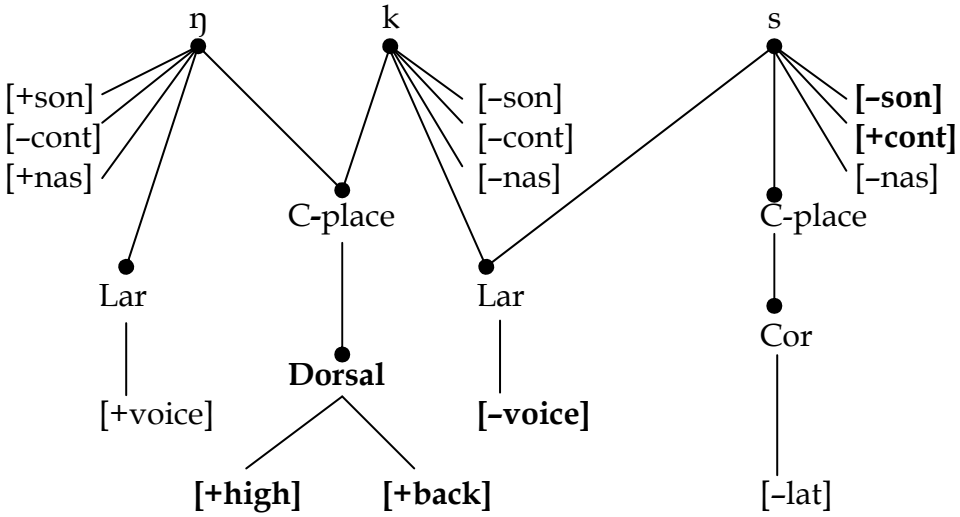

Figure 12: The structure of the cluster [ŋks]

3.4. Syllable contact and the interaction between place of articulation and sonority

Heterosyllabic, i.e. coda–onset, clusters in Latin simplex forms are overwhelmingly in conformity with the Syllable Contact Law; that is, the last segment of the syllable on the left has higher sonority than the first segment of the

[102] I.e. 14×13×12.

[103] The cluster [mbr] is among the frequent ones, but there is no [mpr] (except for the proper name *Sempronius*). Note, however, [ŋgw] vs. [ŋkw] (cf. 2.1.2.7).

[104] Admittedly, though, contrastivity and redundancy in CCC clusters is a more complicated issue. For instance, while there are two fairly frequent [l]-initial CCC clusters ([ltr] [lkr]), these are in almost perfect complementary distribution with NC[r] clusters in that the former occur after [u], where the latter never do (*ultra* 'beyond' vs. *antrum* 'cave'). The only counterexample is *altrix* 'nourisher' (vs. *ultrix* 'avenger'). Note furthermore that altogether five [Ctr] clusters are among the most frequent ones, though of these [ptr] [ktr] almost only emerge in the case of suffixation with *-trix*.

syllable on the right.[105] The asymmetry of most permitted heterosyllabic cluster types is clear. For instance, [s] can only be followed by voiceless stops (*hos.pes* 'host', *hos.tis* 'enemy', *cres.cere* 'grow'); nasals can be followed by stops (*an.te* 'before') but never by liquids; stops can never be followed by nasals or glides ([kw] and [gw] are not heterosyllabic and [gm] is exceptional, see below); liquids can be followed by stops, nasals and [s] (*al.bus* 'white', *pul.sus* 'beaten', *cer.nere* 'see', *ul.mus* 'elm-tree') but not by another liquid (**[rl lr]) or the glide [j] (**[lj rj]).

At the same time, there is an interesting interplay between sonority and place of articulation. In a sequence of a non-coronal and a coronal consonant (in this order) in the lower half of the sonority scale, C_1 does not have to be of higher sonority. Four of the five permitted equal-sonority clusters are of this kind (*ap.tus* 'fit', *ac.tus* 'done', *am.nis* 'river', *di*[ŋ].*nus* 'worthy') as are the two permitted stop+fricative clusters (*ip.se* 'himself', *ve*[k.s]*i* 'I carried'). This may be formalised in the following way:[106]

(8) The Place Condition (first version)

> Heterosyllabic [obs][obs] and [nas][nas] clusters are well-formed irrespective of sonority relations if C_1 is non-coronal and C_2 is coronal (i.e. [pt kt ps ks mn ŋn] are well-formed). In all other cases, only sonority relations are decisive (i.e. [sp sk] are well-formed, **[tk tp pk kp] are not).

The only remaining clusters not in conformity with the Syllable Contact Law are [rw lw jw] (*par.vus* 'small', *sil.va* 'forest', *ae.vi* [aj.wi:] 'age' GEN). These end in [w], which does not have a consonantal place node. It appears that for the Place Condition to take scope over a segment it has to have a consonantal place node; at the same time the asymmetry between [w] and [j] is conspicuous.

In Cser (2012a) I proposed the Inverse Place Condition, a mirror image to the Place Condition, which covered the non-nasal sonorants. While descriptively adequate, that analysis was based on a simpler conception of infrasegmental structure and assumed that [j] was one of the coronal consonants. On that assumption, the analysis was that the clusters not in conformity with the Place Condition were all coronal+non-coronal sequences and thus showed the opposite distribution of place (e.g. a good parallel to the [mn]-type would be the non-existent cluster **[wj]). Thus in the upper half of the sonority scale the opposite of the above condition holds. This new condition was formulated in the following way:

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[105] The most important references for what came to be known as the Syllable Contact Law, repeated here from note 82 are Hooper (1976), Murray and Vennemann (1983), Vennemann (1988), Zec (2007) and Seo (2011). Of these, Vennemann (1988) discusses some of the Latin data too. More recently, the role of sonority in the development of consonant clusters in Late Latin was analysed in Gess (2004), where the validity of essentially the same generalisation is demonstrated in an Optimality Theoretic framework.

[106] Note that in this particular section the focus is on CC sections spanning a syllable boundary, thus e.g. [pt] here represents [pt], [mpt], [ptr], [mptr], and so on.

(9) The Inverse Place Condition (as proposed in Cser 2012a:52)

> Heterosyllabic clusters consisting of non-nasal sonorants are well-formed irrespective of sonority relations if C_1 is coronal and C_2 is non-coronal (i.e. [lw rw jw] are well-formed). If C_2 is coronal, only sonority relations are decisive (i.e. [wr wl jr jl] are well-formed, **[rl lr lj rj wj] are not).

In this form, of course, the Inverse Place Condition is incompatible with the infrasegmental structures given in 2.3. If we assume that the representation of place of articulation is structurally distinct in glides vs. in the other cononants, the issue needs to be framed differently. What one sees is basically a strong distributional asymmetry between the two glides. Those clusters where no glides are involved, that is, the ill-formed **[rl lr] would be excluded by the Syllable Contact Law in general, not mitigated by the Place Condition since both liquids are coronal. But where glides are involved, the regularity boils down to a categorical ban on postconsonantal [j] vs. the possibility of postconsonantal [w] (though not after any consonant). This is actually independent of syllable structure to the extent that in complex onsets too only [w] is found, [j] never (cf. 2.1.2.4). Thus the Place Condition can be reformulated with a wider scope to encompass all consonants that have a consonantal place node.

(10) The Place Condition (revised version)

> Heterosyllabic clusters of two segments with consonantal place nodes and of equal or near-equal sonority are well-formed irrespective of the sonority relations if C_1 is non-coronal and C_2 is coronal (i.e. [pt kt ps ks mn ŋn] are well-formed). In all other cases, only sonority relations are decisive (i.e. [sp sk], all liquid+stop, liquid+[s], liquid+nasal and homorganic nasal+stop clusters are well-formed, **[tk tp pk kp mŋ ŋm nm nŋ lr rl] are not).

The list of attested clusters shows that this general rule needs to be supplemented with a minor regularity, *viz.* a nasal cannot be followed by any [+continuant] segment. This means all nasal + fricative, nasal + liquid and nasal + glide sequences — the inclusion of the last of these is warranted since the continuancy of glides is the same as that of other consonants (as opposed to the place nodes and place features). The absence of the clusters **[pn bn kn gn] shows that the first clause of the Place Condition cannot override a sonority distance greater than that between stops and [s], hence the qualification now included ("two segments of equal or near-equal sonority").

Recapitulating another pertinent point from the presentation of consonant clusters above, the clusters [fr] and [br] appear to be variably hetero- or tautosyllabic (see note 92); when heterosyllabic, they comply with the Place Condition in being non-coronal + coronal sequences, though the sonority distance between [f]/[b] and [r] is comparable to that between a stop and a nasal. The other fricative [s] is never found before voiced consonants (at least internally; initial [sw]

is attested in three stems and their derivatives). The odd behaviour of the rare cluster [dr] was remarked upon in note 91.

The Place Condition encapsulates an empirical observation that has been made in the literature earlier about a variety of languages. Bailey (1970) briefly discusses metathesis as a diachronic change and generalises that it preferably results in non-coronal+coronal clusters. Clements (1990:311–314) discusses the issue and the proposals made earlier to explain such effects by assigning lower sonority to coronals than to non-coronals of identical manner of articulation. He rejects such a solution because it leads to conflicting generalisations and opts instead for an explanation based on markedness, i.e., [t] being simpler than other voiceless stops, it is freer to occur in a variety of positions (see also de Lacy 2006 on markedness in general and place of articulation markedness in particular). This, however, does not in itself necessarily explain preferred sequential orderings (in other words, it explains why [pt] and [tp] are preferred to [kp] or [pk] but does not explain why [pt] is preferred to [tp]). The same is true of Booij's (1995:44–46) analysis of a similar preference in Dutch clusters, which is based at this point on Yip (1991).

If coronals had lower sonority than labials and velars within the same manner class, cases like [pt] and [kt] could be accounted for, since these would be falling-sonority clusters, but the possibility of [ks] and [ps] would be left unexplained. Furthermore, as Steriade (1982) points out, the lack of complex onsets **[tl] **[dl] can actually be an argument for the higher, rather than lower, sonority of [t] [d] because the smaller sonority distance between a coronal stops and [l] makes these clusters worse than e.g. [pl] [kl].

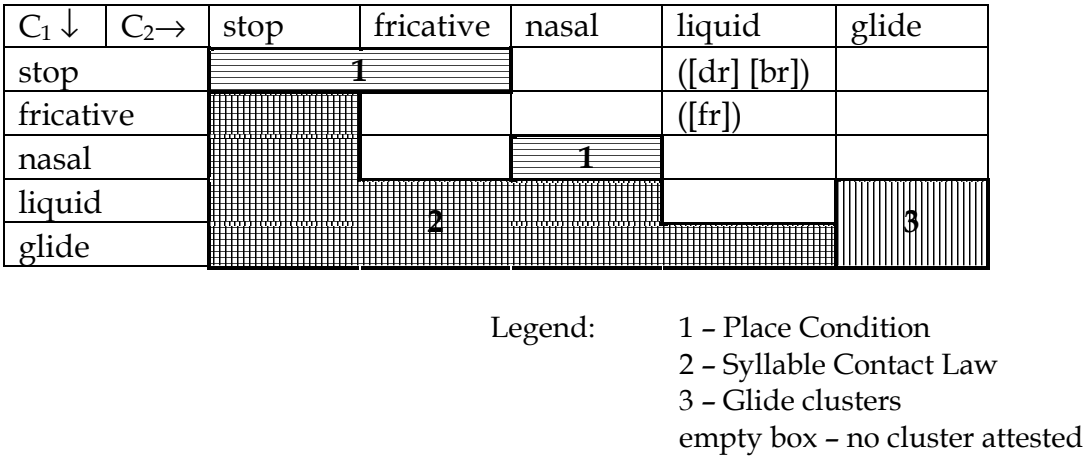

Figure 13: Heterosyllabic cluster types in simplex forms

Figure 13 summarises the distribution of heterosyllabic clusters in simplex forms as a function of sonority. As in the discussion so far, geminates are disregarded (e.g. the liquid+liquid box is left empty in spite of legitimate and numerous geminate liquids). Cluster types that only admit non-coronal+coronal sequences (i.e. comply with the Place Condition) are marked with (1) and

horizontal lines. Other well-formed cluster types are marked with (2) and a chequered box. Cluster types that are not covered by the Place Condition are marked with (3) and vertical lines. The marginally heterosyllabic clusters [fr] [dr] [br] are in parentheses. The empty top right-hand half of the chart vs. the full bottom left-hand half (marked 2) shows the validity of the Syllable Contact Law.

This chapter has demonstrated in detail the phonotactic regularities that prevail in Classical Latin simplex forms. Sonority plays a central role both in intra-syllabic organisation and in syllable contact phenomena but it can be overridden to a certain extent by place of articulation, an observation I encapsulated here in the Place Condition. The processes that take part in complex (prefixed) forms and the phonotactic regularities that prevail in them, including a generalised variant of the Place Condition, will be discussed in chapter 8.

4. Processes affecting consonants

In this chapter the segmental phonological processes affecting consonants are presented. The discussion will not be confined entirely to simplex forms; although the detailed presentation of prefixed forms is relegated to chapter 8, such forms will be mentioned in this chapter as well, since the consonantal processes in simplex and in prefixed forms show a great deal of overlap, and the discussion will be more coherent if the similarities are pointed out right at the first mention of the relevant phenomena.

All the phonological processes in this chapter involve segments that are adjacent. This is because there are no systematic, phonologically general processes working at a distance in Classical Latin. Certain phenomena affecting the two liquids will be discussed separately in chapter 10 and tangentially in chapters 8 and 9. The liquids appear to display a certain tendency for distance dissimilation, but these phenomena are either not phonologically general, or manifest themselves largely as static patterns rather than processes, hence my decision no to include them here.

4.1. Contact voice assimilation

Adjacent obstruents are always voiceless in simplex forms, as a static phonotactic rule mandates (see 3.3), and when two obstruents come into contact in a derived environment, regressive voicing assimilation takes place. Only a Laryngeal node dominating [–voice] is able to spread, partly because of the static rule, partly because in simplexes no environment can emerge at all in which the second obstruent would be voiced.[107] The assimilation is nearly always indicated in writing:

(11) Regressive devoicing in simplexes

scribere 'write' ~ *scripsi* PERF1SING ~ *scriptus* PASSPART
regem ~ *rex* 'king' ACCSING ~ NOMSING
plebem ~ *plebs* / (rarely) *pleps* 'people' ACCSING ~ NOMSING

At prefix–stem boundaries voicing assimilation is usually not indicated unless it produces a geminate, and it varies in certain cases with total assimilation:

[107] Etymologically, of course, there are numerous cases, e.g. **pezd-* > *pēdere* 'fart'. In Classical Latin, however, only regressive voiceless assimilation is in evidence synchronically; this is why Álvarez Huerta (2005:146–147) is able to describe the process as coda neutralisation rather than assimilation (spreading).

(12) Regressive assimilation at prefix–stem boundary

obtinere ~ (rarely) *optinere* 'preserve', most probably [opt-][108]
(rarely) *obpetere* ~ *oppetere* 'encounter' [opp-]
adsistere ~ *assistere* 'stand near', probably [ats-] ~ [ass-]

In the phonological interpretation of non-simplex forms there is some uncertainty. While in simplexes active spreading of a Laryngeal node dominating [+voice] rather than [–voice] is not attested, and eligible forms simply do not emerge for morphological reasons, the same cannot necessarily be said of prefixed or cliticised forms. It is impossible to tell exactly how a prefixed form like *trans*+*gredi* 'step over' or *post*+*genitus* 'born later' sounded, and we also do not know how the cliticised pronouns of the type *eius*+*dem* 'he, the same' GENSING were pronounced. It is not entirely inconceivable that there was regressive voicing assimilation, but we have no evidence of it (Latin had no distinct way of spelling [z]). Apart from *trans*-prefixed words, *post*-prefixed words and *-dem*-cliticised and *-dam*-cliticised [s]-final inflected pronouns no other environments emerge in which a voiceless obstruent would be followed by a voiced obstruent (trivially apart from environments emerging across word boundaries).

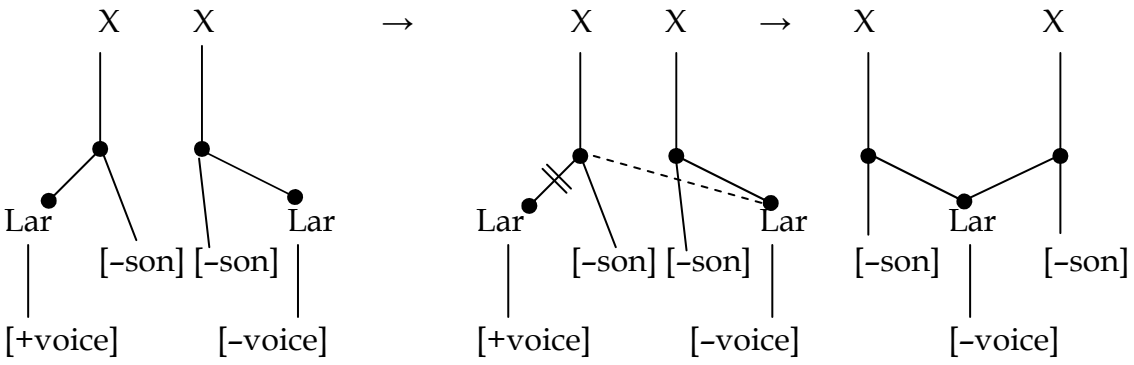

Figure 14: Contact devoicing of obstruents (irrelevant details omitted)

The contact devoicing of obstruents is formalised in Figure 14. As can be seen, this assumes full featural specification for both voiced and voiceless obstruents. If the spreading of a Laryngeal node dominating [+voice] could be categorically excluded, one could argue (as Álvarez Huerta 2005 does) that the asymmetrical pattern warrants an asymmetrical representation. Since, however, the asymmetry is not unequivocal, I will stay with the symmetrical representation, leaving this question on a note of some uncertainty.

[108] Cf. Quintilian's remark in *Inst.* 1.7.7: "Quaeri solet, in scribendo praepositiones sonum quem iunctae efficiunt an quem separatae observare conveniat, ut cum dico *optinuit* (secundam enim *b* litteram ratio poscit, aures magis audiunt *p*)", 'It is often debated whether in our spelling of prepositions we should be guided by their sound when compounded, or separate. For instance when I say *optinuit*, logic demands that the second letter should be a *b*, while to the ear the sound is rather that of *p*' (translation from Butler 1920).

In some lexically determined cases the delinked Laryngeal node is not deleted but projects a Root node and a skeletal slot, to which the preceding short vowel links and this results in surface lengthening on the vowel following on the devoicing. This process is described and formalised in 5.3.2.

4.2. Excursus: loss of [s] before voiced consonants

In a diachronically related process the segment [s] was lost before voiced consonants — sonorants as well as obstruents — in all positions in the prehistory of the language. When it was immediately preceded by a short vowel, that vowel underwent compensatory lengthening. This can be seen in the allomorphy displayed by the prefix *dis-* (see 8.2.4.3):

(13) Loss of [s] in *dis-*

distendere 'stretch', *discurrere* 'run away', *disponere* 'distribute'
vs. *dīgerere* 'disperse', *dīmittere* 'send away', *dīluere* 'wash away'

Also if one considers the three stems of the verb *ponere* 'put', their relation is historically explained by the same change following on (formerly) productive affixation:[109]

(14) The stems of *ponere*

IMPF *pōn-* < **pos+n-*
PERF *pos+u-*
third stem *pos+it-*

The other *s*-final prefix, *ex-* shows the same regularity (see 8.2.4.2), which is also visible in compounds of *sex* '6':

(15) Loss of [s] in *ex-* and *sex*

extendere 'extend', *excellere* 'excel' vs. *ēmanere* 'stay away'; *sex* '6' vs. *sēdecim* '16'

On the other hand, the prefix *trans-* does not display the same regularity. Before non-coronal voiced consonants its [s] remains intact (or is not lost, at least), and before coronals it variably remains (though the tendency is for it to be lost, see 8.2.4.4):

(16) Loss of [s] in *trans-*

transvolare 'fly across, *transmittere* 'send over', *transgredi* 'step over', *translatus* 'taken across'; *transnare* ~ *trānare* 'swim across', *trādere* 'hand over'

[109] For the detailed etymology of this word see de Vaan (2008 s.v.).

Certain compounds do not show deletion at all:

(17) No loss of [s] in compounds

huiusmodi, eiusmodi 'of that kind'

The very frequent cliticised pronouns provide evidence that deletion of [s] was no longer a generally active rule in Classical Latin. The clitics *-dem, -dam, -nam, -vis, -met* and *-libet* can be attached to certain fully inflected pronouns to provide various pragmatic and semantic modifications of them (much like *-ever, -soever* in English).[110] Of the several [s]-final inflected forms only the NOMSING forms of some of these pronouns lose the [s] before the clitic; all the others show the [s] (perhaps phonetically [z]?) intact:

(18) Loss and retention of [s] in cliticised pronouns

īdem 'he, the same' (< **is*+*dem*), but *eiusdem* GENSING, *eosdem* MASCACCPLUR, *easdem* FEMACCPLUR, *īsdem* DATABLPLUR
quīvis 'whoever' (< **quis*+*vis*), but *cuiusvis* GENSING, *quibusvis* DATABLPLUR…
quisnam 'who then', *vosmet* 'yourselves', *nosmet* 'ourselves', *nobismet* DATABL…

If one still insisted on incorporating [s]-deletion in the phonology of Classical Latin,[111] the case of cliticised pronouns could, in theory, be explained with reference to the different levels of the morphology and of the lexical component of phonology. However, that would only be possible on the assumption that either the NOMSING is affixed at a different level than all other case forms, or that the clitic is attached to NOMSING forms at a different level than to all other case forms. Neither of these assumptions seems eminently plausible, and even in this way extra machinery would be needed to describe the *dis-* vs. *trans-* discrepancy. Very little would be gained anyhow since there are otherwise no alternations whose description would necessitate the [s]-deletion rule. While as a descriptive statement it is true that voiced consonants are not preceded by [s] in simplex forms, this generalisation is definable on much broader natural classes and is not specific to [s] (it follows from the Syllable Contact Law and from the ban on adjacent obstruents that are not both voiceless, see 3.3). The upshot of this is that we do not have sufficient grounds to assume that [s]-deletion is a phonological rule in Latin. What one can say at most is that this rule is specific to prefixes (with variable effect in compounds, see *sēdecim* vs. *huiusmodi*), but even in that domain it affects only *ex-* and *dis-* systematically; its effect on *trans-* is much more restricted. In this way it is not very different from the loss of [b] in *ab-* (see 8.2.5.2).

[110] Here I only list the clitics beginning with a voiced consonant. The remaining clitics *-que, -quam, -piam, -cumque* are irrelevant to [s]-deletion. I do not discuss pronominal inflection at all in this work; at this point, the only important difference *vis-à-vis* noun and adjective inflection (cf. chapter 6) is the existence of *-ius*-suffixed GENSING forms for pronouns in general.

[111] As Touratier (2005:117–118) does, who describes and formalises [s]-deletion as a rule on the basis of the behaviour of *dis-*, but leaves all the *transgredi, eosdem* and *huiusmodi*-type problems unmentioned.

4.3. Total assimilation of [t] to [s]

The cluster [ts] does not exist in simplex surface forms. Word-internally this is explained by the Sonority Sequencing Principle (not mitigated by the Place Condition, both consonants being coronal); word-finally by the constraint on extrasyllabic [s], which can only be preceded by the non-coronal stops [p] and [k]. When affixation results in a [ts] sequence, the [t] assimilates to the [s] and a geminate [ss] results[112] (subject to later processes of degemination, see 4.5 below). This rule is fed by voicing assimilation, so underlying [d]'s undergo it as well. All the three [s] suffixes (perfective, third stem and animate nominative singular) trigger this process without exception:

(19) Examples of assimilation

quat- 'shake' →	*quassi* PRESPERF1SING
	quassus PASSPART
ced- 'depart' →	*cessi* PRESPERF1SING
	cessus PASSPART
milet- 'soldier' →	*miles* NOMSING (with degemination)

The transparent compound conjunctions *etsi* 'although' (from *et* 'and' and *si* 'if') and *tametsi* (for full *tamen etsi*) 'notwithstanding' include the cluster [ts] at what can be seen as word boundary. At prefix–stem boundaries this process is also found with the prefix *ad-*, but it is optional. With the two *post*-prefixed words *postsignani* 'soldiers stationed behind the standards' and *postscribere* 'add in writing' the assimilation is not attested.

The assimilation in a proper formalisation involves copying the root node, as shown in Figure 15.

[112] Such a rule is postulated by Touratier (2005:120) as well.

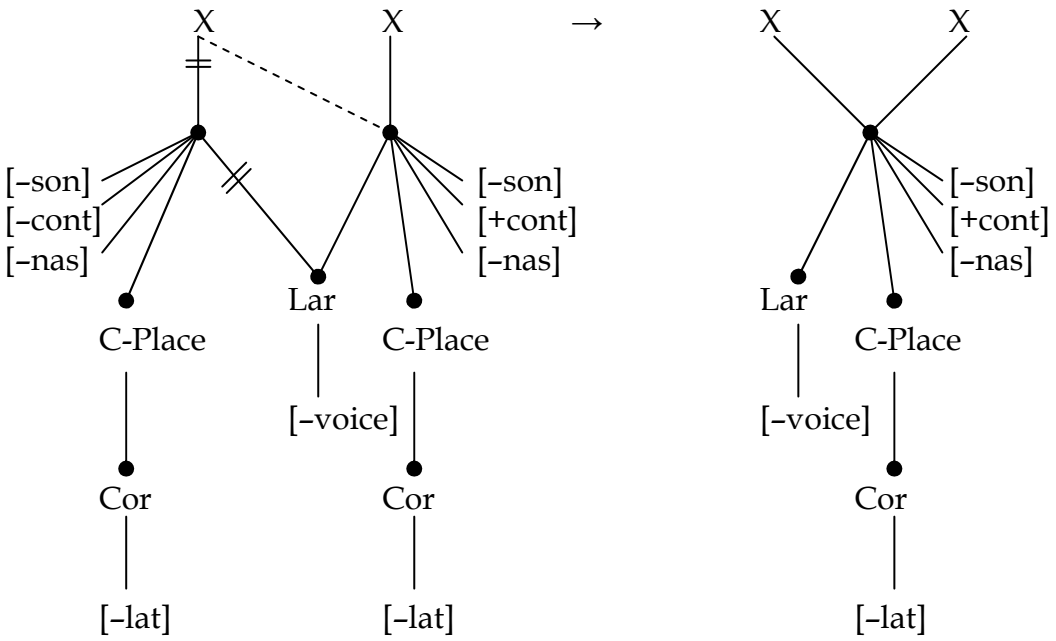

Figure 15: Total assimilation of [t] to [s]

4.4. Rhotacism

Intervocalic [s] is replaced by [r] in derived environments.[113] Typically, this is seen at the end of stems when a vowel-initial affix creates an intervocalic environment:

(20) Rhotacism

[s] → [r] / V__V

mus ~ *muris* 'mouse' NOMSING ~ GENSING
ges- → *gero* 'carry' 1SING, cf. *gessi* PRESPERF1SING, *gestus* PASSPART

Since rhotacism also occurs after glides, the V in the environment of the process clearly refers to the presence of a V-Place node in the immediately adjacent segments rather than nuclear position in the syllable (though this is relevant only for the segment on the left, since there are no postconsonantal instances of [j] and

[113] Rhotacism is a well-known diachronic change in the prehistory of Latin (Leumann 1977:178, Weiss 2009:81, Baldi 2002:285, Clackson and Horrocks 2007:96). The more immediately pertinent question whether it was still a synchronic phonological rule in Classical Latin was touched upon already by de Saussure (1916:202); the slate of papers from the past few years that discuss the synchronic status of rhotacism testify that it continues to be an intriguing issue, see e.g. Albright (2005), Gruber (2006), Embick (2010), Roberts (2012), Kiparsky (to appear), Gorman (to appear). Several of these authors (de Saussure 1916, Baldi 1994, Gorman to appear, Roberts 2012) deny that rhotacism was still operative in the Classical period but they either do not acknowledge the derived environment condition or give a different morphological analysis of the relevant forms.

[w] does not occur after word-internal [s]). Witness the alternation between [ajs]C, [ajs]# ~ [ajr]V, and between [aws]C ~ [awr]V in the following examples:

(21) Rhotacism after glides

maestus 'sad' ~ *maeror* 'sadness'
quaestus ~ *quaerere* 'inquire' PASSPART ~ INF
aes ~ *aeris* 'bronze' NOMSING ~ GENSING
haustus 'drawing (of water)' ~ *haurire* 'draw (water)'

Rhotacism is clearly absent from non-derived environments, as is pointed out already in McCarthy (2003); the derived environment condition is explicitly mentioned in Gorman (in press) too:

(22) Lack of rhotacism in non-derived environments

miser 'miserable', *nisi* 'unless', *pisum* 'pea', *basis* 'base', *causa* 'matter'

Rhotacism also does not occur after nasal vowels even in derived environments:

(23) Lack of rhotacism after nasal vowels

mansi 'remain' PRESPERF1SING, *ensis* 'sword', *mensis* 'month'

What this means is that rhotacism must precede the coalescence of the placeless nasal with the preceding vowel, which produces a long nasal vowel (on this process see 5.3.4). This is a clear example of counterfeeding relationship. In theory, one could also narrow down the environment of rhotacism so that the preceding vowel has to be non-nasal, but since nasal place loss as well as coalescence are independently needed because of the *manere* ~ *mansi* type and the *dens* ~ *dentis* type alternations, the more economical solution will clearly be the one involving counterfeeding order. Rhotacism must also precede the degemination of [s] (*cāssus* → *cāsus* 'fall' PASSPART, see 4.5.2), since these [s]'s are systematically unrhotacised.

At prefix–stem boundary two different developments are attested. One is when a V[s]-final prefix is attached to a vowel-initial stem; the other is when a vowel-final prefix is attached to an [s]V-initial stem. The first is attested only in two highly lexicalised, opaque verbs and their derivatives: *dirimere* 'separate' (< **dis*+*emere*) and *diribere* 'sort (votes)' (< **dis*+*habere* with historical loss of the stem-initial [h]). Apart from *dis-* no other prefix ends in V[s],[114] and apart from these two words there is no instance of *dis-* combining with a vowel-initial stem; apparently in Classical Latin the combinations of vowel-initial stems with this prefix were avoided.

The other configuration, i.e. vowel-final prefix attached to an [s]V-initial stem, is formed apparently with great freedom. Rhotacism does not apply in any

[114] *Trans-*, as in *transire* 'cross', contains a nasal vowel, after which rhotacism is not expected.

of these words (*pro*+*silire* 'jump forth', *de*+*sinere* 'desist', *re*+*secare* 'cut off' and many others). This may imply that rhotacism was relegated to a derivational level preceding prefixation, *dirimere* and *diribere* are lexicalised remnants from an earlier diachronic stage and are not synchronically rhotacised.[115] It may also imply that rhotacism operates at a later derivational level at which a prefix–stem boundary is no longer derived environment. In theory, it might also imply that preserving a stem consonant had some kind of priority over preserving a prefix consonant, but since this is evidently not true with respect to stem vs. suffix consonants (see the examples in 4.3), and is also not true with respect to stem vs. prefix vowels (see chapter 5), it is unlikely to be a general principle in the language.

A formalisation of rhotacism (Figure 16) may represent it as an assimilation in voicing to the two neighbouring vocalic segments. Since this would produce a segment with incompatible feature specifications, *viz.* [+voice], [+cont], [–son], a further readjustment is forced by the change from [–voice] to [+voice]. The readjustment is the change in the feature [–son] to [+son], thus producing [r].[116]

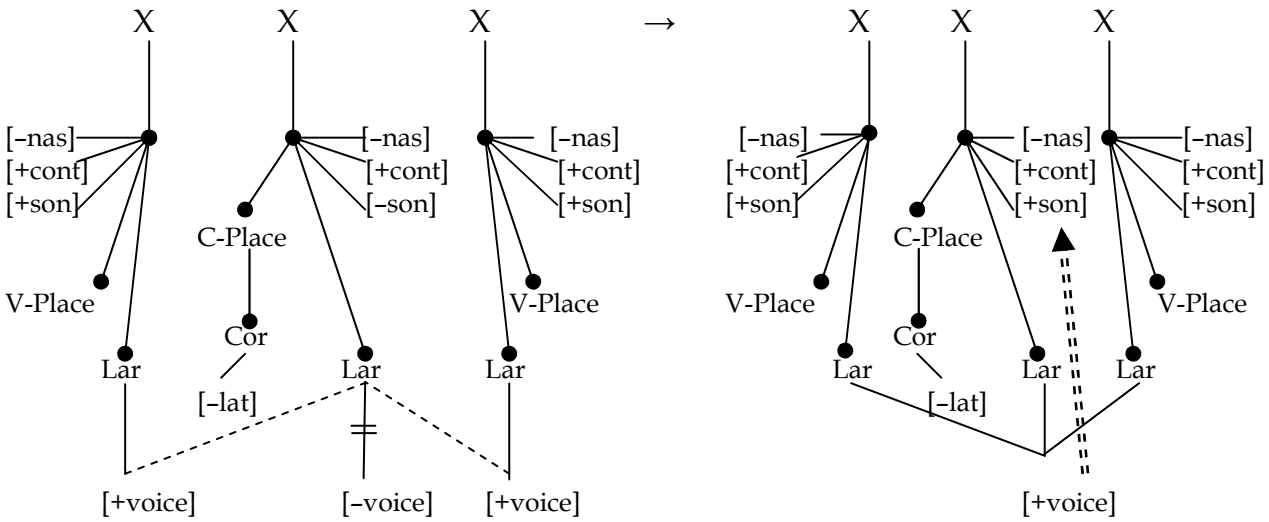

Figure 16: Rhotacism

[115] Roberts (2012) gives a diachronic analysis in which rhotacisation reaches the stem level by the Classical Latin stage, and hence it no longer affects the *prosilire* type (since, under that analysis, prefixes are not part of the stem). And while it could have explained *dirimere* and *diribere* as lexicalised remnants of a previous stage when rhotacism was a word-level rule, it does not say anything about why *dis-* does not combine with vowel-initial stems at a later stage.

[116] Note that instead of a [–son] → [+son] adjustment the C-Place node could also have been deleted, leading to the only [+voice], [+cont], [–son] segment allowed, *viz.* [h]. This was the path taken in Proto-Greek, followed later by deletion of intervocalic [h] (at least this is a possible analysis, see Sihler 1995:171 for data).

4.5. Degemination

4.5.1. General degemination

In both simplex and non-simplex forms every geminate, whether underlying or derived, shortens if it cannot be properly syllabified as a coda–onset sequence or, in the case of [s], as extrasyllabic in a licit environment. This rule is fed by the assimilation of [t] to [s] (4.3) and thus indirectly by contact voice assimilation (4.1). In theory, this regularity allows for simple intervocalic geminates ([Vt.tV]), but also for geminates including a complex onset ([Vt.trV]), a complex coda ([Vnt.tV]) or even both ([Vnt.trV]), since proper syllabification is possible in each of these cases. In fact, only the first two of the four possible types are found, and the second only in prefixed forms (e.g. *attrahere* 'attract' ← *ad*+*trahere*). This seems to be an accidental property resulting from a variety of lexical idiosyncrasies such as the lack of underlying geminates next to a consonant or the lack of prefixes ending in a complex coda.[117] Complex codas immediately followed by complex onsets, however, as in *mulctra* 'milking bucket', are exceedingly rare (see 3.2, subsection 3.3 within Table 6), so geminates of the [Vnt.trV] type are probably barred on a more systematic basis.

Examples of degemination are given in (24) and (25).

(24) Degemination in simplexes

verr- → *versus* 'sweep' PASSPART (cf. *verro* PRESIMPF1SING, *verri* PRESPERF1SING)
fall- → *falsus* 'deceive' PASSPART (cf. *fallo* PRESIMPF1SING, *fefelli* PRESPERF1SING)
mell- → *mel* 'honey' NOMSING (cf. *mellis* GENSING)
oss- → *os* 'bone' NOMSING (cf. *ossis* GENSING)
milet+*s* → *miless* → *miles* 'soldier' NOMSING, see 4.3 above[118]
obsed+*s* → *obsets* → *obsess* → *obses* 'hostage' NOMSING
sumps+*sti* → *sumpsti* 'take' PRESPERF2SING[119]

(25) Degemination in prefixed forms

ex+*salire* → *exilire* 'jump out' ([kss] → [ks])
sus+*spirare* → *suspirare* 'sigh'[120]

[117] The prefix *trans-* ends in a complex coda underlyingly (placeless nasal + [s]), and its [s] is not affected by the general degemination. It is, however, optionally affected by the specific degemination of [s], see 4.5.2.

[118] Words like *miles* scan with a heavy last syllable in preclassical comedy (Plautus), which shows that degemination was not yet fully active at that time. The pronouns *hic* and *hoc* 'this' exceptionally end in an unshortened geminate [kk] even in Classical Latin, as is evidenced by versification and as is explicitly mentioned by the grammarian Velius Longus (*De orthographia,* Keil 1855–78, vol. 7:54: "scribendum per duo *c hocc erat alma parens* aut confitendum quaedam aliter scribi aliter enuntiari" 'the word *hoc* in] *hocc erat alma parens* should be written with double *c* or else one should admit that some things are written one way and pronounced another way', translation mine); cf. also Allen (1978:75–77).

[119] For the analysis of these perfective forms see 6.2.3.2.2.

For comparison, there is no degemination in these and similar prefixed forms:

(26) Lack of degemination in prefixed forms

ad+suescere → *assuescere* 'get used to' ([ssw])
ad+probare → *approbare* 'approve'
ad+quaerere → *acquirere* 'acquire' ([kkw])

Interestingly, the data show that the only consonants affected by the degemination in simplex forms are the coronal continuants [r l s]. The other consonants are exempt from it simply because they never occur in the triggering environment. The consonant [s] is the only segment that undergoes degemination at prefix–stem boundary. This follows by necessity if both prefixes and stems have proper syllabification independently and then resyllabification takes place at the boundary only if without it there would be no onset to the stem-initial syllable (as explained in chapter 7). In such a scenario the only syllabification problem can be caused by a prefix-final or a stem-initial extrasyllabic [s], as in *exilire* and *suspirare* in (25), respectively.[121]

4.5.2. Degemination of [s]

As an extension of the degemination rule, [ss] is shortened in simplexes after any consonant or long vowel even if its syllabification would be possible. These instances of [ss] are all derived via the [t]-assimilation rule (4.3); the lexical frequency of such [ss]'s is increased by the fact that the affix of the third stem of verbs after [d] and [t] is regularly *-s-* rather than *-t-*. Examples:

(27) [ss]-shortening

cad+sus → *cātsus* → *cāssus* → *cāsus* 'fall' PASSPART[122]
mīt+si → *mīssi* → *mīsi* 'send' PRESPERF1SING
vert+sus → *verssus* → *versus* 'turn' PASSPART[123]
spond+sus → *sponssus* → *sponsus* 'promise' PASSPART[124]

---

[120] Note that the degemination in *suspirare* is because [sp] is not an onset cluster in Latin, as opposed to stop + liquid clusters or [sw]. Similarly, the degemination in *exilire* shows that [ks] is not a coda cluster as opposed to e.g. [rs]. Pillinger (1983) as well as Niedermann (1953) suggest that degemination may have taken place in clusters of the type [kkl], [ttr] as well (i.e. where C.CC was a possible syllabification), as in *attrahere* 'pull', though they admit that the evidence for this is meagre.

[121] The verb *surgere* 'rise' shows degemination of [r] if it is analysed on an etymological basis as *sub+regere*, cf. perfective *surrexi*, third stem (supine) *surrectum*. The same stands for *porgere,* a rare by-form of *porrigere* 'extend', etymologically from *por+regere*. In both of these cases, a short vowel was crucially lost historically after the geminate, thus creating the triggering environment for the degemination.

[122] For the lengthening of the vowel see 5.3.2.

[123] *Versus* from *vert+sus* 'turn' PASSPART is homophonous with *versus* from *verr+sus* 'sweep' PASSPART (24) due to the two different degemination rules.

Degemination follows rhotacism and so these intervocalic instances of [s] do not undergo it (no *cāssus* → *cāsus* → ***cārus*). At prefix–stem boundary, the shortening is optional, e.g. *transsilire* ~ *transilire* 'jump over' (← *trans*+*salire*).

At first sight, general degemination appears to be driven by the syllable template, but the specific degemination of [s] does not, since the former reduces unsyllabifiable sequences, while the latter reduces legitimate coda–onset sequences. But on closer inspection the contrast between the two degeminations is not so straightforward. Those codas which consist of a consonant + [s] are, in fact, few and far between. Word-internally a coda [s] can only be preceded by vowels (as in *hostis* 'enemy') and the glides, which have a vocalic structure.[125] Word-finally a coda [s] can be preceded by vowels (as in *mus* 'mouse'), by the glides in four words altogether,[126] by [l] in two rarely used words,[127] variably by [m] in *hiems/hiemps* 'winter' and by [r] in a number of *t*- and *d*-stem nouns and adjectives. Of these, only the last group is robustly attested in the lexicon, and in all of these [rs]-final words the postconsonantal coda [s] emerges as a result of nominative singular suffixation with *-s* followed by (voicing assimilation, then) assimilation of [t] to [s], then by degemination of the general kind:

(28) [r]+stop final stems

misericord+*s* → *misericor*[t]*s* → *misericor*[ss] → *misericor*[s] 'merciful'

The marginal nature of postconsonantal coda [s] may well have contributed to the perception of geminate [ss] after consonants as ill-formed and thus to its reduction to bring the word forms into line with "core" syllabification (not in the technical sense of the term). On the other hand, coda [s] after long vowels was not at all rare: *bēstia* 'beast', *iūstus* 'just', *prīscus* 'ancient', *rōstrum* 'beak of bird' and many others, including most verbs whose imperfective stem ends in [sk], e.g. *crēscere* 'grow', *nōscere* 'know', *hiāscere* 'gape'. Thus syllable structure motivates specific [s]-degemination only in part.

4.6. Nasal place loss before fricatives

The nasal [n] loses its C-Place node before the fricatives [s] and [f], and a placeless nasal results. The placeless nasal never surfaces, before fricatives it always undergoes a further change, *viz.* coalescence with the preceding vowel (see 5.3.4). This happens in simplexes and non-simplexes alike, and is not indicated in the

[124] Note that it is irrelevant whether this rule precedes or follows nasal place loss before fricatives and coalescence; a form like *sponsus* will undergo [ss]-shortening either because of the nasal consonant (like *versus*) or because of the long (nasal) vowel (like *mīsi* or *cāsus*).

[125] The exhaustive list of examples for the latter, also given in 3.2, is this: *maestus* 'grieving', *quaestus* 'asked', *aestus* 'summer', *caestus* 'boxing gloves', *caespes* 'lawn' for [js].C, and *faustus* 'favourable', *haustus* 'swallowed', *Auster* 'southerly wind', *auscultare* 'listen' for [ws].C.

[126] *Aes* 'bronze', *praes* 'guarantor', *laus* 'praise' and *fraus* 'deceit'.

[127] *Puls* 'porridge', *uls* 'beyond'.

writing. The two most typical cases are nasal-final prefixes combining with a fricative-initial stem, and the suffixation of [nt] and [nd]-final stems with [s], since the rule is fed by the assimilation of [t] to [s] (4.3 above). It is possible that in higher styles of speech this rule was suppressed and the nasal was restored to a certain extent as a hypercorrection; this aspect of variation is disregarded here.

Of the nasal-final prefixes *in-* shows the relevant alternation in several forms, e.g. *inscius* 'unaware' [ĩːskius] vs. *inultus* 'unavenged' [inultus]. The alternation is evident also in *manere* [maneːre] ~ *mansi* [mãːsiː] 'stay' INF ~ 1SINGPERF, where the *-s-* is the perfective suffix. For [m] followed by [s] see 4.7 below. Forms where the nasal vowel never alternates with an oral vowel + [n] sequence are discussed in 5.3.4.

4.7. Epenthesis after [m]

When [m] is followed by [s] or [t], no place loss results. In fact, the labial place of the nasal is reinforced by the insertion of an epenthetic [p]. This is a highly systematic process in spite of the fact that there are very few [m]-final stems and consequently very few potential inputs (and the written evidence is also somewhat variable).[128] The set of affected forms comprises the noun *hiem(p)s* 'winter' and the following verbs:

(29) Verbs showing [p]-epenthesis after [m]; all forms INF, 1SINGPERF with *-s-* suffixation (apart from the last six) and PASSPART with *-t-*suffixation[129]

comere ~ *compsi* ~ *comptus* 'comb'
sumere ~ *sumpsi* ~ *sumptus* 'take'
praesumere ~ *praesumpsi* ~ *praesumptus* 'take first'
resumere ~ *resumpsi* ~ *resumptus* 'take back'
consumere ~ *consumpsi* ~ *consumptus* 'use up'
absumere ~ *absumpsi* ~ *absumptus* 'take away'
adsumere ~ *adsumpsi* ~ *adsumptus* 'take to onself'

[128] Álvarez Huerta (2005:153) claims that ancient grammarians' evidence points to this being a purely orthographic convention rather than a phonological rule, quoting Marius Victorinus 1.4 (Keil 1855–78, vol. 6:21). In view of the full context, however, that locus cannot be cited in support of such a position. Before mentioning *hiemps* 'winter', *sumpsit* 'he took', *consumptum* 'used up' Marius Victorinus discusses the neutralisation of voice before [s] in words like *ple*[p]*s* ~ *plebis* 'people', and proffers advice on the spelling of such words. The point he appears to be making with respect to the *sum(p)sit*-type forms is that these are different from the *plebs*-type; since the ⟨p⟩ in these does not alternate with anything, and since leaving it out cannot result in confusion, it should simply not be written. Although he does say that spelling such words with ⟨p⟩ is a mistake (*vitiose scribetis*), he does not imply that the ⟨p⟩ is silent, only that it is not supported by analogy.

[129] Historically all these verbs are prefixed formations based on *emere* 'buy'. Other [m]-final stems take the *t*-suffix with an intervening vowel (*vomere* → *vomitus* 'vomit'), and either do not take the *s*-suffix at all or are irrelevant on account of some idiosyncrasy (e.g. *premere* → *pressi, pressus* 'press').

(29) continued

promere ~ *prompsi* ~ *promptus* 'take out'
demere ~ *dempsi* ~ *demptus* 'take away'
emere (~ emi) ~ *emptus* 'buy'
coemere (~ coemi) ~ *coemptus* 'buy up'
adimere (~ *ademi*) ~ *ademptus* 'buy'
eximere (~ *exemi*) ~ *exemptus* 'take out'
perimere (~ *peremi*) ~ *peremptus* 'annihilate'
redimere (~ *redemi*) ~ *redemptus* 'buy back'

In a feature geometric representation the entire structure of the epenthetic [p] apart from the root node and the skeletal node is explicable from the neighbouring segments (see Figure 17).

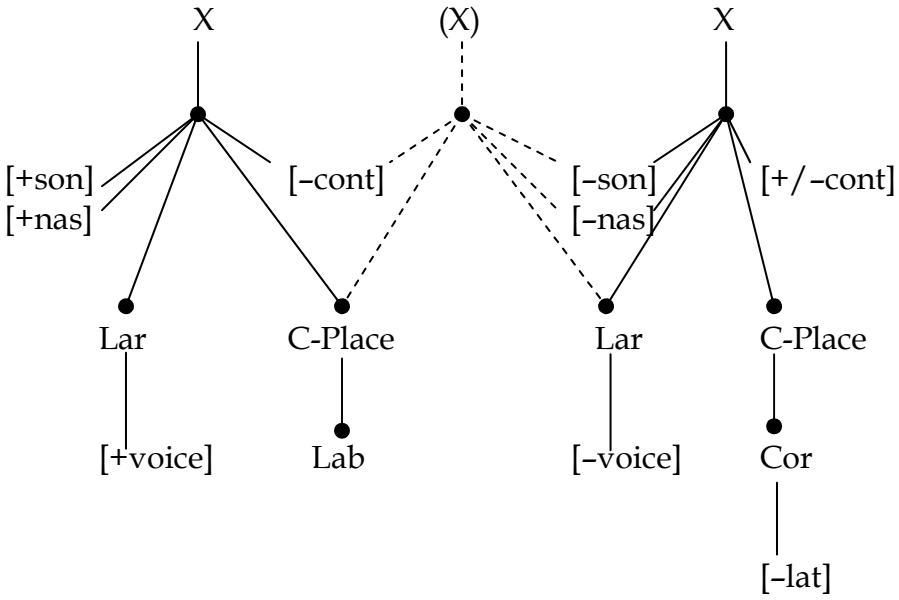

Figure 17: [p]-epenthesis in the environment [m]_[t] and [m]_[s] (collapsed)

Comparative evidence shows that a similar insertion happened historically in the original context [m]_[l] as well (e.g. *exemplum* 'example', *amplus* 'large', cf. de Vaan 2008 s.vv. *emo, amplus*); the context [m]_[r] is not entirely clear from this point of view (cf. Weiss 2009:164).

4.8. Place assimilation

In Classical Latin there are two place assimilation processes. Typically they result in alternations only at prefix–stem boundaries but they are vacuously true of simplex forms as well.[130] The differences between the two processes are as follows:

(30) Place Assimilation 1:
- affects sequences of a non-peripheral (i.e. coronal or placeless) nasal and any stop
- C-Place node of stop links to Root node of nasal
- probably exceptionless (postlexical?)

Place Assimilation 2:
- affects all consonant sequences where [cont] and [son] specifications do not conflict and where C_2 is non-coronal (i.e. stops assimilate to stops, nasals to nasals, and [s] to [f]; cf. the Generalised Place Condition in 8.3.2.3)
- C-Place node of non-coronal C_2 links to Root node of C_1
- results in geminates (coupled with voice assimilation for stops)
- exceptions possible at prefix–stem boundaries

Examples for both types of assimilation can be given from the domain of prefixed words.

(31) Examples of place assimilations

PA 1, [n]: *imbibere* 'drink in', *inquirere* 'inquire' [ŋk] vs. *inest* 'is in'
PA 1, placeless nasal: *componere* 'compose', *conquirere* 'collect' [ŋk], *condonare* 'give' vs. *coire* 'meet', *cō-nubium* 'marriage'
PA 2, [d]: *appetere* 'try to reach', *accipere* 'receive' vs. *adest* 'is present'
PA 2, [b]: *occludere* 'close' vs. *obaeratus* 'involved in debt'
PA 2, [n]: *immittere* 'send in'
PA 2, placeless nasal: *committere* 'bring together'

The rules are formalised in Figures 18 and 19. Both formalisations conflate two configurations each. That of place assimilation 1 (Figure 18) conflates [n] + stop and placeless nasal + stop sequences. That of place assimilation 2 (Figure 19) conflates two configurations as regards the second consonant. C_2 either has a Labial or a Dorsal node, not both; the condition on the assimilation is that C_2 cannot be coronal. Also note that the formulation above for place assimilation 2 ("sequences where [cont] and [son] specifications do not conflict") does not say exactly the same as [αson, βcont] for both segments, as in Figure 19. The latter

[130] In etymologically related words their diachronic reflexes can be recognised in simplexes too, e.g. *singuli* 'one at a time' with [ŋg] but *simplex* 'simple', both from the root **sem-* 'one' (an earlier form of Place Assimilation 1, affecting [m] too), or *sitis* 'thirst' vs. *siccus* 'dry' (< **sit-kos*, Place Assimilation 2).

means identical specification for these features and thus identical sonority. But non-conflicting specifications are also possible when a segment does not have a [cont] and/or [son] feature at all (a possibility not included in Figure 19). This will be relevant to one specific configuration, to be discussed in chapter 11.

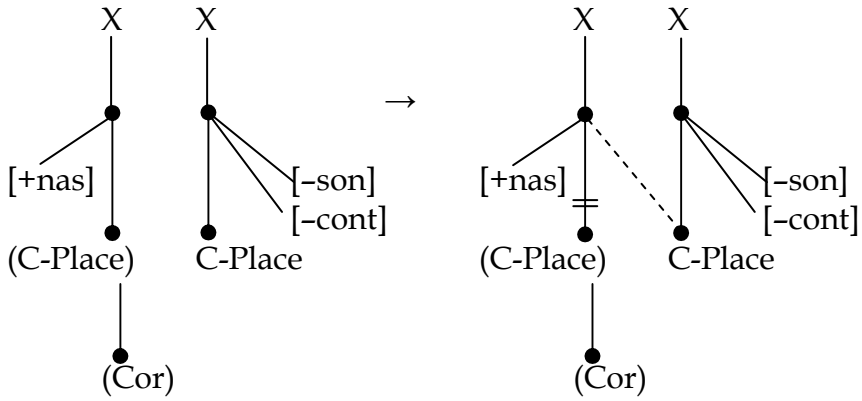

Figure 18: Place assimilation 1 (irrelevant details omitted)

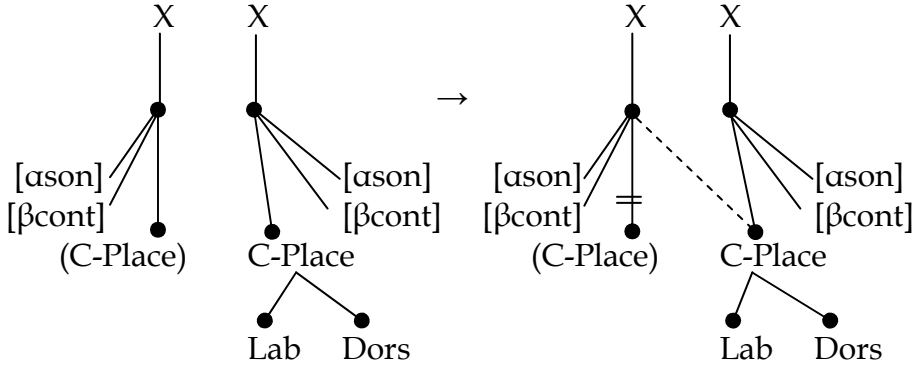

Figure 19: Place assimilation 2 (irrelevant details omitted)

The first consonant in both types of place assimilation may or may not have a C-Place node. If it does have one (i.e. it is not the placeless nasal of *con-*), that C-Place node is delinked. The case of the placeless nasal is particularly interesting. The main point is that the placeless nasal of *con-* is able to undergo both place assimilation 1 and place assimilation 2 (and also undergoes total assimilation to liquids, see 8.2.3.2) but when it is followed by [n], neither place assimilation 1 nor place assimilation 2 can take place, since [n] does not satisfy the structural description of C_2 for either. It is not a [–son] segment, so it does not trigger place assimilation 1, and it is coronal, so it does not trigger place assimilation 2. In this case the placeless nasal is lost, probably via coalescence with the preceding vowel (see 5.3.4) — or just possibly lost entirely with compensatory lengthening — (see *cō-nubium* above). When it is followed by a vowel, again the nasal cannot acquire its V-Place node, since V-Place nodes do not link to consonants (unless as secondary place); so the placeless nasal is lost again, and in the resulting hiatus no compensatory lengthening is possible (see *coire* above).

The suffix of the animate accusative singular is a placeless nasal with all vowel-final stems (for a detailed analysis see chapter 6). In the default case this merges with the stem-final vowel, a process resulting in a long nasal vowel (see 5.3.4). However, if the clitic *-dem* 'same' is added to the accusative pronouns, the placeless nasal undergoes place assimilation 1 and acquires a coronal place node from the stop [d]. The same happens to the plural genitive of these pronouns, where the suffix ends in a placeless nasal. Thus from the same pronominal stem we get the following ACCSING and GENPLUR forms:

(32) Alternations involving the placeless nasal

eam [eãː] 'she' ACCSING ~ *eandem* [eandẽː] 'she, the same' ACCSING
earum [eaːrũː] GENPLUR ~ *earundem* [eaːrundẽː] GENPLUR, stem: *ea-*

4.9. Dark and clear [l]

There is compelling evidence that [l] was strongly velarised in coda position, and it is highly probable that it was somewhat palatalised in gemination and before [i]. In onset position it was, in all likelihood, velarised before all vowels except [i].[131] Since [l] does not figure in highly productive morphological processes, there are very few alternations in the strict sense of the word that are based on the secondary articulations of [l]; nearly the only such cases are [l]-final stems affixed with vowel-initial vs. consonant-initial suffixes. But these, along with other patterns visible in the lexicon, make it quite clear that, when in the appropriate environment, [l] had a strong velarising effect on preceding short vowels. This is actually the only verifiable case of secondary articulation in the Latin consonant system. The following examples illustrate this:

(33) The darkening effect of single [l] in coda and before vowels other than [i]

sepelire 'bury' INF ~ *sepultus* PASSPART ~ *sepulchrum* 'grave'
pellere 'beat' INF ~ *pulsus* PASSPART
velle 'want' INF ~ *velim* SUBJ1SING ~ *vult* 3SING ~ *volumus* 1PLUR
familia 'household' ~ *famulus* 'servant'
ocellus 'eye', *agellus* 'field' ~ *filiolus* 'son', *amiculus* 'friend', all DIMIN

The conditions of the darkening effect of [l] cannot be defined with precision synchronically because they were obscured by the stress shift mentioned in 5.1.1,

[131] The evidence has been thoroughly assessed in the diachronic literature, see Sen (2012:472–473 and 2015:15 sqq.), Meiser (1998:68–69), Leumann (1977:85–87). The primary direct evidence is a statement by Pliny the Elder reported to posterity by Priscian (book 2 of *Institutiones,* Keil 1855–78, vol. 2:29), the indirect evidence comes from the prehistory of Latin (vowel weakening and the effect of [l] on preceding vowels) as well as the Romance languages ([l] > [w] in French, for instance *alba* 'white' > *aube* 'dawn' or *alter* > *autre* 'other'). Sen (2012:472) argues that onset single [l] was gradiently velarised depending on the following vowel.

by analogical levelling and by recent borrowings. The details of the diachronic process can be found in the major handbooks, e.g. Leumann (1977:85–7), and most recently in Sen (2015:15–41). The most important factors are the following:

- the darkening effect is stronger in non-initial than in initial syllables
- the darkening effect is stronger in coda position than in onset position
- the darkening effect is also dependent on the segment preceding the vowel before the [l] (cf. *filiolus* vs. *amiculus* above).

There are thus two interrelated sets of facts. One is the distribution of the variants of [l]; the other is the spreading of the secondary (i.e. vocalic) place features of [l] onto the preceding short vowel. As for the positional variants, it is clear that at least two must be assumed, one with a V-Place node dominating a Dorsal node with [+high] [+back], the other without. The "plain" [l] is to be assumed word-initially and after consonants. The representations are shown in figures 20 and 21.

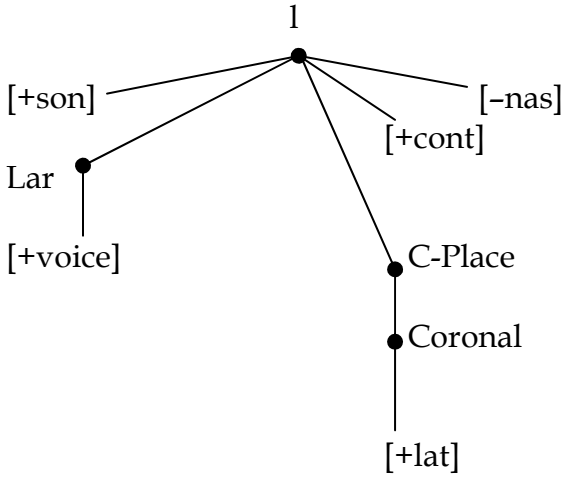

Figure 20: Full structure of plain [l]

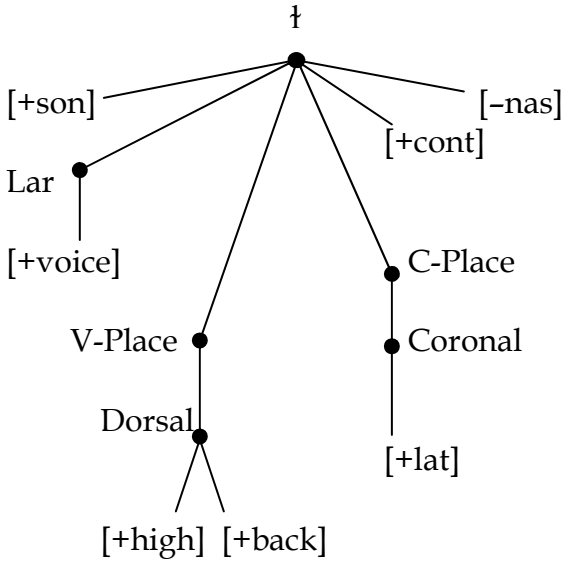

Figure 21: Full structure of velarised [l] (repeated from Figure 5)

Historical evidence points to a palatalised quality in geminated [ll] and in [l] before [i]. Representationally this would mean an [l] with a V-Place node dominating [–back] and possibly also [+high]. Since, however, it is impossible to find clear cases of the synchronic spreading of palatality from [l], I will not assume such a representation here (but I do not thereby claim that palatalised surface variants did not exist).

As for the spreading, it is clear that there are two distinct outcomes, [o] and [u]. This implies that, depending on the environment in somewhat opaque ways, either only [+back] spread, leading to [o], or both [+back] and [+high], leading to [u], as in *vel-* → *volumus*, and in *vel-* → *vult* or *sepel-* → *sepultus*, respectively. In the latter case the entire Dorsal node spreads to the preceding vowel (Figure 23); in the former, only a single feature (Figure 22).

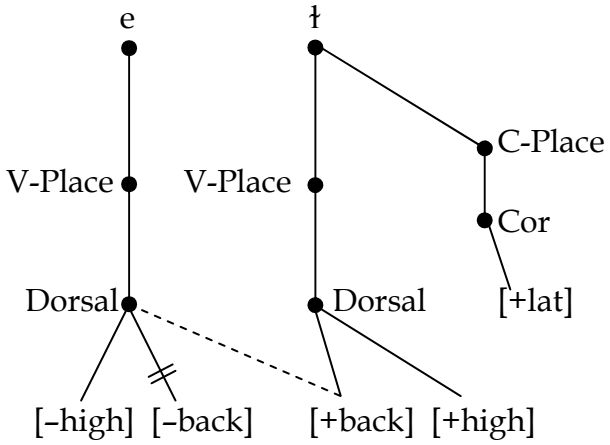

Figure 22: [el] → [ol] (irrelevant details omitted)

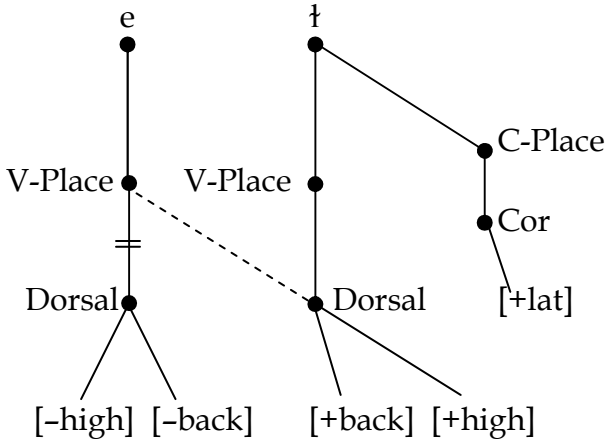

Figure 23: [el] → [ul] (irrelevant details omitted)

4.10. Final stop deletion

A process that deletes a final unsyllabifiable stop affects the neuter stems *cord-* 'heart' and *lact-* 'milk' when zero-suffixed, turning them into *cor* and *lac*, respectively (both NOMACCSING). In terms of syllable structure this rule is related to the degemination seen in 4.5.1; the motivation in both cases seems to be a segment that cannot be assigned a syllabic position. The cluster [kt] clearly violates the Sonority Sequencing Principle; and while [rd] does not, it was seen in chapter 3 that voiced stops are not allowed in complex codas and are highly restricted in simple codas. Not all unsyllabifiable consonants are deleted, however; as will be seen in 5.2.1, a final [r] following a stop is saved by vowel insertion.

4.11. Total assimilation at prefix–stem boundary

A general process of total assimilation is attested at prefix–stem boundaries only, and will be discussed in 8.3.2.3.

5. Processes affecting vowels

This chapter discusses the alternations that vowels enter into in Classical Latin. The three sections of the chapter present qualitative alternations, vowel–zero alternations, and length alternations, respectively. The section on qualitative alternations begins with the description of a diachronic change that does not strictly belong to the synchronic phonology of Classical Latin but is nevertheless responsible for a conspicuous pattern of fossilised alternations in a significant part of the lexicon, hence the decision to include it here.

5.1. Alternations in vowel quality

5.1.1. The Old Latin weakening

In about the 6th–5th centuries BC a pervasive neutralisation affecting short vowels in non-initial syllables took place. The generally accepted explanation is that in this period word stress was on the first syllable and the neutralisations (mergers) in non-initial syllables are weakenings that are cross-linguistically typical of unstressed vowels. Also, along with syncope (the diachronic loss of short vowels in certain internal syllables), this weakening is practically the sole evidence for word-initial stress in this early period.

The synchronic reflexes of the Old Latin weakening are visible but rather unsystematic in Classical Latin. The change that resulted in the Classical stress pattern (penult if it is heavy and antepenult if the penult is light) had completely obscured the original motivation, and other factors had interfered heavily, including analogical levelling, borrowing and later segmental changes — not always clearly distinguishable from each other. For this reason it is impossible, in my view, to include the weakening in the synchronic phonology of the language. Where differences in form are historically due to the weakening, they must be regarded as lexicalised. Since, however, the patterns introduced by this change are found in a large part of the vocabulary, the basic points of its reconstruction will be presented here.[132]

[132] This brief summary mainly follows Sen (2015:80–88), but the fundamentals with large sets of data can generally be found in the comprehensive discussions of the history of Latin (e.g. Leumann 1977:79–91, Sihler 1995:59–64, Meiser 1998:67–73, Baldi 2002:253–256 or Weiss 2009:116–121). Touratier (2005:217–221) includes some instances of this weakening in his description of Classical Latin synchronic phonology under a morphological regularity he calls *apophonie synchronique*, covering lexical items he analyses as compositional (e.g. *conficere* 'accomplish') as opposed to lexical items he analyses as simplexes (e.g. *interficere* 'kill', both verbs compound of *facere* 'do'). I completely disregard the forms of diachronic weakening that affected

Some of the most obvious examples come from the set of prefixed verbs, since those can easily be compared to unprefixed base forms (although such examples cannot be found for all phonological configurations). The fundamental regularity for medial open syllables is that all short vowels were raised to [i]:

(34) Open syllable weakening

eligere 'choose' (cf. *legere* 'gather')
confícere 'accomplish' (cf. *fácere* 'do')
cupidítas 'desire' (cf. *cupidus* 'desiring' < **kupido*-)
capítis 'head' GENSING (cf. *caput* NOMSING)

In closed syllables the mergers were less pervasive; rounded vowels collapse in [u], and [a] raises to [e]:

(35) Closed syllable weakening

confectus 'accomplished' (cf. *factus* 'done')
obsessus 'besieged' (cf. *sessus* 'seated')
euntis 'going' GENSING (< **ejontes*)
adductus 'led on' (cf. *ductus* 'led')

The presence of onset [r] after the affected vowel had a lowering effect in open syllables and allowed the raising to go only as far as [e]:

(36) Weakening before [r]

peperi 'I brought forth' (cf. *parere* INF)
temperare 'regulate' (cf. *tempus* < **tempos*)

The labial consonants [p b f m w] affected preceding vowels in open syllables as is indicated by orthographic variation:

(37) Weakening before labials

obstipescere/ obstupescere 'be stupefied' (cf. *stupere* 'be stunned')
surripere/surrupere 'steal' (cf. *rapere* 'take away')

Whether this variation in the writing points to phonological variation between [i] and [u], or to a high front or central rounded vowel ([y], [ʏ] or [ʉ], cf. Allen 1978:59 or Sen 2015:83) is a question I leave open.

Dark [l] (cf. 4.9) also influenced the course that weakened vowels took and led to [u] or [o] where otherwise [i] or [e] would be expected:

vowels in final syllables, since those left no alternations behind, or at last hardly any compared to medial weakening.

(38) Weakening before dark [l]

ins<u>u</u>lsus 'dull', orig. 'salted' (cf. *s<u>a</u>lsus* 'salted')
ad<u>o</u>lescere 'grow up' (cf. *<u>a</u>lere* 'nourish')

Forms involving syllables closed by glides were mentioned in 2.2.2. In these, regular diachronic processes (*[ew] > [uː] and *[ej] > [iː]) produced the long vowels after regular weakening:

(39) Closed syllable weakening before glides

*[rekajd-] > *[rekejd-] > [rekiːd-] *recīdere* 'cut back/up' (cf. *caedere* 'cut')
*[reklawd-] > *[reklewd-] > [rekluːd-] *reclūdere* 'close' (cf. *claudere* 'close')

At the same time, a large number of words do not show the effect of Old Latin weakening (*sep<u>e</u>lire* 'bury', *al<u>a</u>cer* 'swift', *perp<u>e</u>ti* 'tolerate' etc.). Different explanations are found in the relevant literature, including analogical levelling, recomposition and vowel harmony-type retention, but with these I will not be concerned here.

5.1.2. Synchronic alternations between the short vowels

The most frequent quality alternations affects the two short palatal vowels [i] and [e]. There are four specific environments that trigger an alternation between these two vowels. All the four are effective only in non-initial syllables, but this is caused by three different factors. The alternation in 5.1.2.1 results diachronically from the Old Latin Weakening discussed in the previous section, which only affected non-initial syllables. Those in 5.1.2.2 and 5.1.2.3 are confined to non-initial syllables simply because synchronically there are no monosyllabic [i]-final or [is]-final stems. That in 5.1.2.4 is found in suffixes only, which evidently cannot be the first syllable of any word form.

5.1.2.1. Alternation in closed vs. open syllables

In non-initial syllables, [i] is very often found in open syllables while [e] in closed syllables, depending on how suffixation affects the syllabification of the post-vocalic consonant. Examples of nouns and adjectives exhibiting this alternation are most easily found in the third declension (consonant- and *i*-stems), where the NOMSING suffix is either zero or *-s*, but all other suffixes begin with a vowel (such as the GENSING suffix *-is*) and thus the stem-final syllable is closed in the NOMSING but open in all other cases:

(40) [e] ~ [i] alternation

NOMSING	GENSING	gloss
pecten	*pectinis*	'comb'
nomen	*nominis*	'name'
pontifex	*pontificis*	'priest'

A stem-final coronal stop is regularly lost before the *-s* suffix (see 4.3 and 4.5.1):

(41) [e] ~ [i] alternation with coronal stop loss

NOMSING	GENSING	gloss
miles (← *-et+s*)	*militis*	'soldier'
comes (← *-et+s*)	*comitis*	'companion'
deses (← *-ed+s*)	*desidis*	'idle'
obses (← *-ed+s*)	*obsidis*	'hostage'

Many verbs in their various forms and other derived words show the same phonological relation:

(42) [e] ~ [i] alternation in verbs

perficere 'achieve' INF	*perfectus* PASSPART
praecinere 'sing' INF	*praecentor* 'lead singer'
accipere 'get' INF	*acceptum* PASSPART

While the number of forms displaying this alternation is high, there are also many exceptions to it, *viz.* non-alternating short palatal vowels in analogous environments. For instance, non-alternating [e] is found in several verbs:

(43) Lack of [e] ~ [i] alternation in verbs

perpeti 'tolerate' INF	*perpessus* PASSPART
aggredi 'attack' INF	*aggressus* PASSPART

Non-alternating [i] is found in many nouns:

(44) Non-alternating [i]

NOMSING	GENSING	gloss
calix	*calicis*	'chalice'
sanguis (← *-in+s*)	*sanguinis*	'blood'
lapis (← *-id+s*)	*lapidis*	'stone'

Non-alternating [e], however, is only found in two nouns and two adjectives. They clearly constitute a minor phonological pattern with stem shapes of the form C[e]C(C)[et]-, including a single consonant in the middle in three out of the four cases and two consonants only in *perpes*, an etymologically prefixed word:[133]

(45) Non-alternating [e]

NOMSING	GENSING	gloss
seges (← *-et+s*)	*segetis*	'cornfield'
teges (← *-et+s*)	*tegetis*	'covering'
hebes (← *-et+s*)	*hebetis*	'blunt'
perpes (← *-et+s*)	*perpetis*	'continuous'

5.1.2.2. Lowering before [r]

The high vowels [i] and [u] are lowered to [e] and [o], respectively, before [r] in a derived environment. The two subcases are (i) affixation with a morpheme boundary between the vowel and the [r] (46, 47), (ii) [r] resulting from rhotacism[134] (48, 49) as opposed to an underlying [r] (on rhotacism see 4.4). Examples for both are given below.

(46) Pre-r lowering of [u] before morpheme boundary[135]

fu- 'be' → *fore* INF, *foret* 3SINGPASTSUBJ

(47) Pre-r lowering of [i] before morpheme boundary[136]

capi-o, capi-s, capi-a-t… ↔ *cape-re, cape-re-t...*
'catch' 1SING, 2SING, 3SINGSUBJ ↔ INF, 3SINGPASTSUBJ

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[133] In Latin historical linguistics the *seges*-class falls under the generalisation called *alacer*-rule, which describes the lack of vowel weakening in the environment (C)V_iCV_i, see e.g. (Weiss 2009:118).

[134] This feeding relationship is mentioned in passing by Uffmann (2007:158), but not elaborated in detail. In Latin historical linguitics it has long been known that rhotacism *qua* sound change preceded lowering *qua* sound change (e.g. Leumann 1977:51); in that context it is the *vir* 'man', *hircus* 'goat' type words (see below) that pose a problem and require other explanations.

[135] This is the only example, a highly defective verb overlapping in its paradigms with *esse*. The other so-called *u*-stem verbs (e.g. *metuere* 'be afraid') only take vowel-initial allomorphs (for more details see chapter 6).

[136] This environment only emerges with what are called (on an etymological basis) short *i*-stem verbs. As I will argue in chapter 6, there appear to be compelling reasons to believe that such verbs were possibly reanalysed as consonant stems in some of their forms, and so the new morphological analysis was *cap-ere, cap-ere-t* etc. with a different suffix allomorph, and there was no lowering before [r]. The lowering of [u] in *fore* and the lowering of both short high vowels before [r] resulting from rhotacism is not affected by this reanalysis.

(48) Pre-r lowering of [u] fed by rhotacism

NOMSING	GENSING	gloss
tempus	*temporis*	'time'
corpus	*corporis*	'body'
pignus	*pignoris*	'pledge'

(49) Pre-r lowering of [i] fed by rhotacism

NOMSING	GENSING	gloss
cinis	*cineris*	'ash'
cucumis	*cucumeris*	'cucumber'
pulvis	*pulveris*	'dust'

It is clear that neither the [i] → [e] / _[r] nor the [u] → [o] / _[r] rule operates in nonderived environments:

(50) [ir] and [ur] in nonderived environments

vir 'man', *levir* 'brother-in-law', *satira* 'satire', *hircus* 'goat'…
fulgur 'lightning', *cicur* 'tame', also in suffixed forms *fulguris, cicuris* GENSING…

At compound boundaries the lowering rule does not work:

(51) No lowering in compounds

semi-rasus 'half-shaven', *semi-rotundus* 'semicircular'

What this means is that compounds do not constitute derived environment in the required sense. Since many of them are highly transparent and on occasion appear to be of the "Augenblicksbildung" (hapax legomenon) kind, it is unlikely that they would all be lexicalised. Thus the only plausible explanation that remains is that compounding as a morphological operation is assigned to a different level and thus either follows the lowering rule (and thus counterfeeds it) or precedes it and so does not constitute a derived environment.

Interestingly, however, there are two examples of lowering at compound boundary: *legerupa* 'law-breaker' (← *leg-* 'law' + *rup-* 'break') and *viveradix* '(plant) having root' (← *vivus* 'live' + *radix* 'root'). While both forms exhibit variation in the surviving manuscripts of the relevant texts and are somewhat contested by textual critics, there is at least a likelihood that they have historical reality.[137] If we take

[137] Both forms are mentioned in Lindsay (1894:192 and 373) and Leumann (1977:81, 280 and 390), and *legerupa* is mentioned in Weiss (2009:264). *Legerupa/legirupa* is found in Plautus' comedies (considerably earlier than the classical period) four times, and once in Prudentius. Editors of

these forms at face value, the implication is that at some not so distant point in the history of the language compounds did constitute derived environment for lowering before [r], and the latter phonological rule shifted levels later. Since, however, there is no evidence whatsoever that the suffixed and the rhotacised forms failed to also constitute derived environment for the same rule at that time, it is more likely that rule scattering had taken place (for the notion see Bermúdez-Otero and Trousdale 2012, Bermúdez-Otero 2006:506), i.e. pre-[r] lowering operated for a while both at the level of compounding and at the level of case and verb suffixation, but was later confined to the latter. At any rate, given that all the data we have are two words of which one is disputed, I will not pursue this conjecture any further.

5.1.2.3. Word-final lowering

Word-final short [i] is categorically banned in Classical Latin. When a stem that ends in [i] is zero-suffixed, short [i] is lowered to [e]. This is apparent in two types of forms: nominative-accusative singular *i*-stem neuter nouns and adjectives, and imperatives of verbs whose imperfective stem ends in [i]:

(52) Word-final lowering

mari- 'sea' → *mare* NOM/ACCSING (cf. *mari-a* NOM/ACCPLUR)
celeri- 'swift' → *celere* NOM/ACCSINGNEUT (cf. *celeri-a* NOM/ACCPLURNEUT)
capi- 'catch' → *cape* IMP (cf. *capi-o* 1SING, *capi-unt* 3PLUR)

As I explain later in chapter 6, an alternative analysis is possible for the latter category, *i*-stem verbs. Under that analysis, the imperative is analysed as a consonant-stem form suffixed with the usual consonant-stem ending *-e* and is then not an example of word-final lowering.

5.1.2.4. Alternation in suffixes

In some suffixes one finds the two vowels alternating, and in verbal as well as nominal inflectional morphology they both alternate with zero (though not with each other in the same suffix). One clear example is the nominal suffix *-itas/-etas/-tas*; there is also a pair of adjectival suffixes *-ius/-eus* (e.g. *eximius* 'exceptional' vs. *aureus* 'golden'), but for their distribution no phonological conditions can be identified. As regards the former, the regularity very clearly is that if the stem ends in [i], the variant can only be *-etas*, in all other cases mostly *-itas*, though after continuants a vowelless allomorph *-tas* is found in a handful of words:

Plautine comedies usually settle for *legirupa*, considered by Lindsay the inferior reading. *Viveradix* is also attested as *viviradix* and is mostly found in Pliny and Columella, both 1st c. AD.

(53) Alternations in suffixes

novus 'new' → *novi̲tas* 'novelty'
celeber 'frequented' → *celebri̲tas* 'multitude'
vastus 'empty' → *vasti̲tas* 'waste land'…
socius 'companion' → *socie̲tas* 'fellowship'
ebrius 'drunken' → *ebrie̲tas* 'drunkenness'
varius 'variegated' → *varie̲tas* 'variety'
contrarius 'opposed' → *contrarie̲tas* 'opposition'
pauper 'poor' → *paupertas* 'poverty'
difficilis 'difficult' → *difficultas* 'difficulty'

The alternation between the two vowelled variants is driven by the constraint that bans a sequence of two short [i]'s (thus ***sociitas,* ***ebriitas* etc. are impossible).[138] This is all the more interesting given the existence of the vowelless variant, since at a purely descriptive level *socitas, ebritas* etc. would be possible both morphologically and phonologically.[139]

The suffixes of verbal and nominal inflection are discussed in chapter 6.

5.2. Vowel–zero alternations

5.2.1. Before stem-final [r]

There is a widespread [e] ~ Ø alternation found in the final syllable of nominal stems between a stop and a stem-final [r]. The vowel appears if the [r] is not followed by a vowel; if it is, the vowel is absent:[140]

(54) [e] ~ Ø alternation before stem-final [r]

NOMSING	GENSING	gloss
pater	*patris*	'father'
mater	*matris*	'mother'
celeber	*celebris*	'frequented'
ager	*agri*	'field'
acer	*acris*	'sharp'
liber	*libri*	'book'

[138] Note, however, that a sequence of a short and a long [i] is allowed, as attested in the GENSING and PLURNOM forms of *-ius*-words, e.g *socii* 'companion's' or 'companions'. Sequences of two short [i]'s appear marginally and optionally in perfective verb forms, where the second of the two vowels is practically always stressed, see 6.2.3.2.3.

[139] It goes without saying that I am not here taking sides on the question of the etymology of these forms.

[140] It is interesting to note that the instances of this alternation go back to two (sets of) completely unrelated sound changes. The alternation in the family relation terms including *pater, mater* goes back to Proto-Indo-European ablaut and is widely attested in the related languages. Most of the other instances result from a combination of sound changes specific to Latin and hence much more recent (Weiss 2009:123).

The [e] is present not only when the syllable is final, witness *celeberrimus* 'most frequented', *paternus* 'fatherly/paternal'. It appears that the alternation is best described as vowel epenthesis rather than deletion, since for the latter there would be many counterexamples:

(55) non-alternating [e] in the same environment

NOMSING	GENSING	gloss
socer	*soceri*	'father-in-law'
cicer	*ciceris*	'chickpea'
uber	*uberis*	'fertile'
līber	*līberi*	'free'
later	*lateris*	'brick'

By contrast, if the alternating stems are represented as vowelless underlyingly, the insertion is forced by the phonotactics, since a word-final or preconsonantal stop+[r] sequence is ill-formed for sonority reasons. It is also clear that the vowel insertion must precede the rule that deletes unsyllabifiable consonants (manifesting itself in degemination and stop-deletion in *cor* and *lac*, see 4.5 and 4.10, respectively), otherwise the [r] would be deleted as well and no vowel-insertion would take place. The rule can be formalised in the following (non-geometrical) fashion:

(56) The [e]-insertion rule

$$\varnothing \rightarrow [e] \,/\, [-son, -cont] \_ [r] \{C, \#\}$$

In some cases the outcome of the epenthesis seems to be lexicalised. For instance, the adjective *superus* 'that is above', based on *super* 'above' shows only vowelled forms, and so does the verb *superare* 'rise above'. The derived adjective *supremus* 'topmost, last', however, shows the vowelless stem variant, and so does the adveb *supra* 'on the top', which implies that this stem was originally a vowelless, epenthesising stem.

5.2.2. Prevocalic deletion of back vowels

In derived environments, the back vowels [a] [o] are deleted when another vowel follows. Examples abound in the relevant types of nominal declensions and in verbal imperfectives. A systematic discussion of these is found in chapter 6, but a couple of examples are given here:

(57) Back vowel deletion

ara+*īs* → *arīs* 'altar' DATABLPLUR
amā+*ō* → *amō* 'love' 1SING
amā+*ē*+*t* → *amet*[141] 'love' 3SINGSUBJ
domino+*īs* → *dominīs* 'lord' DATABLPLUR
domino+*ī* → *dominī* 'lord' NOMPLUR

The deletion requires a following filled syllable nucleus rather than a segment vocalic in its internal structure (i.e. a segment possessing a V-Place node) or an empty vowel. That a structurally vocalic segment is not enough is made clear by the combinations in similar environments of the back vowel [a] and the glide [j], where there is no change apart from concatenation (other derived combinations of a back vowel and a glide do not occur):

(58) No deletion before [j]

ara+[j] → [aːraj] 'altar' (written ⟨arae⟩) GENDATSING, NOMPLUR

An empty vowel also does not induce deletion, but is instead filled by the vowel before it via linking to its root node (irrespective of its quality). This process is described phonologically in 5.3.3. below; the morphological contexts in which empty vowels are found are presented in chapter 6.

The question whether the process is relevant to the vowel [u] is essentially a morphological one and its aspects pertaining to inflection are also discussed in detail in chapter 6. The vowel [u] occurs in derived prevocalic environments in [u]-final nouns stems suffixed with the GENPLUR ending [ũː] (e.g. *tribuum* [tribuũː] 'tribe' GENPLUR), and in adjectives where the gender markers follow a relative stem ending in [u] (e.g. *exiguus* ~ *exigua* ~ *exiguum* 'small' MASC ~ FEM ~ NEUT). In the case of verbs there are reasons to believe that what are traditionally called *u*-stems in fact end in a sequence [uw] except for the strongly defective verb *fore* 'be', whose relevant forms are the *a*-suffixed subjunctives (practically only *fuat* SUBJ3SING). The [u] is never lost in these cases; the only instance when it is lost is in the DATABLPLUR of some *u*-stem nouns (e.g. *portibus* from the stem *portu*- 'port'). Since, however, many nouns in the same category do not show loss of [u] (e.g. *tribubus* 'tribe' DATABLPLUR), and since heteroclisy is a pervasive feature of nominal declension, the *portibus*-type data are probably best analysed as heteroclitic consonant-stem forms rather than forms involving [u]-loss. The upshot is that [u] is indeed excluded from the rule of prevocalic back vowel deletion, which is thus formalised (non-geometrically) in the following way:

[141] The shortening of the [eː] before word-final [t] is an independent process, see 5.3.1.

(59) The vowel deletion rule

V[+back, –high] → ∅ / _V (in derived environments)

It appears that the loss of non-high back vowels is never fed by prefixation, as forms with *pro-* and *con-* amply show, e.g. *proavus* 'great-grandfather', *coactus* 'coerced', the latter with prevocalic loss of its placeless nasal (see 5.3.4).

5.2.3. Vowel–zero alternation in suffixes

In the discussion of the suffix *-itas/-etas/-tas* in 5.1.2.4 it was already seen that zero was a possibility in the place of the suffix-initial palatal vowel. There, however, the focus was on the regularity governing the distribution of the two vowelled variants rather than on the vowel–zero alternation. Some other derivational suffixes show an [i] ~ Ø alternation, and in verbal inflection [i] ~ Ø and [e] ~ Ø alternations are found too. For example, one may consider the noun-forming suffix -(*i*)*mentum*:[142]

(60) V ~ Ø alternation in suffixes

alimentum 'nourishment'
sedimentum 'settling'

fragmentum 'fragment'
armentum 'cattle'
augmentum 'growth'
fermentum 'yeast'
incrementum 'increase'
pigmentum 'colour'

The choice of the suffix cannot be motivated phonotactically, since the cluster [gm] is only ever found in [k]-final and [g]-final stems affixed with *-mentum* or *-men*, an etymologically and functionally related ending.[143] By contrast, a form such as ***almentum* without the suffix-initial [i] would be perfectly well-formed, since the cluster [lm] is found in simplex forms (e.g. *ulmus* 'elm-tree', or indeed *almus* 'nourishing' from the same etymological root as *alimentum*).

Many examples of vowel–zero alternations are discussed in chapter 6, which presents the verbal and nominal inflection, the extensive and varied allomorphic variation found in it and its phonological conditioning in detail.

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[142] Note that in many cases the stem itself ends in *ī* and so while the form appears to end in ⟨imentum⟩, the suffix itself is *-mentum*, e.g. *condīmentum* 'spice', *detrīmentum* 'rubbing off'.

[143] Actually, voiced obstruents are never found in coda position in unprefixed and uncliticised forms except for the case above plus the final [d] of neuter pronouns (see chapter 3). At prefix–stem boundaries different generalisations are valid.

5.3. Length alternations

Systematic length alternations in Latin include the shortening of long vowels in several environments, the lengthening that accompanies the devoicing of voiced stops, the lengthening resulting from coalescence with an empty vowel, and the lengthening and concomitant nasalisation resulting from coalescence with a placeless nasal. These will now be discussed in this order. The historical lengthening following loss of [s] is not a systematic synchronic process any longer; it is discussed in 4.2 above and in chapter 8.

5.3.1. Shortenings

Long vowels are systematically shortened in the following environments:

(i) before [nt], [nd]
(ii) before another vowel
(iii) before word-final [t]
(iv) before word-final liquids in polysyllables.

In (i) and (ii) nothing else matters but the following segmental portion. By contrast, following [t] and the liquids only have a shortening effect word-finally, and the liquids only in words of more than one sylable. Some of these environments are made up of a single affix; final shortening [t] is always the 3SING affix (but distributionally all final [t]'s are preceded by short vowels, e.g. *caput* 'head'), shortening [nd] is the PARTPASSFUT affix; and the shortening effect of [l] is only visible in nouns derived with the suffix *-āl(i)-*, but these processes are exceptionless all the same. Examples:

(61) Exampes of vowel shortening

(i) *vidē-* 'see', *amā-* 'love' → *vidĕnt, amănt* 3PLUR, *vidĕntem, amăntem* PARTACCSING, *vidĕndus, amăndus* PARTPASSFUT
(ii) *vidē-* 'see' → *vidĕo* 1SING, *vidĕam* 1SINGSUBJ
(iii) *vidē-* 'see', *amā-* 'love' → *vidĕt, amăt* 3SING
(iv) *videā-* 'see' SUBJ → *videăr* 1SINGPASSSUBJ
oratōr- 'speaker' → *oratŏr* NOMSING (cf. *oratōris* GENSING)
animāl(*i*)- 'animal' → *animăl* NOMSING (cf. *animālis* GENSING)

Monosyllables show shortening only before [t] and [nt] (word-finally [nd] does not occur so it never creates a monosyllabic environment):

(62) Shortening in monosyllables

năt, nănt 'swim' 3SING, 3PLUR, *dĕt, dĕnt* 'give' 3SINGSUBJ, 3PLURSUBJ; but *pār* 'equal', *fūr* 'thief', *cūr* 'why', *sōl* 'sun' with no shortening

Shortening in hiatus has only the exceptions that were listed in 2.2.3: the *ē*-stem noun DATGENSING forms ending in *-iēī*, the disyllabic forms of the verb *fieri* 'become' (*fīo* 1SING, *fīunt* 3PLUR, *fīat* 3SINGSUBJ) and the pronominal genitives ending in *-īus*.

5.3.2. Lengthening before voiced stops

It is a clearly observable regularity that in non-final syllables short vowels undergo lengthening before an underlying voiced stop when that stop is devoiced via contact voice assimilation.[144] There are exceptions, and there is also the occasional problem of determining vowel length in closed syllables, where poetic metre provides no information. Nevertheless, there is a clear majority of eligible forms where this lengthening can be ascertained.

(63) Lengthening concomitant on devoicing: some data

ag- → *āctus* 'do' PASSPART
reg- → *rēctus* 'govern' PASSPART
cad- → *cāsus* 'fall' PASSPART

All the creditable examples have underlying [g] or [d]. The labial stop [b] does not figure either because it is never immediately followed by a voiceless obstruent (e.g. the third stem of *cub-* 'lie down' is *cubit-*, not ***cupt-*), or because the vowel is long anyhow (*lāb-* → *lāpsus* 'totter' PASSPART). When the stop that undergoes the devoicing is [d], the following obstruent is always [s], to which the [t] resulting from [d] assimilates in two steps (see 4.1 and 4.3), and then the [ss] is shortened because of the preceding long vowel, as is explained in 4.5.2 (*cad+sus* → *cātsus* → *cāssus* → *cāsus*). The lengthening does not affect vowels in final syllables (*grĕg-* → *grĕx* 'herd', *obsĕd-* → *obsĕs* 'hostage' NOMSING, the latter with assimilation of [t] to [s] and with general degemination affecting final [ss], cf. 4.5.1). There is a tendency for [i] to remain unaffected (*scid-* → *scĭssus* 'cleave' PASSPART), though there is *vid-*

[144] In Latin historical linguistics the change underlying this phenomenon is called Lachmann's Law, probably one of the most famous and most debated sound changes. The literature on it is enormous, and it was at times in the focus of intense theoretical debates, discussed at length in order to underpin Neogrammarian, analogist or generative rule-based hypotheses about phonological or grammatical change. Collinge (1985) is a good survey of previous research up to that time; Jasanoff (2004) includes a brief but incisive survey and suggests an interesting solution to the diachronic problems surrounding Lachmann's Law; Roberts (2009) includes a very detailed summary of the phenomena, the issues, the evidence, all previous research with assessment, and proposes an analysis in the Stratal OT framework. On the phonetics of similar processes Gussenhoven (2007) is an important work. Note, however, that Lachmann's Law is not exactly coextensive with the phonological process I describe here. For example, *dividere* ~ *dīvīsi* ~ *dīvīsus* would not be listed as an example of Lachmann's Law because the etymological root ends in a Proto-Indo-European aspirate (de Vaan 2008 s.v.), and aspirates were not affected by this change.

→ *vīsus* ‘see’ and *divid-* ~ *divīsus* ‘divide’ PASSPART, two similar but etymologically unrelated stems.

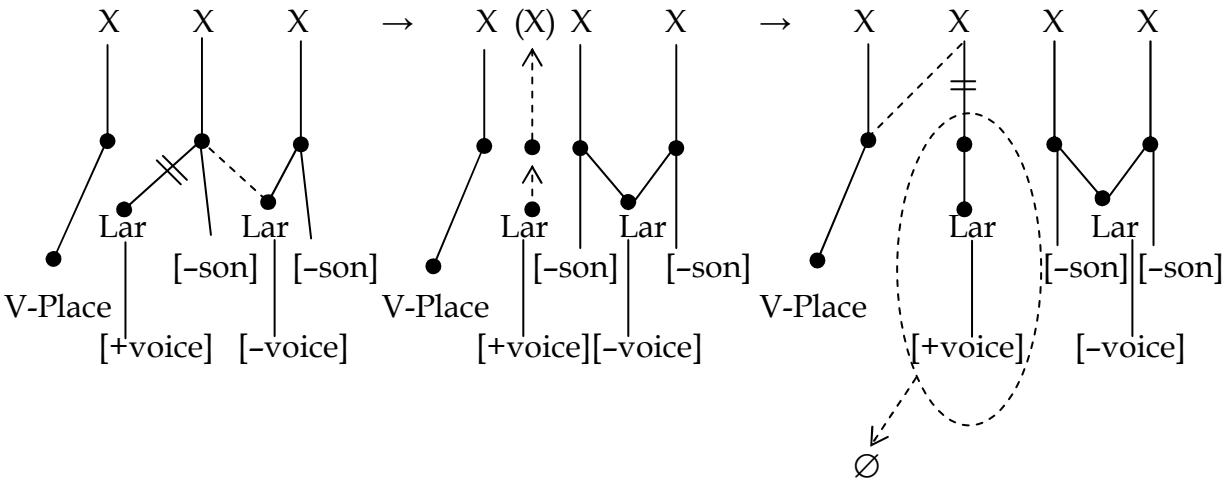
The most productive candidates for creating the required environment are the *-t-* and the *-s-* suffixes of the third stem, and the *-s-* of the perfective stem of many verbs; for the latter see *intellegere* ~ *intellēxi* ‘understand’, *dividere* ~ *divīsi* ‘divide’ INF ~ PRESPERF1SING. Perfective forms are not often adduced as examples in the literature on Lachmann’s Law, since vowel lengthening in the perfective stem is very frequent independently of the devoicing (*sedere* ~ *sēdi* ‘sit’ INF ~ PRESPERF1SING), and so one can never say with absolute certainty that a lengthening such as that seen in *intellēxi* has anything to do with the devoicing of [g]. At the same time there is reason to believe that the vowel is short in several *s*-perfectives in which the [s] is preceded by underlying [k] or [t][145] (*quatere* ~ *quăssi* ‘shake’, *illicere* ~ *illĕxi* ‘entice’, *conspicere* ~ *conspĕxi* ‘catch sight of’), which is at least suggestive of a relation between the lengthening and the devoicing.

If one assumes that we are here dealing with a special kind of compensatory lengthening triggered by the loss of underlying voice, this can be formalised as a four-step process (see Figure 24): (i) voice assimilation, i.e. the delinking of the Laryngeal node of the first obstruent, which dominates a [+voice] feature, and the linking of the Laryngeal node of the second obstruent, which dominates a [–voice] feature, to the Root node of the first obstruent (see 4.1); (ii) the projection of a Root node and a skeletal slot by the delinked Laryngeal node; (iii) the spreading of the vowel onto the newly projected skeletal slot; (iv) the deletion of the structure dissociated from the devoiced stop, that is, of the Larnygeal node and the [+voice] feature it dominates, along with the Root node it projected in step (ii). Of the four sub-processes, only (ii) is lexicaly conditioned: it is only in a subset of the phonologically eligible forms that a Root node and a skeletal slot are projected by the delinked Laryngeal node. Step (iv) is not a separate process in the sense that it instantiates the general rule deleting all incomplete segments at the end of the derivation, such as a placeless nasal that neither acquired a C-Place node nor merged with a preceding vowel.

Since no segment can have two Laryngeal nodes, the delinked Laryngeal node will not link to the Root node of the vowel; and since vowels are redundantly voiced, the vowel before the devoicing site will also not host the delinked voice feature. Thus the Laryngeal node delinking from the stop is deleted in the end — a major difference *vis-à-vis* the lengthening and concomitant nasalisation resulting from coalescence with a placeless nasal (see 5.3.4 below). The transient Root node is necessary only because a melodic node cannot link immediately to a skeletal slot and, *a fortiori*, cannot project one.

Note that in prefixed forms the quality of the vowel is unpredictable from the imperfective because of the historical weakening (see 5.1.1); e.g. both *peragere* ‘transfix’ and *redigere* ‘drive back’ have the same long vowel in the third stem (*perāctus, redāctus* PASSPART) because they both derive from *agere* ‘do’.

[145] See Allen (1978:67), Leumann (1977:591), and the most detailed Meiser (2003: 107–146) on *s*-perfects.



(i) voice assimilation

(ii) projection of Root node and skeletal slot by Laryngeal node

(iii–iv) vowel lengthening and deletion of transient Root node (and structure dominated by it)

Figure 24: Lengthening concomitant on devoicing (irrelevant details omitted)

Note further that the formalisation given in Figure 24 makes it possible, in theory, for glides to be lengthened just like vowels in the relevant context. This is harmless since a geminate glide before a consonant would be unsyllabifiable and thus degeminated anyway (see 4.5.1). There is then no need for formally excluding glides from the process, though it is, of course, possible via stipulating that the vocalic segment needs to be linked to a syllable nucleus rather than to a coda.

5.3.3. Coalescence with empty vowel

Some suffixes in the nominal declension begin with an empty vowel, that is, an empty skeletal slot in a syllable nucleus; to wit, particular allomorphs of the ablative and dative singular, and the nominative, accusative and genitive plural endings (for details see chapter 6). Because of the relevant allomorphic distributional regularities, these allomorphs are associated only with vowel-final stems. In these configurations, the Root node of the preceding vowel spreads onto the empty skeletal slot unless this would produce an association between one root node and three skeletal slots; that is, with long vowels (in reality only [e:]) the process does not take place and the empty skeletal slot is ultimately deleted. The following examples illustrate an *a*-stem noun in the ablative singular (Figure 25) and in the accusative plural (Figure 26); in the former the suffix is a plain empty skeletal slot, in the latter an empty skeletal slot followed by [s]:

Figure 25: ABLSING affixation of *a*-stem (e.g. *puella-* → *puellā* 'girl' ABLSING)

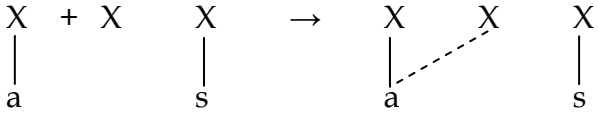


Figure 26: ACCPLUR affixation of *a*-stem (*puella-* → *puellās* 'girl' ACCPLUR)

5.3.4. Coalescence with placeless nasal

Whatever its source, a placeless nasal that is preceded by a vowel (but crucially not followed by a vowel in the same word) merges with that vowel to produce a long nasal vowel. As explained elsewhere (cf. 2.1.3, 2.2.1 and 4.6), such a sequence may result from nasal place loss before fricatives or from affixation with an ending consisting of a placeless nasal and nothing else, but it may also be lexical (see below). The placeless nasal is in all cases associated with a skeletal slot; otherwise one could not account for the invariable length of the resulting nasal vowel, and one could not explain the place-assimilated nasal of cliticised forms such as *eandem* 'she, the same' ACCSING from the stem *ea-* (cf. 32 in 4.8). For the former, a skeletal slot is needed, for the latter both a skeletal slot and a root node.

In many words the surface nasal vowel does not alternate with any other segment(s), e.g. *ensis* 'sword', *anser* 'goose', *palam* 'in public'. In theory, the analysis of such forms could go in three directions: (i) the nasal vowel is underlying; (ii) an oral vowel + placeless nasal sequence is underlying; (iii) an oral vowel + full nasal (i.e. [m] or [n]) sequence is underlying.

Of these, I reject (i) on the basis of economy, for two reasons in particular. One is that most other instances of nasal vowels can arguably be derived from a vowel + nasal consonant sequence, including the *frons* ~ *frondis* 'foliage' type (see 2.2.1) and the accusative singular forms of animate nouns such as *puellam* 'girl' (morphologically with a placeless nasal affix, but phonetically no different from the ending of *palam*). The other is that the non-alternating nasal vowels are invariably long just like their alternating counterparts. Thus I think one would gain practically nothing at the systemic level in exchange for enlarging the underlying vowel inventory with the five nasal vowels.

If one opted for (iii), one would have to decide what the underlying nasal consonant was in each case, or at least in each type. Word-internally, in the *ensis, anser* type [n] would be an obvious choice since [n] from other sources actually loses its C-Place node before fricatives (4.6). But in this type of words the underlying [n] would always undergo complete neutralisation, which is not desirable.

Word-final nasal vowels are even more problematic with regard to option (iii). They clearly cannot be derived from V[n]#, since such sequences appear on the surface in many words (*pecten* 'comb', *fulmen* 'lightning'). Deriving them from V[m]# (which would replicate their history) is also untenable synchronically in view of the broader category of word-final nasal vowels. These nasal vowels are mostly invariable (the *palam*-type), just like those in the *ensis*-type. But final nasal vowels may alternate with a V[n] sequence (mainly in pronouns such as *eandem*, see above), just like the non-final nasal vowels in the *frons* ~ *frondis* type. There is, however, no reliable evidence that they ever surfaced as V[m] sequences (perhaps apart from place-assimilated examples before the clitic *-piam*, e.g. *quempiam* 'whoever' ACCSING or *quampiam* 'whichever/whatever' FEMACCSING).

Since there are thus no grounds for assuming word-final [n] in such words underlyingly, and since assuming a word-final [m] would necessitate processes untypical of [m] elsewhere (i.e. alternation with [n] and with a nasal vowel), the most attractive option is (ii), that is, assuming an oral vowel + placeless nasal sequence underlying word-final nasal vowels. But this also tilts the balance towards assuming the same underlying configuration in the *ensis*-type. In this way no extra machinery is needed in addition to that introduced so far (place assimilation, plus the coalescence process formalised in Figure 27), and no absolute neutralisation affects the nasals.[146]

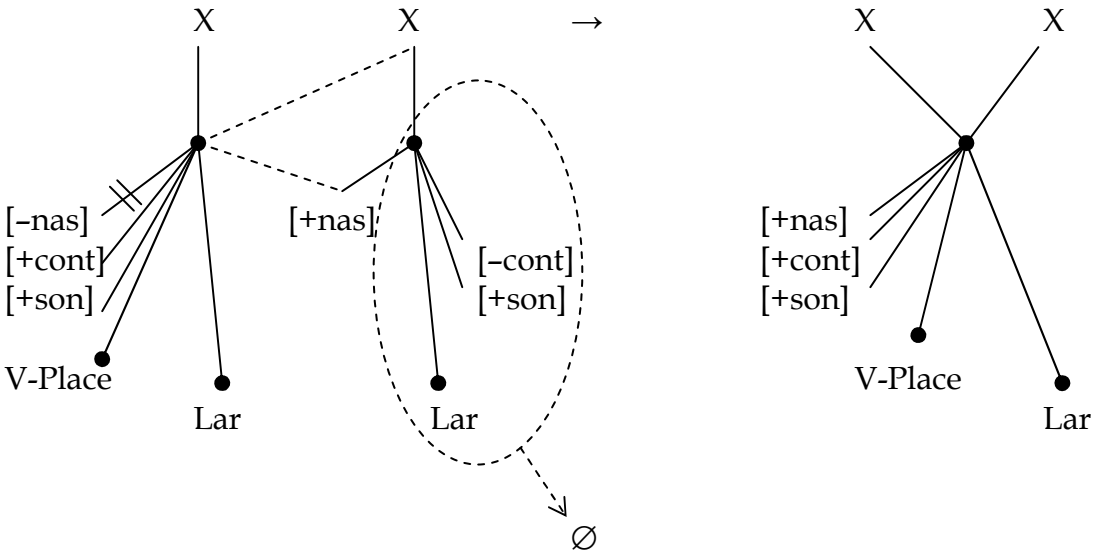


Figure 27: Coalescence with placeless nasal and the representation of a nasal vowel (with place and voice features omitted)

It is possible, though not necessary, to hypothesise that all nasals before stops are underlyingly placeless. The phonological rules introduced so far could equally derive the surface forms of all the *frons* ~ *frondis* type words, regardless of whether the nasal is underlyingly placeless or coronal ([n]). This is because the

[146] The fact that the placeless nasal never surfaces unchanged is not absolute neutralisation in the same sense as neutralising an underlying full segment; an incomplete segment *a priori* cannot surface unchanged.

place of nasals before tautomorphemic stops is always redundant, and place assimilation 1, which operates in a nasal+stop sequence, is independently motivated. The two derivations (both for the NOMSING and the GENSING) would look as shown in Figure 28.[147]

Underlying form:	froNd+s	froNd+is	frond+s	frond+is
voice assimilation (cf. 4.1)	froNts	---	fronts	---
t → s / _s (cf. 4.3)	froNss	---	fronss	---
degemination (cf. 4.5.1)	froNs	---	frons	---
nasal place loss (cf. 4.6)	---	---	froNs	---
place assimilation 1 (cf. 4.8)	---	frondis	---	---
coalescence	frõːs	---	frõːs	---
Surface form:	frõːs	frondis	frõːs	frondis

Figure 28: Derivation of nasals before stops: underlyingly placeless vs. full segment; example: *frons* ~ *frondis* 'foliage' NOMSING ~ GENSING

If the nasal and the stop are not adjacent underlyingly, that is, there is a morpheme boundary between them, the nasal cannot be underlyingly placeless at the end of lexical stems; as was shown in 4.7, a stem-final [m] triggers the insertion of a labial stop when affixed with [t] or [s] (*comere* → *compsi, comptus* 'comb'), and, of course, pre-vocalic nasals (e.g. *comere*) would be impossible to derive plausibly.

Some aspects of the behaviour of the prefix *con-*, which ends in a placeless nasal, were briefly explained in 4.8; see also 8.2.3.2. The placeless nasal undergoes place assimilation before stops (PA 1) and non-coronal nasals (PA 2); it may also undergo total assimilation to liquids. Before the fricatives [s] and [f] it coalesces with the vowel. Before the glides [j] and [w] it probably coalesces with the vowel just like before fricatives, though the evidence is less clear on this point. The most interesting cases are the combinations of *con-* with vowel-initial stems (e.g. *coire* 'meet'). In these, the placeless nasal cannot acquire a C-Place node from the following segment, since the latter is a vowel; it also cannot coalesce with the preceding vowel, since that would result in a long nasal vowel in the first part of a hiatus, a configuration strictly banned in Classical Latin (on hiatus see 2.2.3). Before [n], contrary to what one would expect, there is no assimilation. Metrical and graphic evidence points to a long vowel and a single [n], thus *cō-nubium* 'marriage'. This is explained in 4.8 as resulting from the properties of the two place assimilation processes; a sequence of a placeless and a coronal nasal simply does not match the structural description of either. What happens is probably coalescence, though the nasality of the vowel was not indicated in the spelling with an extra ⟨n⟩ before the stem-initial ⟨n⟩; in this case the suface representation would be [kõːnuːbiũː]. The other possibility is that instead of coalescence the placeless nasal (but not its skeletal slot) was simply deleted and the vowel

[147] In Figure 28 I use ⟨N⟩ to denote the placeless nasal, a notation I otherwise avoid in order not to evoke the classical notion of archiphoneme (cf. Trubetzkoy 1969:79 sqq.).

underwent compensatory lengthening, thus resulting in [koːnuːbiũː]. The latter process would be unparallelled,[148] the former would be in harmony with independently estlablished rules; but I see no way to decide between the two.

5.3.5. The *abiēs*-pattern

As was seen in 4.5 and in 5.1.2.1, degemination does not lead to compensatory lengthening in Latin (*milets* → *miless* → *miles* 'soldier' NOMSING). However, three nouns which belong to the same class as *miles* constitute a minor sub-pattern with an interesting phonological quirk, the lengthening of the vowel in the NOMSING. These are the following:

(64) The *abies*-words

NOMSING	GENSING	gloss
abiēs	*abiĕtis*	'fir-tree'
ariēs	*ariĕtis*	'ram'
pariēs	*pariĕtis*	'wall'

In Latin there are no more *-ie*C-final nominal stems apart from these three plus *hiem*(*p*)*s* 'winter' (GENSING *hiemis*), which shows no lengthening and also no loss of the stem-final consonant. The phonological similarity of the three stems is conspicuous, all of them being of the shape (C)*a*C*iet*-. There does not appear to be any convincing attempt at an explanation of the vowel lengthening (see De Vaan 2008 s.vv. and the references there). One notes, however, that in these three words (and in *hiems*) the appearance of an [i] in the oblique cases, where the stem-final syllable would be open, is precluded on phonological grounds. As was pointed out in 5.1.2.4, an [ii] sequence is ill-formed in Latin: ***abiitis* as the hypothetical genitive of *abiēs* is impossible in the same way as ***sociitas* instead of *societas* 'society'. It is at least hypothetically possible that the unexplained lengthening in the NOMSING serves as a phonological device to increase the distance between that form and the other forms, since the [e] ~ [i] alternation, which could otherwise contribute to increasing this distance, is excluded.

One might argue that the distance between the NOMSING and the other forms is minimal in the case of both noun types that are exceptions to the closed syllable ~ open syllable [e] ~ [i] alternation, namely the *seges*-type and the *lapis*-type (see 5.1.2.1 above), where there is neither qualitative alternation nor quantitative alternation. This is true but it is to be noted that the *seges*-type and the

[148] Deletion with compensatory lengthening but without coalescence, that is, without nasalisation of the vowel would be unparallelled within Latin but it would be in harmony with certain cross-linguistically observable patterns. Nasal vowels are not permitted before nasal consonants in French, for instance; if a similar constraint was stipulated for Classical Latin, it would automatically result in non-nasalising compensatory lengthening.

lapis-type exceptions are fully arbitrary in the sense that there would be nothing phonologically ill-formed about a hypothetical ***lapes* NOMSING (instead of *lapis*) or a hypothetical ***segitis* GENSING (instead of *segetis*). These forms just do not exist — although they could. By contrast, as was explained above, forms like ***abiitis* etc. are not only non-existent, they are also impossible, so the lack of a qualitative alternation is not arbitrary in their case. I will make no attempt here to formalise this insight, and given the small number of items involved I cannot say that I have discovered a robust generalisation. Nevertheless there seems to be a pattern here, even if only a minor one.

Another possibility is analogical attraction from *ē*-stem nouns.[149] In Latin, no word ends in [ies] in any form but many nouns end in [ie:s] in the NOMSING. The latter kinds of nouns, however, mostly belong to a different inflectional class called *ē*-stem or fifth declension (*faciēs* 'face', *aciēs* 'edge', *caesariēs* 'long hair' etc., see chapter 6) — the only exceptions being *abiēs, ariēs* and *pariēs,* in which the length of the vowel in the NOMSING can then potentially be exlained with reference to the analogy of *ē*-stem nouns.

[149] Thanks to László Kálmán (p.c.), who drew my attention to this possibility.

6. The inflectional morphology of Classical Latin

6.1. Introductory remarks

In Classical Latin 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 of nouns/adjectives into five declensions (i.e. paradigm classes). This chapter attempts to give a comprehensive and systematic description which is theoretically informed and which articulates an important insight regarding the relation between phonology and morphology. It is demonstrated that the apparent variety found in the inflectional system can be reduced to patterns of mostly binary allomorphy which are phonologically conditioned by the stem-final segment. The conditioning appears to be a function of a scale of vocalicness, which is here argued to be nothing else but the sonority scale of vowels.[150]

A crucial observation with respect to the vocalic scale — in relation to 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 6.5. To anticipate a point to be made there, 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).

In this work, stem is generally defined as the imperfective and the perfective stem for verbs and the portion preceding the case endings for nouns or 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 defect-

[150] The application of this idea to nominal inflection is explored in Spaelti (2004) and, with very minor modifications, in Emonds and Spaelti (2005), an upgraded extension of the former, and then revisited in Emonds (2014). My work, including Cser (2015) and the present chapter takes broader scope than either of these in giving 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.

ive nominal form (called supine) and several derived nouns, adjectives and verbs. In this chapter I 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. My 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 my characterisations are not etymologically based but are meant to capture synchronic patterns and alternations. Relevant differences will be highlighted and explained at the appropriate points.

Importantly, the putative morphological status of the stem-final segment proves to be irrelevant (cf. the discussion in 1.4). 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 6.2.3.2.1).

As a consequence, I 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 I 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, I 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, I will refrain from identifying such entities as morphological units of any kind.

A case in point is the verb *monere* '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.vv. *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* 'delete' in the imperfective (where the stem-final [e:] is definitely not an affix), or from *fui* '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 morphological exponence but only where a fairly obvious agglutinating structure can be discerned.[151]

The structure of this chapter is the following. In section 6.2 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 6.2.2, affixes immediately following the perfective stem in 6.2.3, affixes following extended stems in 6.2.4). In section 6.3 nominal inflection follows, with a lengthier discussion of the nominative singular (6.3.2), then all the other cases (6.3.3). The morphophonological analysis in 6.4 summarily presents the relation between the vocalic scale and all allomorphy. In 6.5 the relation of the vocalic scale to sonority is explored.

6.2. Allomorphy in the verbal inflection

6.2.1. 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 29 gives a conspectus of all the forms based on these two stems. The morphemes can combine left-to-right as the lines indicate; morphemes in the same column do not combine with each other. Figure 29 also lists all the allomorphs that the post-stem formatives have.[152]

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

[152] The passive perfect in Latin consists entirely of participle + *esse* 'be' combinations. Not being morphological constructions these will not be discussed here. I will also not cover the handful of verbs that show irregular allomorphic patterns (e.g. *ferre* 'take', *esse* 'be', *velle* 'want'). 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. For a descriptive conspectus of all regular forms see Clackson (2011).

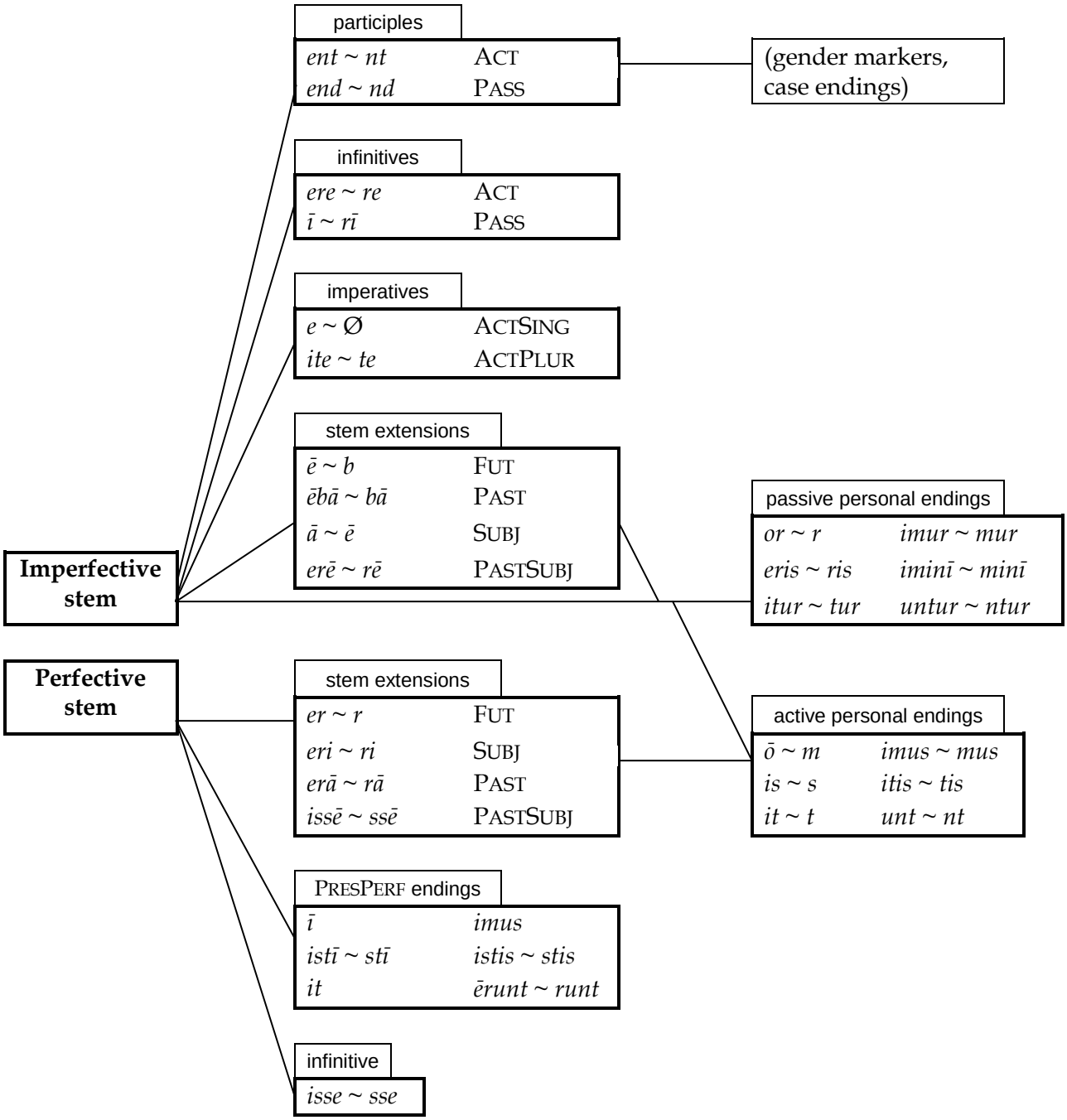


Figure 29: The general structure of Latin verb forms based on the imperfective and the perfective stems

First I look at the distribution of the allomorphs of formatives immediately following the imperfective stem. This means mood and tense formatives (which I here call stem extensions), infinitival and participial affixes, and personal endings with no stem extensions intervening, among them the imperative endings. Then I look at those affixes that can immediately follow the perfective stem. Finally I look at the personal endings following extended stems (both imperfective and perfective).

6.2.2. Affixes immediately following the imperfective stem

On the left of Table 7, 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 6.2.4. The gender markers and the case endings which can follow the participial affixes are discussed under nominal morphology in section 6.3. 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* (actually, a placeless nasal) 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 I 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-*),[153] and another variant after non-high vowels (*vidē-*, *amā-*). 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]. This is shown schematically in Figure 30.

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

[153] 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 [oː], which looks like an accidental gap since all other vowel qualities are attested. If [u] and [uː] are also added, one is 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 7). 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 (2005:68 sqq.), 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 verbs like *vivere*. For a conspectus of the history of all *u*-stem verbs see Szemerényi (1980).

	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, IMP2PLUR	IMP2SING	pass. p. e. 3SING, 12PLUR	pass. p. e. 2SING	ACTĪNF	PASTSUBJ	FUT	PAST	SUBJ	ACTPART	PASSPART	p. e. 3PLUR	PASSĪNF	p. e. 1SING

Notes to Table 7:
(1) Word-final lowering (5.1.2.3): [i] → [e] / _#, thus *capi-* → *cape*
(2) Lowering before [r] (5.1.2.2): [i] → [e] / _[r] (in derived environments), thus *cape-ris* etc.
(3) Prevocalic deletion of back vowels (5.2.2): a,(o) → Ø / _V (in derived environments), thus *amā+ē-* → *amē-* and *amā+ō* → *amō*.
(4) Truncation: by a local[154] rule, [iːi] → [iː], 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'.

Table 7: Affix variants immediately following the imperfective stem (first version)

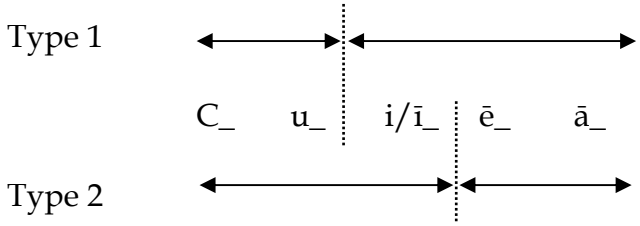


Figure 30: The environments of Type 1 vs. Type 2 allomorphy

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

6.2.2.1. An alternative analysis of *i*-stems

In Table 7 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] ~ Ø and [e] ~ Ø alternations) coupled with the phonological processes mentioned in the notes to the table (the [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 7). 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 (cf. 5.3.1), which also affects [iː] and neutralises it with [i] before the relevant affixes (all vowel-initial):

(65) Vowel shortening in hiatus

V: → V / __V e.g. *ferī+o* 'hit' 1SING, *vidē+at* 'see' SUBJ3SING → *ferĭo, vidĕat*

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 (i.e. without the *ī*) in certain forms. Such an analysis has several advantages. Of the four additional notes to Table 7, 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, see the examples in 5.1.2.2 and 5.1.2.3, respectively). Furthermore, the passive infinitive ending is regularised to a Type 1 allomorphy (*capī* now being a consonant stem form). The revised charts below (tables 8 and 9) are split into Type 1 vs. all other kinds of allomorphy; note the different placement of *cap(ī)-* on the left.

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, IMP2PLUR	IMP2SING	pass. p. e. 3SING, 12PLUR	pass. p. e. 2SING	ACTINF	PASTSUBJ	PASSINF

Table 8: Type 1 affix variants immediately following the imperfective stem (revised from Table 7)

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	ACTPART	PASSPART	p. e. 3PLUR	p. e. 1SING

Note to Table 9: Prevocalic deletion of back vowels (5.2.2): a,(o) → Ø / _V (in derived environments), thus *amā+ē-* → *amē-* and *amā+ō* → *amō*.

Table 9: Type 2 and other affix variants immediately following the imperfective stem (revised from Table 7)

6.2.3. Affixes immediately following the perfective stem

6.2.3.1. 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 2009:390 sqq., 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 Figure 29 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 1977:608–9). 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, as is shown in Figure 31:

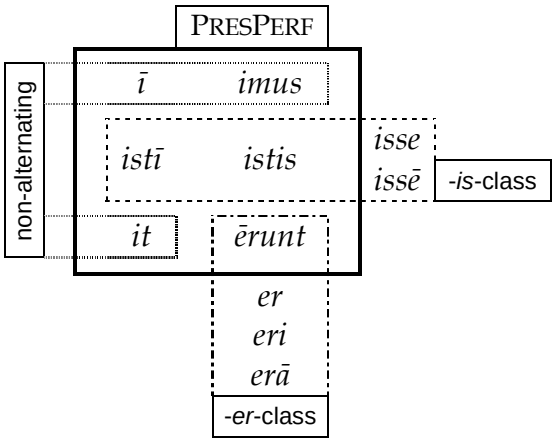


Figure 31: Formal types of affixes immediately following the perfective stem

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

6.2.3.2. Alternations in the affixes and their environments

6.2.3.2.1. 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].[155] 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 postclassical 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:

(66) Perfective *v*-deletion

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.[156] 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

[155] 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.

[156] For *nōv-* with *-is*-class affixes, the ratio of deleted forms in the corpus I 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-*). Actually, the restriction of *v*-deletion to suffixes can be seen as an effect of the derived environment condition.

non-alternating affixes.[157] 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 my own statistical counts prove (appendix 1), [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 10 with examples.[158] 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, with [u] always patterning with the consonants (therefore perhaps [uw] rather than [u]), and [i(ː)] patterning either with the consonants and [u(w)] or with the non-high vowels. Thus, Figure 30 can be repeated here virtually unchanged, with only [oː] added to the environments (Figure 31).

	-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*

Table 10: Affix variants immediately following the perfective stem

[157] 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 sqq.).

[158] 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*). The forms in the shaded bottom part of the chart are usually referred to as contracted in Latin linguistics (e.g. Clackson and Horrocks 2007:280, Baldi 2002:381). I do not follow this practice and reserve the term contraction for a different set of phenomena (e.g. for a reduction in the number of syllables in certain prefixed forms, see 8.2.1).

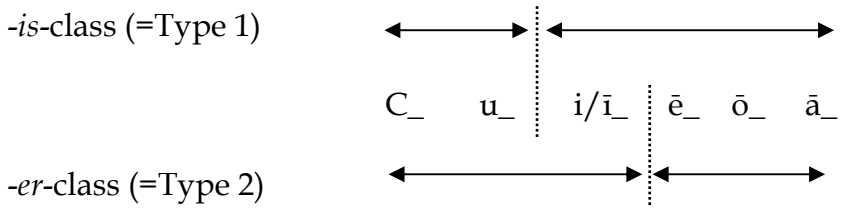


Figure 31: The environments of *-is*-class vs. *er*-class allomorphy

6.2.3.2.2. 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 traditional account, 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 (4.5.1),[159] 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.

An interesting consequence of this allomorphic choice is that since the perfective marker *-s* itself is deleted, in morphological terms the two transparent, agglutinating perfective markers *-v-* and *-s-* (but apparently only these) are, in fact, optional. It is not, however, the case that *-s-* is simply optionally deleted before the allomorphic choice is made, since that would result is forms like ***derecisti* instead of *derexti*. The postvocalic suffix allomorph is chosen in the position after the *-s-*, and after that the *-s-* itself is deleted. With *-v-* it is different, since that ending is always preceded by a vowel, so the choice of the postvocalic suffix allomorph is inevitable after *v*-deletion.

6.2.3.2.3. 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 (65) above — if a stem ending in long [i:] is followed by the vowel-initial suffixes, the [i:] shortens: *finīv-erat* but *finĭ-erat* 'he had finished'; 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 [i:w]-final stems, the

[159] Note that in *accestis* the rule deletes two [s]'s.

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 was mentioned in 5.1.2.4, a sequence of two short [i]'s is forbidden in Latin (e.g. *socie̱tas* 'fellowship', *varie̱tas* 'variety' vs. *novi̱tas* 'novelty', *celebri̱tas* '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 [i:] and so ⟨abiisse⟩ and ⟨abisse⟩ are plain spelling variants representing [abi:sse], the expected (morpho)phonological form. While we cannot say with absolute certainty that ⟨ii⟩ never represented [i:] 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.[160] 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.[161]

A third way of looking at these forms concentrates on word stress. 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*, DATABLPLUR *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*).[162] 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 I 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

[160] 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 from Mozley 1928), where *rediistis* must scan as four syllables (light–light–heavy–light).

[161] 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 (see 4.4 and 5.1.2.2), I 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, which in the end would simply replicate the accepted etymological analysis (see e.g. Baldi 2002:387 sqq.).

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

or 1SING forms. But at least tentatively one 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 vowelless allomorph is selected by the stem and so no sequence of vowels results.

6.2.3.3. The non-alternating suffixes

The three remaining suffixes 1SING *-ī,* 3SING *-it* and 1PLUR *-imus,* which I 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 [i:]; thus, *audīvi(t)* ~ *audii(t)* 'hear',[163] *finīvit* ~ *finiit* 'finish', but only *novi(t)* 'know', *amavi(t)* 'love' etc. (This may reflect the analogical pull of the only truly vowel-final perfective stems *ī-* 'go' and *desī-* '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.[164] Where the perfective stem ends in [i:] 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.[165] When these can be taken at face value, they represent genuine cases of vowel contraction, which makes them doubly exceptional (contraction 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 -[i:w]- final stems. This means that this suffix can only be preceded by consonants, [u] or the [i:] of *ī-* 'go' and *dēsī-* 'cease'. After consonants and [u] no suffix ever shows a vowelless variant. After the [i:] 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

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

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

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

corpus: one single *desīmus*, six occurrences of *desiimus* (and eleven of *desīvimus*, all postclassical). 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, similarly 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.[166]

At this point it is useful to 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, I came across a contrast between *petĭmus* ('we strive for') and *petīmus* ('we strove for') within a single work, Lucanus's *Pharsalia*.[167] 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 then be *v*-deletion of *petīv-* (*contra* the generalisation above) and vowelless *-mus*. 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⟩.[168]

The point I want to make here is that the limitations on what one can do with a textual database for Latin become quite severe when when trying 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 revised to encompass what I have termed non-alternating affixes and to encompass the minor variations described above; see Table 11.

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

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

[168] 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://www.perseus.tufts.edu/hopper/text?doc=Perseus%3atext%3a1999.02.0134.

	-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-ērunt*	*monu-imus*	*monu-it*
non-truncated -i/ī_	*abī-sse* (*abi-isse*)	*abi-ērunt*	*abī-mus*	*abi-it*
truncated -ī_	*audī-sse* (*audi-isse*)	*audi-ērunt*		*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*	

Table 11: Affix variants immediately following the perfective stem (revised and extended from Table 10)

6.2.4. Affixes following the extended stems

Extended stems, whether perfective or imperfective, can only be followed by the personal endings. These featured already in Table 7 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 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*).[169] 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; see Table 12.[170]

[169] The 1SING ending written ⟨m⟩ is phonologically a placeless nasal which is realised as nasalisation and lengthening on the preceding vowel (see 5.3.4).

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

	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

Table 12: Affix variants following extended stems

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 stem extension is *-ā-*.

6.3. Allomorphy in the nominal inflection

6.3.1. 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), Emonds and Spaelti (2005) and Emonds (2014).

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 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].[171] In particular, the stem-final segments which define the types by conditioning allomorphy in case marking are the following:[172] *-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*, NeutNomAccPlur *-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[173] and will not be rehearsed here. I 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. I will treat stem-final [i] as inherently 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. I 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;[174] 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

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

[172] 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 I 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.

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

[174] 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. I do not believe this ambiguity can be resolved, but I also do not believe very much hinges on it.

adjectives are a much less stable category, i.e. more prone to shifting between stem types, than most other stem types.[175] 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.[176]

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-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.[177] 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.[178] 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 shift 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 174); the tantalising variation is not found between two extremes but at a lopsided periphery of a category.

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[175] 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.

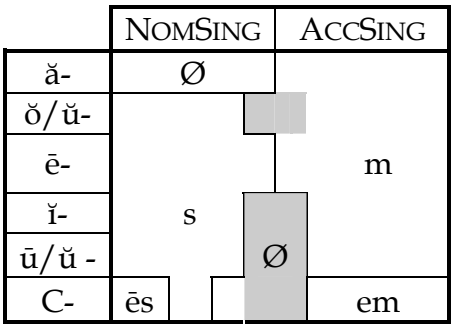
[176] For example, I classify the NOMSING *-ēs* ending as a consonant stem ending because formally this is more straightforward than classifying it as an *i*-stem ending and then deleting the [i] in actual forms like *fames* 'hunger', *nubes* 'cloud', *clades* 'destruction'. Another motivation for this 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.

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

[178] 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 (2005). 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').

6.3.2. 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 nominative and accusative singular endings are shown in Table 13.[179]



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

Table 13: Nominative and accusative singular endings

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 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 stems and the consonant stems. Combined with a stem-final vowel this placeless nasal results in a long nasal vowel written ⟨Vm⟩, which inherits the quality of the stem-final vowel (for the phonological process see 5.3.4). 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

[179] In tables 13 and 15 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'.

cases in the table above. For *o*-stem neuters, the nasal-affixed accusative form functions also as the nominative. There are no neuters among *a*-stems and *ē*-stems.[180]

6.3.2.1. Phonological alternations in the nominative singular

The NOMSING of nouns and adjectives often shows peculiarities which I here only mention briefly. One example that was mentioned at several points earlier is the disappearance of a dental stop before [s] (*mile-s* ~ *milit-em* 'soldier' NOMSING ~ ACCSING), the result of assimilation followed by degemination, phonological processes attested independently of nominal morphology (see 4.3 and 4.5). 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; on the alternation of vowels see 5.1.2.1). In *i*-stem neuters the lowering rule [i] → [e] / _ # applies (*mari-* → *mare* 'sea', see 5.1.2.3). 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 [o:], whether it is present in the stem otherwise or not: *tirōn-* → *tirō* 'new recruit', *origin-* → *origō* 'beginning'.

If a stem ends in C[r], an epenthetic [e] is inserted in the NOMSING (*patr-* → *pater* 'father', *agr-* → *ager* 'field', see 5.2.1). 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*); I regard the latter type as formally heteroclitic, even if only marginally. On adjectives of a similar stem shape see below.

6.3.2.2. Gender marking

The following common ways of marking gender in adjectives (and a number of nouns) are found.[181]

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[180] 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 *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').

[181] 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. NEUT *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.

(i) MASC, NEUT 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 (see later); the neuter differs from the masculine in the NOMSING (MASC *purus,* NEUT *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 NEUT has *i*-stem plus zero for both (e.g. MASC/FEM NOMSING *viridis,* ACCSING *viridem,* NEUT *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.[182] In all other forms these adjectives are regular. Examples:

(67) Adjectives with C*r*(V)-final stems in NOMSING (*piger* 'reluctant', *acer* 'sharp')

MASC *piger* (stem *pigr-*, zero suffix, *e*-epenthesis)
NEUT *pigrum* (stem *pigro-*, placeless nasal suffix)
FEM *pigra* (stem *pigra-*, zero suffix)

MASC *acer* (stem *acr-*, zero suffix, *e*-epenthesis)
NEUT *acre* (stem *acri-*, zero suffix, final *e*-lowering)
FEM *acris* (stem *acri-*, suffix *-s*)

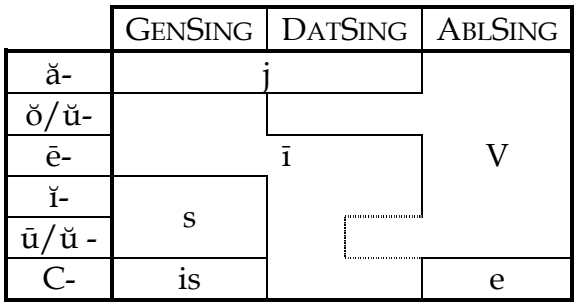
6.3.3. Case endings and allomorphy: The remaining cases

The genitive, dative and ablative singular endings are shown in Table 14. 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 due to the back vowel deletion rule seen in 5.2.2; *ē*-stems also take *-ī* and the stem-final vowel shortens in line with the hiatus rule in (65) above.[183] *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

[182] 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.

[183] Except when the stem-final [e:] is preceded by [i], the only vowel possible, in which case it remains long, e.g. *rē-* → *rĕī* 'thing', but *diē-* → *diēī* 'day', see the discussion of hiatus in 2.2.3.

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



arae	*arae*	*arā*
annī	*annō*	*annō*
diēī	*diēī*	*diē*
maris	*marī*	*marī*
tribūs	*tribuī/senatū*	*tribū*
regis	*regī*	*rege*

Table 14: Genitive, dative and ablative singular endings

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.[184]

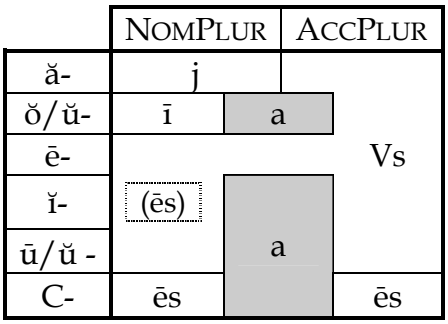
For vowel-final stems the ablative is uniformly suffixed with an empty vowel,[185] which appears on the surface as the lengthening of the stem-final vowel if it is short, and as vacuous lengthening (sheer stem) if the final vowel is already long. The suffix is *-e* after consonant-final stems.

In the NOMACCPLUR (Table 15) 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 -V*s*, which manifests itself as [s] preceded by 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*.

[184] 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 15), and the lexical items in question all have C-stem datives.

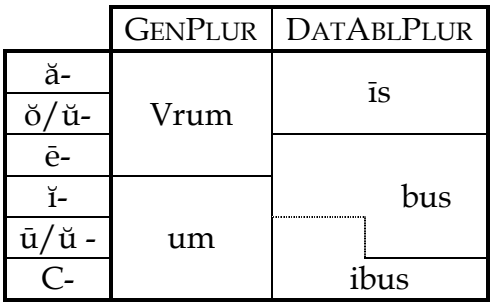
[185] Spaelti (2004) describes the ABLSING in the same way, as also the other cases that involve empty vowels (ACCPLUR and GENPLUR). Oniga (2014) and Wiese (2013) express the same insight by describing these affixes as including a (non-segmental) length feature.



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

Table 15: Nominative and accusative plural endings

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*.[186] This is in contrast to the ACCPLUR, where distinct *-ēs* vs. *-īs* forms are available.



arārum	*arīs*
annōrum	*annīs*
diērum	*diēbus*
puppium	*puppibus*
tribuum	*tribubus/portibus*[187]
regum	*regibus*

Table 16: Genitive, dative and ablative plural endings

The GENPLUR allomorphy (Table 16) is a very clear case of what I called Type 2 allomorphy in the discussion of verbal inflection. All consonant and high-vowel-final stems are affixed with [ũ:] (written ⟨um⟩), and all other vowel-final stems are affixed with [Vrũ:] (written ⟨rum⟩), the latter resulting in lengthening on short

[186] This is true again *contra etymologiam*, since the nominative plural *-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*.

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

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).

6.4. Morphophonological analysis: Inflectional allomorphy and the vocalic scale

The stem types as environments conditioning allomorphy can be arranged on a scale (see Figure 32) 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.[188] 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.

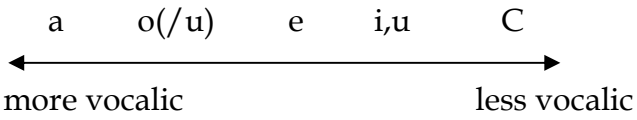


Figure 32: The vocalic scale (length unmarked; high vowels discussed below in section 6.5)

The scale is common to verbal and nominal inflection. Although in verbal inflection the vast majority of allomorphy belongs to either of two types, 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 *ēː ~ āː* allomorphy (number 9 in Tables 7 and 9) separates the most vocalic environment from all the others and the 1SING ending is vacuously non-contradictory in Tables 7 and 9 since it does not alternate; after extended stems (Table 12) it is Type 2 like all affixes.[189]

Affix variation is greater in the nominal inflection than in the verbal inflection, but a similar pattern is observable. The GENPLUR allomorphy is clearly

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

[189] Even the passive infinitive ending (number 13) under the first analysis (Table 7), which I then replaced with the more streamlined one in tables 8 and 9, draws the line between short and long [i] and is thus non-contradictory.

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 (hence it is questionable 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.

Table 17 compares and summarises all 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.[190]

Noun Adj	Ø	*j*	*īs*	*j, ī*	*m*	*j, ī*	*Vrum*	*Vs*	*m*	*V*	…	…	*ē*	Verb
ă														ā
ŏ/ŭ														ō, (*fore*)
ē														ē
ĭ														ī
ū/ŭ														u
C	Ø													C
	s, ēs	*ī*	*(i)bus*	*Vs, ēs*	*Ø*	*(i)s*	*um*	*ēs*	*em*	*e*	…	…	*ā*	
	anim. NOM SING	DAT SING	DATABL PLUR	anim. NOM PLUR	NEUT NOM ACC SING	GEN SING	GEN PLUR	anim. ACC PLUR	anim. ACC SING	ABL SING	Type 1	Type 2	IMPF SUBJ	

Table 17: Summary of inflectional allomorphy

[190] 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 184). 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, animate NOMPLUR for *i*-stems). 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 [oː] is only found in truncated perfects of the *nosse* type.

6.5. 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?[191] To answer this question we need to consider what the sonority of vowels actually involves.

From discussions of, and analyses invoking, sonority (Parker 2002 and 2011, 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 sonority 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 2006:123 sqq. and Parker 2011 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

[191] 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 and Spaelti (2005) and in Emonds (2014) the term sonority does not figure at all, though in the former there is reference at one point to the "more sonorous" (i.e. non-high) vowels (p. 17).

imperfective as well as perfective verb stems are, in fact, consonant-final (that is, they end in [uw], see 6.2.2 and 6.2.3.2.1).

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) and (2015:42–78) 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[192] 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 Udihe case mentioned in Nevins (2011), but that involves 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.

[192] In a broader perspective, however, stress and vowel height were related in preclassical Latin. As was briefly explained in 5.1.1, in an early period word stress appears to have been on initial syllables, and short unstressed vowels, i.e. those in non-initial syllables, systematically became higher. However, when stress moved to its Classical Latin position, 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*.

7. Resyllabification

In chapter 3 I gave a comprehensive description of syllable structure and the consonantal phonotactics of simplex forms. In chapter 4 certain aspects of the phonology of prefixed forms were discussed, but the phonotactics of such forms has not yet been given systematic treatment. Prefixation and reduplication is the topic of chapters 8 and 9, respectively. In the present chapter I discuss resyllabification, which involves the reorganisation of syllable structure at boundaries in complex forms and at word boundaries.

7.1. Resyllabification at prefix–stem boundaries

When a prefix is added to a stem, the assignment of the segments at the boundary to syllabic positions shows the following very general regularities in those cases when segmental or featural change can be factored out.

- A prefix-final consonant is syllabified as onset to the first syllable of the stem if and only if without it there would be no onset to that syllable: *ab*+*ire* → *a.bi.re* 'go away' vs. *ob*+*ruere* → *ob.ru.e.re* 'bury' in spite of simplex *fu.ne.bris* 'funeral' etc.[193]
- A stem-initial [s] that would be extrasyllabic in an unprefixed form is syllabified leftwards as coda if a well-formed coda results: *re*+*stare* → *res.ta.re* 'remain' (but *ob*+*stare* → *ob.{s}.ta.re* 'obstruct' with the [s] remaining extrasyllabic).
- There is no leftward syllabification of other stem-initial consonants: *re*+*fractus* → *re.frac.tus* 'broken'.[194]

What this shows is that syllabification cannot override the syllable structure that is created within morphological boundaries except if onsetless syllables would result following a closed syllable (as in *a.b*+*i.re*). The assignment of stem-initial extrasyllabic [s] to the prefix-syllable (as in *re*+*s.ta.re*) does not contradict this, since that [s] is not incorporated into the syllable structure of the stem.[195] In a

[193] *Pace* Pulgram (1975:138). Harris (1983) demonstrated the workings of this principle, generally referred to as Onset Satisfaction, in Spanish at word boundaries. For the different scansions involving [br] see the pentametre line Ovid *Epist*.2.2.60: *posse velim cineres obruere ipse meos* 'I wish I could bury my own ashes' vs. Horace's hexametre ending *Epist*. 1.19.49: *funebre bellum* 'grievous war'. Like other stop+liquid clusters in simplexes, [br] is also variably tauto- or heterosyllabic, see the discussion of such clusters in 3.3.

[194] Despite appearances, the prefixation of ⟨gn⟩-initial stems (e.g. *ignoscere* 'forgive' from *in* + *gnoscere*) does not involve leftward resyllabification. For a detailed discussion see chapter 11.

[195] Note that this account of the interaction between syllable boundaries and morphological boundaries is considerably simpler than that presented in Devine and Stephens (1977:136–138).

cyclical derivation of syllable structure the resyllabification process can be represented as in Figure 33.

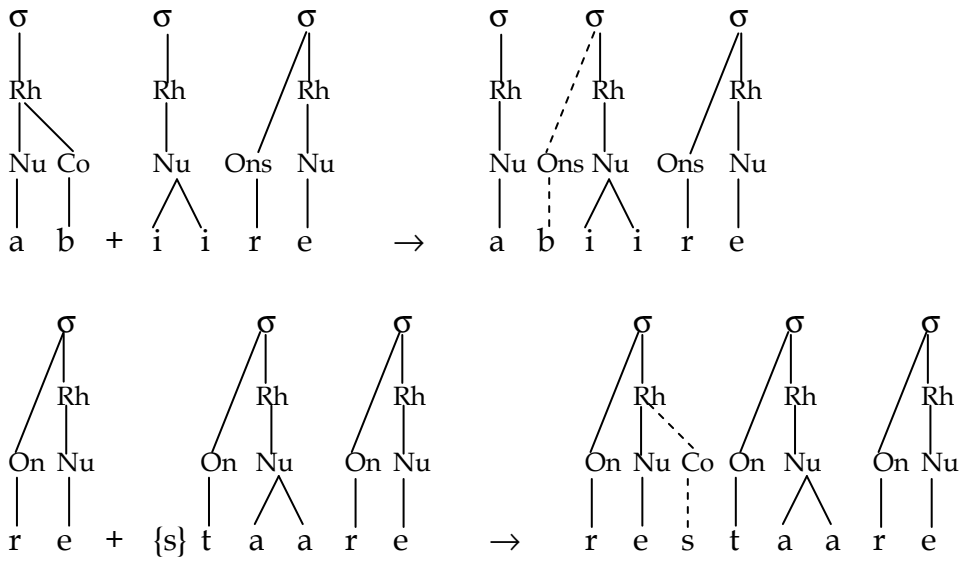


Figure 33: Resyllabification

7.2. Resyllabification at word boundaries

Resyllabification at word boundaries is subject to the same rules:[196]

(68) Resyllabification at word boundary

videt ille 'he sees' → *vi.de.til.le* (like *a.bi.re*)
videt rem 'he sees (a/the) thing'→ *vi.det.rem* (like *ob.ru.e.re*)

There is, however, one significant difference. As we have just seen, extrasyllabic [s] is resyllabified as coda to the preceding syllable within a word unless an ill-formed syllable would result. At word boundary, the treatment of extrasyllabic [s] is more complicated. The poetic corpus shows the following.

[196] A handful of examples of the leftward resyllabification of onset consonants are known in poetry (like *impotentia freta* 'unbridled waves' syllabified as *im.po.ten.ti.af.re.ta* in Catullus *Carm.* 4.18). These isolated manifestations of poetic license are not regarded here as having any bearing on the phonological regularities of syllabification.

Words beginning with an [s]+stop cluster[197] are most often found after consonant-final or long-vowel-final words or in line-initial position, where the syllabification of the extrasyllabic [s] is impossible (for the researcher) to determine and irrelevant (for the ancient poet) from the point of view of the metrical composition of the poem. These I call neutral positions. The only non-neutral position is following a short-vowel-final word within the same line. The incidence of [s]+stop-initial words in non-neutral position is very low: of the 10,217 occurrences of all such words in the poetic corpus only 48 (=0.47%) are found in non-neutral position.[198]

The treatment of this configuration shows interesting differences between the individual poets, see Table 18. The proportion of [s]+stop-initial words in non-neutral position is relatively high for Catullus, lower but still not very low for Lucretius and the Golden Age poets Horace, Propertius and Tibullus. Vergil is strongly aversive to this configuration, and so are all the later Golden and Silver Age poets beginning with Ovid.[199]

Catullus applies leftward resyllabification in 5 out of the 6 cases; his contemporary, Lucretius never does (0 out of 10 cases; his prosodic choice resembles that of Plautine comedy, where the configuration in question was not avoided and the [s] was not resyllabified). Horace, Propertius and Ovid never resyllabify, Vergil is indecisive; the 1st century AD poets Silius Italicus, Martialis and Lucanus resyllabify their [s]+stop words in non-neutral position, their contemporary, Statius, is again indecisive. Persius and Valerius Flaccus do not have a single instance of the configuration in question.[200]

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[197] In the classicist tradition the [s] in such clusters is referred to as *s impurum* ('impure *s*'). A number of initial clusters only found in Greek loans and names (*viz. sm, ps, x* [ks], *z* [dz] or [zd]) are also regarded as instantiations of *s impurum* because of their behaviour in poetry. With this latter group I will not be concerned although there is a certain degree of overlap. For an excellent discussion of their relation and their relevance to poetics see Hoenigswald (1949b); in that paper most of the data listed here can be found, and the earlier discussions are given thorough, if terse, critical treatment.

[198] As Hoenigswald (1949b:272) points out, "in post-scenic verse, words ending in short vowel are not permitted before words beginning with s impure". The term *post-scenic* refers to literature after Plautus and Terence, that is, roughly from the mid-second century BC on.

[199] Because of the fragmentary nature of what remains of their works I have not included Ennius and Lucilius here. But note the former's *auspicio regni stabilita scamna solumque* 'the chair and throne [of royalty], established firm by the watching of birds' (1.96, translation by E. H. Warmington, source: http://www.attalus.org/poetry/ennius1.html) with resyllabification, and the latter's *inmutasse statumque* 'to have changed the condition' (fragm. 292), *atque accurrere scribas* approx. 'and that the scribes run' (*Sat.* 375, a hexametre ending), *deducere scalis* approx. 'to lead down the stairs' (*Sat.* 392, also a hexametre ending), perhaps *Albesia scuta* 'the Albenses' shields' (*Sat.* 1150, probably a hexametre ending) and *Pyrgensia scorta* 'Pyrgan whores' (*Sat.* 1271, perhaps a hexametre ending) without resyllabification (like in Plautus and Terence).

[200] Note, however, that two Valerius Flaccus-loci are open to such an interpretation. They are *Arg.* 5.602: *atque ubi Rhipaea stupuerunt flumina bruma* 'and when the rivers were frozen in the Rhipean winter' and 6.229: *vadit eques densa spargens hastilia dextra* 'the mounted warrior strides, frequently throwing (his) javelins with his right hand' (translations mine). While there is a tradition of interpreting *Rhipaea* and *densa* as feminine ablative singular forms, i.e. ending in a long *ā*, and thus irrelevant metrically from the point of view of the [s] + stop sequence, semantic and syntactic considerations make a neuter nominative and accusative plural interpretation (i.e.

What this very clearly shows is that the resyllabification of initial extrasyllabic [s] was not phonologically determined. In particular, the early contemporaries Catullus and Lucretius contrast sharply in their treatment of these segments, as illustrated by the scansion of the two hexameter lines in (69).

	Total no. of [s]+stop-initial words	No. of [s]+stop-initial words in non-neutral position	% of [s]+stop-initial words in non-neutral position	Resyllabified	Not resyllabified
Lucretius	445	10	2.25%		10
Catullus	101	6	6%	5	1
Vergil	1112	2	0.18%	1	1
Horace	620	9	1.45%		9
Propertius	255	7	2.75%		7
Tibullus	86	2	2.3%	2	
Ovid	2587	4	0.15%		4
Silius Italicus	1301	2	0.15%	2	
Persius	59	0	0%		
Lucanus	815	1	0.14%	1	
Martialis	701	2	0.35%	2	
Statius	1308	2	0.15%	1	1
Valerius Flaccus	530	0	0%		
Juvenal	297	1	0.33%	1	
	10217	**48**			

Table 18: Extrasyllabic [s] in non-neutral position in poetry

(69) Contrasting scansions of extrasyllabic [s]

Catullus *Carm.* 64.186
nulla fugae ratio nulla spes omnia muta[201]
(– ∪ ∪ – ∪ ∪ – – – – – ∪ ∪ – ∪)

Lucretius *De rerum nat.* 4.475
unde sciat quid sit scir(e) et nescire vicissim[202]
(– ∪ ∪ – – – – – – – – ∪ ∪ – –)

with short *a*) possible, respectively; in that case the former locus would have 'Rhipean rivers' rather than 'Rhipean winter', in the latter the adjective *densa* 'frequent' would refer to the javelins and not the warrior's right hand. However, I do not specifically argue for either interpretation, I merely point out that they are theoretically conceivable.

[201] 'Nowhere is path for flight: none hope shows: all things are silent' translation from Burton (1894).

[202] 'whence he knows what 'tis to know and not-to-know in turn', translation from Leonard (1921).

The later poets tend to simply avoid putting [s]+stop-initial words in non-neutral position (Vergil, Ovid, Silius Italicus, Lucanus, Statius, Martialis, Persius, Valerius Flaccus, Juvenal); those who do not, tend in the Lucretian way not to resyllabify (Horace, Propertius); Catullus' practice of not avoiding this configuration *and* resyllabifying is not followed by anyone except maybe Tibullus (but in his small corpus there are only two occurrences anyway). Although it is clear that poetic practice was shaped by a number of factors, among them the influence of the Greek models,[203] and that poetry was, in all likelihood, not actually recited metrically, I do suspect that the marked avoidance and/or indeterminacy of the configuration exemplified here has a phonological basis and results from the conflict of two principles:

(70) Principles constraining resyllabification

(70/i) Resyllabification can only be rightwards.[204]
(70/ii) An extrasyllabic segment may not be adjacent to a nucleus.

Within words (i.e. at prefix–stem boundaries) the second principle clearly has precedence over the first, and so leftward resyllabification always takes place (*re+s.ta.re*; see also *nescire* as opposed to *unde sciat* in the above line by Lucretius in 69). But between words this order of precedence seems to apply only for Catullus; for Lucretius, Horace and Propertius it is the opposite; and all the other poets are at pains to avoid having to take sides.[205]

To conclude this chapter the actual loci[206] are exhaustively listed in tables 19 and 20.[207]

[203] Among others, Hoenigswald (1949b) and Zirin (1970) make the point that [s]+stop clusters were avoided in non-neutral position because they presented a conflict between the Greek scansion (where leftward resyllabification was the practice) and the natural prosody of Latin (where leftward resyllabification did not apply across word boundary). But the treatment of stop+liquid clusters also differed between the two languages and yet there was no tendency to avoid these in Roman poetry.

[204] Since rightward resyllabification is subject to the constraint that it may only apply if a syllable would remain onsetless without it, this principle can actually be seen as an amalgamation of two principles: (70/ia) A coda cannot be followed by a nucleus; (70/ib) Resyllabification is not allowed, where (70/ia) always has precedence over (70/ib) in Latin, and consonantal epenthesis is generally disallowed, thus the only way to remedy coda+nucleus sequences is by rightward resyllabification.

[205] I note in passing that the proportion of the only remaining initial [s]C cluster [sw] in neutral vs. non-neutral position is 3 to 1 in the poetic corpus, which shows that there was no tendency to avoid [sw] in non-neutral position (cf. also Zirin 1970:39 and Ballester 1996:78).

[206] In an earlier paper on the treatment of extrasyllabic [s] in verse (Cser 2012b) I included two loci that are not listed here. Statius *Theb.* 1.332 was simply an error, the extrasyllabic [s] is in a neutral position in that line. Verg. *Georg.* 1. 84. appears to be a data problem. The textual variant found in the Brepols corpus is *saepe etiam incendere sterilis profuit agros* 'Oft, too, 'twill boot to fire the naked fields' (translation from Greenough 1900); the memento to the text says it was adopted from the Teubner edition (Ribbeck 1894). However, that edition (as well as other editions I checked, e.g. Greenough's 1900 edition), has *saepe etiam steriles incendere profuit agros*. In this variant the extrasyllabic [s] is in a neutral position and hence irrelevant. The source of the Brepols variant, which is problematic with the long [e:] of *incendere* and the long [i:] of *sterilis* is unclear to me, but it is certainly not the edition referred to. If it was an existing and authentic text, it would show extrasyllabic [s] in a non-neutral position, with no resyllabification.

Locus	Line	Syllabification of relevant portion
Catullus *Carm.* 17.24	si pote stolidum repente excitare veternum[208]	po.tes.to.li.dum
Catullus *Carm.* 22.12	hoc quid putemus esse qui modo scurra[209]	mo.dos.cur.ra
Catullus *Carm.* 44.18	nec deprecor iam si nefaria scripta[210]	ne.fa.ri.as.crip.ta
Catullus *Carm.* 63.53	ut aput nivem et ferarum gelida stabula forem[211]	ge.li.das.ta.bu.la
Catullus *Carm.* 64.186	nulla fugae ratio nulla spes omnia muta[212]	nul.las.pe.(s-)
Vergil *Aen*. 8.425	Brontesque Steropesque et nudus membra Pyracmon[213]	bron.tes.ques.te.ro. pes.(qu-)[214]
Tibullus *El*. 1.5.28	pro segete spicas pro grege ferre dapem[215]	se.ge.tes.pi.cas
Tibullus *El*. 1.5.53	ipsa fame stimulante furens herbasque sepulcris[216]	fa.mes.ti.mu.lan.te
Silius Italicus *Pun.* 9.575	immane stridens agitur crebroque coacta[217]	im.ma.nes.tri.den.(s-)
Silius Italicus *Pun.* 17.546	diversa spatio procul a certamine pugnae[218]	di.ver.sas.pa.ti.o
Lucanus *Phars.* 5.118	aut pretium; quippe stimulo fluctuque furoris[219]	quip.pes.ti.mu.lo
Martialis *Epigr*. 2.66.8	ut digna speculo fiat imago tua[220]	dig.nas.pe.cu.lo
Martialis *Epigr*. 5.69.3	quid gladium demens Romana stringis in ora[221]	ro.ma.nas.trin.gi.(s-)
Statius *Theb.* 6.551	praeceleres agile studium et tenuissima virtus[222]	a.gi.les.tu.di.(-)
Juvenal *Sat.* 8.107	occulta spolia et plures de pace triumphos[223]	oc.cul.tas.po.li.(-)

Table 19: Extrasyllabic [s] resyllabified

[207] The word *mihi*, whose second vowel is variably short or long, even for the same poet, presents a minor difficulty here. If the second syllable scans light, resyllabification of [s] has obviously not taken place (and the vowel is short); see the last two items in Table 20. (Note, however, that in these cases a contracted pronunciation *mī* is not out of question, and then, of course, resyllabification remains undetectable and metrically irrelevant.) By contrast, if the second syllable scans heavy, there are three possible explanations: (i) the vowel is long and the [s] was not resyllabified; (ii) the vowel is short and the [s] was resyllabified; (iii) the vowel is long and the [s] was resyllabified. Since I see no way of deciding in the seven extant instances which of the three is the case, I simply disregard them. I do not really think this distorts the data in any harmful way.

[208] 'Better a-sudden t'arouse that numskull's stolid old senses' translation from Burton (1894). Since the verse lines listed here for the sake of illustrating prosodic patterns do not necessarily constitute self-contained sense units, the translations are to be taken merely as indicative. Unless otherwise indicated, they were all taken from the Perseus database (http://www.perseus.tufts.edu/hopper/).

[209] 'What must we wot thereof? a Droll erst while' translation from Burton (1894).

[210] 'Nor do I now object if noisome writs [I hear]' translation from Burton (1894).

[211] '[that I] tarry 'mid the snows and where lurk beasts in antres frore' translation from Burton (1894).

[212] 'Nowhere is path for flight: none hope shows: all things are silent' translation from Burton (1894).

[213] 'naked Pyracmon and…Brontes and Steropes' translation from Williams (1910).

[214] Though Hoenigswald (1949b:277) claims that the heavy scansion of *-que* is a different issue altogether.

[215] '[to offer] for a field of corn wheat in the ear, or for the sheep-fold's health some frugal feast' translation by Theodore C. Williams (source: http://www.gutenberg.org/ebooks/9610).

[216] 'Made hunger-mad, [may she devour] the grass that grows on graves' translation by Theodore C. Williams (source: http://www.gutenberg.org/ebooks/9610).

[217] 'Trumpeting wildly and compelled by many [a stab]' translation from Duff (1927).

[218] 'a spot far removed from the strife of battle' translation from Duff (1927).

[219] '[receives death] as prize…surges with frenzy and the soul divine' translation from Ridley (1905).

[220] 'that the image may be worthy of your mirror' from the anonymous Bohn translation (source: http://www.tertullian.org/fathers/martial_epigrams_book02.htm).

[221] 'why did you draw the sword, madman, against the mouth of Rome?' from the anonymous Bohn translation (source: http://www.tertullian.org/fathers/martial_epigrams_book05.htm).

[222] 'the runners…in a test of agility where valour plays little part' translation by A. S. Kline (source: http://www.poetryintranslation.com/klineasstatiusthebaid.htm).

[223] 'secret spoils, peace-trophies more numerous than those of war' translation from Ramsay (1918).

Locus	**Line**	**Syllabification of relevant portion**
Lucretius *De rerum nat.* 1.372	cedere squamigeris latices nitentibus aiunt[224]	ce.de.re.{s}.qua.mi.ge.ris
Lucretius *De rerum nat.* 4.475	unde sciat quid sit scire et nescire vicissim[225]	un.de.{s}.ci.at
Lucretius *De rerum nat.* 4.772	inde statu prior hic gestum mutasse videtur[226]	in.de.{s}.ta.tu
Lucretius *De rerum nat.* 4.801	inde statu prior hic gestum mutasse videtur[227]	in.de.{s}.ta.tu
Lucretius *De rerum nat.* 4.849	multo antiquius est quam lecti mollia strata[228]	mol.li.a.{s}.tra.ta
Lucretius *De rerum nat.* 5.47	quidve superbia spurcitia ac petulantia quantas[229]	su.per.bi.a.{s}.pur.ci.ti.(-)
Lucretius *De rerum nat.* 5.79	libera sponte sua cursus lustrare perennis[230]	li.be.ra.{s}.pon.te
Lucretius *De rerum nat.* 6.195	speluncasque vel ut saxis pendentibus structas[231]	pen.den.ti.bu.{s}.truc.tas[232]
Lucretius *De rerum nat.* 6.943	sudent umore et guttis manantibus stillent[233]	ma.nan.ti.bu.{s}.til.lent
Lucretius *De rerum nat.* 6.1188	tenvia sputa minuta, croci contacta colore[234]	ten.vi.a.{s}.pu.ta
Catullus *Carm.* 64.357	testis erit magnis virtutibus unda Scamandri[235]	un.da.{s}.ca.man.dri
Vergil *Aen.* 11.309	ponite: spes sibi quisque. sed haec quam angusta videtis[236]	po.ni.te.{s}.pes
Horace *Epodi* 17.26	levare tenta spiritu praecordia[237]	ten.ta.{s}.pi.ri.tu
Horace *Sat.* 1.2.30	contra alius nullam nisi olenti in fornice stantem[238]	for.ni.ce.{s}.tan.tem
Horace *Sat.* 1.2.71	velatumque stola mea cum conferbuit ira[239]	ve.la.tum.que.{s}.to.la
Horace *Sat.* 1.3.44	si quod sit vitium non fastidire. Strabonem[240]	fas.ti.di.re.{s}.tra.bo.nem
Horace *Sat.* 1.5.35	linquimus, insani ridentes praemia scribae[241]	prae.mi.a.{s}.cri.bae

Table 20: Extrasyllabic [s] not resyllabified

[224] 'waters (they say) before the shining…scaly creatures somehow give' translation from Leonard (1921).
[225] 'whence he knows what 'tis to know and not-to-know in turn', translation from Leonard (1921).
[226] 'That former [image] seemeth to have changed its gestures', translation from Leonard (1921).
[227] See previous note.
[228] 'Far ancienter than cushions of soft beds', translation from Leonard (1921).
[229] 'And lo, the pride, grim greed, and wantonness — how great [the slaughters]', translation from Leonard (1921).
[230] 'of own free will they circle their perennial courses round', translation from Leonard (1921).
[231] '[thou…canst view] their caverns, as if builded there of beetling crags', translation from Leonard (1921).
[232] As is well known, word-final [s] is often dropped in Lucretius and those before him.
[233] '[rocks] sweat moisture and distil the oozy drops', translation from Leonard (1921).
[234] 'the spittle in fine gouts tainted with colour of crocus', translation from Leonard (1921).
[235] 'to his valorous worth attest shall wave of Scamander' translation from Burton (1894).
[236] 'dismiss it! For what hope ye have is found in your own bosoms only. But ye know how slight it is' translation from Williams (1910).
[237] 'no breath…can ease my straining breast' translation by A. S. Kline (source: http://www.poetryintranslation.com/PITBR/Latin/HoraceEpodesAndCarmenSaeculare.htm).
[238] 'Another, again, will only have such as take their station in a filthy brothel.' translation from Smart and Buckley (1863).
[239] '[A woman]… covered with robes…when my ardor was at its highest' translation from Smart and Buckley (1863).
[240] 'if he has any defect, we ought not to contemn [our friend]; a cross-eyed person…' translation from Smart and Buckley (1863).
[241] 'we passed…laughing at the honors of that crazy scribe' translation from Smart and Buckley (1863).

Locus	Line	Syllabification of relevant portion
Horace *Sat.* 1.10.72	saepe stilum vertas iterum quae digna legi sint[242]	sae.pe.{s}.ti.lum
Horace *Sat.* 2.2.36	proceros odisse lupos quia scilicet illis[243]	qui.a.{s}.ci.li.ce.(t-)
Horace *Sat.* 2.3.43	quem mala stultitia et quemcumque inscitia veri[244]	ma.la.{s}.tul.ti.ti.(-)
Horace *Sat.* 2.3.296	Haec mihi Stertinius sapientum octavus amico[245]	mi.hi.{s}.ter.ti.ni.us
Propertius *El.* 3.1.27	Idaeum Simoenta Iovis cum prole Scamandro[246]	pro.le.{s}.ca.man.dro
Propertius *El.* 3.11.53	bracchia spectavi sacris admorsa colubris[247]	brac.chi.a.{s}.pec.ta.vi
Propertius *El.* 3.11.67	nunc ubi Scipiadae classes ubi signa Camilli[248]	u.bi.{s}.ci.pi.a.dae
Propertius *El.* 3.19.21	tuque o Minoa venumdata Scylla figura[249]	ve.num.da.ta.{s}.cyl.la
Propertius *El.* 4.1.41	iam bene spondebant tunc omina quod nihil illam[250]	be.ne.{s}.pon.de.bant
Propertius *El.* 4.4.48	tu cape spinosi rorida terga iugi[251]	ca.pe.{s}.pi.no.si
Propertius *El.* 4.5.17	consuluitque striges nostro de sanguine et in me[252]	con.su.lu.it.que.{s}.tri.ges
Ovid *Ars am.* 1.332	Altera Scylla novum Circes medicamine monstrum[253]	al.te.ra.{s}.cyl.la
Ovid *Her.* 10.106	Strataque Cretaeam belua stravit humum[254]	be.lu.a.{s}.tra.vi.(t-)
Ovid *Metam.* 4.45	Derceti quam versa squamis velantibus artus[255]	ver.sa.{s}.qua.mis
Ovid *Metam.* 12.438	manat et exprimitur per densa foramina spissus[256]	fo.ra.mi.na.{s}.pis.sus
Statius *Theb.* 7.733	quercus alumna vadi fas et mihi spernere Phoebum[257]	mi.hi.{s}.per.ne.re

Table 20 continued

[242] 'You that intend to write what is worthy to be read more than once, blot frequently' translation from Smart and Buckley (1863).
[243] 'dislike a large pike…because truly [pikes are]' translation from Smart and Buckley (1863).
[244] 'whom vicious folly or the ignorance of truth [drives]' translation from Smart and Buckley (1863).
[245] 'Stertinius, the eighth of the wise men, gave to me, as to a friend' translation from Smart and Buckley (1863).
[246] 'Idaean Simois and Scamander sprung from Jove' translation from Butler (1912).
[247] 'I saw her arms bitten by the sacred asps' translation from Butler (1912).
[248] 'Now where are Scipio's fleets, where the standards of Camillus?' translation from Butler (1912).
[249] 'And thou, Scylla, that didst sell thyself for the beauty of Minos' translation from Butler (1912).
[250] 'even then the omens boded her well, since…[the horse…had done] her no [hurt]' translation from Butler (1912).
[251] 'do thou take the dewy ridge of the thorn-clad hill' translation from Butler (1912).
[252] 'she consulted owls how she might have my blood, and [gathered…] for my [destruction]' translation from Butler (1912).
[253] 'the other one, Scylla, has been turned into a wonder [of the sea] by Circe's witchcraft' my translation; a textually problematic line, not included in many editions and hence usually untranslated.
[254] 'the prostrate monster tinged with its blood the Cretan ground' translation from Davidson (1813).
[255] 'Derceto…her body changed, and scales upon her limbs' translation from More (1922).
[256] 'liquors…thick squeeze out through numerous holes' translation from More (1922).
[257] 'this oak-spear, foster child of your stream. I can scorn Phoebus now' translation by A. S. Kline (source: http://www.poetryintranslation.com/klineasstatiusthebaid.htm).

8. The phonology of prefixed forms

8.1. Introduction

Prefixed forms display some phonological phenomena that are different from those encountered in simplex forms, and therefore it is necessary to discuss them separately and comprehensively. Some phonological processes that typically occur at prefix–stem boundary were discussed in chapter 4, and some phonotactic aspects in chapter 3. In the present chapter every prefix that can be regarded as a morphological unit in Classical Latin is discussed in detail, specifically with respect to its phonological behaviour.

Morphosyntactically speaking prefixed forms are "rigid" in the sense that, like prefixed forms in the Slavonic languages, and unlike prefixed forms in German or Hungarian, they are inseparable. In terms of productivity, transparency and phonological interference they can be arranged on a cline with strongly lexicalised and opaque forms at one end and transparent formations at the other. The difference can be exemplified with *dēgere* 'live' (usu. with an object like 'life' or 'time'), which is composed of *dē* 'from' + *agere* 'do, drive', vs. *perpolitus* 'highly polished', in which the adjective *politus* 'polished' is combined with *per*, which has two meanings, 'through' and 'highly, very'. The transparent nature of *perpolitus* is not only seen in its semantics and in the lack of phonological interference between the two component parts, but also in some instances of its use, where it is used next to other *per*-prefixed adjectives with similar meanings.[258] This cline is related, though certainly not in an isomorphic fashion, to the diachronic emergence of these forms.[259]

The tangled history of prefixed forms will not, in general, be pursued here. I nevertheless note some of its salient features because an understanding of these is indispensable for what follows in the present chapter as well as chapter 11. Prefixation led in many cases to lexicalisation, which in turn resulted in drastic phonological modifications at the prefix–stem boundary as well as within the

[258] A case in point is found in the *Rhetorica ad Herennium* 4.32: *ut [continuationes]* perfecte *et* perpolitissime *possint esse absolutae* 'so that periods can be finished in a well-rounded and highly polished manner' (translation mine).

[259] The best summary of these issues to date is Prinz (1949–50 and 1953), which is based on an extensive study of manuscript and inscriptional evidence as well as grammarians' remarks; one may further consult Leumann (1977:181–219) on the sound changes that took place in consonant clusters, including those that emerged at prefix–stem boundaries, Buck (1899:117–118 and 156–167) on the assimilation of prefix-final consonants, and García González (1996), a short case-study of the prefix *ad-* and its epigraphic variants based on the Roman inscriptional corpus (*CIL* vol. 6). In the discussion of prefix variability I rely on Prinz (1949–50 and 1953) besides my own corpus research.

stem.[260] The pace and the extent of lexicalisation, however, was highly variable (which explains the cline mentioned in the previous paragraph). Furthermore, prefixation also involved recomposition in all periods of the documented history of Latin. An early case of recomposition is seen in *perjūrare* 'forswear', which is the recomposed variant of the older form *peierare* [pejjera:re] (same meaning). Later recompositions can be reconstructed on the evidence of Romance languages; it is well known that reflexes of forms like *rétinet* 'he keeps' (< *re*+*tenet*) often derive not from the inherited Classical Latin forms but from recomposed variants such as **reténet* (> Fr *retient* etc.).

The varying pace of lexicalisation and the varying degree of transparency coupled with the phonological processes that took place at prefix–stem boundaries resulted in a not particularly straightforward relation between written forms and probable phonological variants. It is clear that in many cases an assimilation that certainly took place is not indicated in writing (e.g. simple voicing assimilations as in ⟨adtinere⟩ for *attinere* 'hold' or the velarisation of the nasal as in *incipere* 'begin'). It is also clear that beginning with the 1st century AD etymologically oriented habits of spelling began to gain ground, but did not affect all words of a similar composition to the same extent. Since, however, many of the characteristic traits of the variation that appears in the texts are clearly phonologically based, it can be assumed that the picture is not badly distorted — that is, with all the necessary provisos. In those instances below where there seems to be good reason to believe that the written forms depart from the reconstructible phonological reality, this will be duly pointed out.

The case of *peierare/perjūrare* brings us to yet another related issue, that of attestation. The fact is that while the former is evidently the older variant on phonological grounds, its appearance in written documents postdates that of the latter by more than a hundred years (early 1st century BC for *peierare*, late 3rd century BC for *perjūrare*). Furthermore, there appears in some manuscripts of Plautus, Cicero and St Augustine an intermediate form written ⟨peiur-⟩ or ⟨peiiur-⟩, which indicates assimilation of [r] (as in *peier*-) but unweakened stem vowel (as in *perjur*-). If one considers word class as well, the picture is further complicated. This particular prefixed stem underlies three words: the verb *peierare/perjurare/peiurare,* the noun *perjurium/peiurium* and the adjective *perjurus/peiurus*. The forms written as *peier*- are all forms of the verb; those written as *perjur*- are mostly forms of the noun and the adjective, and only in a few instances are they forms of the verb; those few written as *pei(i)ur*- are all forms of the noun and the adjective until the end of the Republican era, after which one or two verbal formations are attested.

If one assumes that late antique and medieval scribal interference has been factored out by the editors of the texts that found their way into the database (actually the manuscript evidence for these words is fairly safe), and if one further assumes that the spellings faithfully represent pronunciation variants ([rj] vs. [jj], or [e] vs. [u:] in the stem; note that this assumption is, of course, not self-

[260] Within stems, these phonological modifications are virtually confined to short vowels; see the brief discussion of these in 5.1.1.

explanatory), a possible scenario that explains this lexical distribution could be that after an early split into a verb *peierare* and an adjective/noun *perjurus/perjurium*, a secondary verb was formed on the basis of the nominal forms, which was thus *perjurare*. Yet it remains a problematic point why the attestation of the apparently earlier form is actually later than that of the more recent form.[261]

8.2. The prefixes of Latin

Latin prefixes are exhaustively listed in (71).

(71) The prefixes of Latin

(i)	Vowel-final:	*dē-*
		prō-
		sē-
		ne-
		re-
		ambi-
		ante-
		vē-
(ii)	Glide-final:	*prae-*
(iii)	[r]-final:	*per-*
		super-
		subter-
		inter-
		por-
(iv)	Nasal-final:	*con-*
		in-
		circum-
		an-
(v)	Obstruent-final:	*post-*
		ex-
		dis-
		trans-
		ad-
		ab-
		ob-
		sub-

[261] On the story of these words see Prinz (1953:52–53) as well as Walde and Hoffmann (1956 s.v.) and de Vaan (2008 s.v.).

8.2.1. Vowel-final prefixes + *prae*

8.2.1.1. *dē-*

The lexically frequent prefix *dē* only shows phonological modification when followed by a stem-initial vowel.[262] In such cases the vowel shortens as is normal in word-internal hiatus: *dĕhinc* 'hence', *dĕhiscere* 'swallow', *dĕunx* '11/12'. In some words lexicalised contraction with a short vowel is found:[263] *dēgere* < *dē+agere* 'live',[264] *dēbere* 'owe' < *dē+habere*. Evidence from poetry indicates that those imperfective forms of *deesse* 'be missing, absent' where the stem begins with [e] are contracted even if the writing does not normally indicate it (i.e. *deesse* INF, *deerat* 3SINGPASTIMPF etc. are disyllabic, *deest* 3SINGPRESIMPF is monosyllabic).

8.2.1.2. *prō-*

This prefix is also frequent lexically. It has three variants: *prō-*, *prōd-* and *prŏ-*. The first is normally found before consonants. The other two are prevocalic variants: the hiatus is filled with [d] in *prōdire* 'go forward', *prōdesse* 'be of use' and *prōdigere* 'drive'; by contrast, the hiatus remains unfilled and the long vowel shortens in *prŏavus* 'great-grandfather', *prŏhibere* 'prohibit', *prŏhinc* 'hence', *prŏin* and *prŏinde* 'likewise'. Of these, *prŏinde* is regularly contracted in poetry to a disyllable,[265] *prŏin* and *prŏhinc* are not used in poetry, the other words are not contracted. Lexicalised contraction is found in *prōmere* 'bring forth' < *prō+emere*.

Surprisingly, the short form is also found with the majority of [f]-initial stems: *prŏfugus* 'fugitive', *prŏfanus* 'profane', *prŏfundere/prŏfusus* 'pour out', *prŏfiteri/prŏfessus* 'say publicly', *prŏficiscor/prŏfectus* 'travel', *prŏfecto* 'really', *prŏfestus* 'common (scil. day)', *prŏfatur/prŏfatus* 'speak out' (as opposed to *prōficere* 'go forward, affect',[266] *prōfluere* 'gush forth', *prōflare* 'blow forth', *prōferre* 'bring forth'). This is phonologically very strange, all the more so since the rare instances of internal [f] in simplex forms are preceded, with one exception, by long vowels (see 2.1.1).

A vacillating prefix is found in the word *prŏpago* (sometimes *prōpago* 'issue'). This word may have been analogically influenced by the etymological family built around *prŏpe* 'near' or *prŏprius* 'own'. The word *propitius* 'favourable' is also believed to have *prŏ-* rather than *prō-*; the negative evidence for this is the

[262] Including, as elsewhere in Latin phonology, [h]V-initial stems as well.

[263] The word *deorsum* 'downwards' was fairly popular with prose writers, but of the poets only Lucretius ever used it, thus the relevant aspects of its realisation are hard to guess. In Lucretius it is almost always disyllabic, which means that the sequence written ⟨deor⟩ constituted one syllable, sometimes trisyllabic with a light first syllable, i.e. *dĕorsum,* which is more in line with the general tendency. Etymologically, a [w] was lost between the two vowels.

[264] Note that this verb has no third stem, where the stem vowel would be long on account of the rule explained in 5.3.2 and thus contraction precluded: ***deāct-*.

[265] But this may be skewed in that out of the 23 occurrences in poetry 20 are by Lucretius.

[266] Note the minimal pair *prōfectus* PASSPART of *prōficere* 'go forward, affect' vs. *prŏfectus* PASSPART of *prŏficisci* 'travel', or *prŏfecto* 'really'.

complete absence of this word from poetry, which may be due to three consecutive light syllables (*prŏpĭtĭ-*), unfitting for any of the classical metres bar an exceedingly rare one (called galliamb).[267]

8.2.1.3. *sē-*

This prefix is significantly rarer than the preceding two and is never found before vowels or before [t b s f n r]. One reason for its rarity may have been a partial coincidence with *sē-*, the variant of *sex* 'six' in compounds before voiced consonants (e.g. *sēdecim* '16' from *sex+decem*).[268] There is only one form, *seorsus* 'separate', in which a vowel-initial (originally [w]-initial, see *deorsum* above) stem follows *sē-*. This form is not used by poets except Lucretius, and just like *deorsum,* it is overwhelmingly contracted. In the two instances when it is not contracted, the prefix scans as a light syllable, i.e. *sĕ.or.sum.*

8.2.1.4. *ne-*

The negative prefix *ne-* is one of the rarest prefixes. It only occurs in *nequire* 'be unable', *nescire* 'not know', *nefas* 'disallowed', *nefandus* 'unspeakable', *nefarius* 'outrageous', *negligere* 'neglect', *negotium* 'business' and preclassical *nefrens* 'toothless'. Apparently before sonorants (*viz.* in *neg-ligere* and *neg-otium*) the prefix is augmented to *neg-*.

8.2.1.5. *re-*

This is one of the most frequently used prefixes. It occurs before all kinds of stems except [r]-initial ones. Before vowels a variant *red-* appears (similarly to *prod-*), as in the following words:

(72) Words prefixed with *red-*

redigere 'drive back'
redire 'go back'
redundare 'overflow'
redimere 'take back'
redhibere 'take back'
redhostire (preclass.) 'recompense'
redhalat (hapax legomenon in Lucretius) 'exhale' 3SINGPRESIMPF

[267] Note that the short-vowel variant of the prefix is also found in several obscured formations such as *procul* 'far', *probus* 'excellent'.

[268] Thus, for instance, there are two words *sējugis*: one means 'separate' and is from *sē+jug-*, the other means 'six-horse' (scil. cart etc.) and is from *sex-jug-*. The second half of both forms is the stem meaning 'bind'.

The variant *red-* is also found in *reddere* 'give back', which is a synchronically inexplicable oddity. The etymology of this word is generally believed to involve original imperfective reduplication (**re-di-dare*, see Walde and Hoffmann 1956 s.v.; de Vaan 2008:174–5 is silent about it), an explanation not without problems in view of the perfective *reddidi* (with perfective reduplication *plus* the geminate [d]) and the third stem *reddit-*, though, of course, analogy may have interfered.

Around 200 AD, the preconsonantal variant *re-* appears before vowels in Tertullian's works, who has *reaedificare* 'rebuild', *reanimare* 'restore to life' and *reinduti* 'reclothed' next to regular *redaccendere* 'relight' and *redornantur* 'reornate'. Even later, around and after 400 AD, further such forms make their appearance as *reordinatio* 'reordination', *reinterpretatus* 'reinterpret', *reignire* 'relight' and *reaccendere* 'relight' in the Christian literature.

One more point: throughout the classical period, the frequently occurring verb *reicere* (< *re*+*jacere*) 'throw back' scans with a heavy–light syllable sequence for the portion written ⟨rei⟩, which clearly shows the gemination of [j] ([rej.ji.ke.re]).[269] In all likelihood this is due to the analogy of simplex forms, where intervocalic [j] is redundantly geminated (see 2.1.1, also see Allen 1978:39 and Weiss 2009:154).

8.2.1.6. *ambi-*

This very rare prefix occurs, strictly speaking, only with a couple of vowel-initial stems in the classical period, and in this environment it loses the final vowel:

(73) Words prefixed with *amb*(*i*)-

ambire 'go round'
ambigere 'go round'
ambesse (←*amb*+*ed-*) 'gnaw around'
amburere 'burn'
ambago or *ambages* 'evasion'

Consonant-initial stems prefixed with *ambi-* are first found in a technical text by Apuleius (*ambifarius* 'ambiguous'), and then a couple more well after the classical period (*ambiformiter* 'in two forms' in Arnobius, *ambidexter* 'ambidextrous' from the 5th c. AD on).

Since the etymologically related, synonymous prefix *an-* (see 8.2.3.3 below) occurs almost exclusively before consonants, the two prefixes can be regarded as variants of the same entity even in Classical Latin.

[269] Contrary to Touratier (2005:75), who claims that the phonetic representation of this word was [re:jikere].

8.2.1.7. *ante-*

This prefix appears as *ante-* or *anti-* without any discernible regularity:

(74) Words prefixed with *ante-/anti-*

antecellere 'surpass'
antecedere 'precede'
antesignani 'troops in front'
anteferre 'carry in front'
anticipare 'anticipate'
antistes 'high priest'

There seems to be some evidence that when a vowel-initial stems was prefixed with *ante-*, the final [e] of *ante-* was lost, though such forms are few and far between. The only example with any frequency is *anteire* 'go before' in its attested forms *anteis, anteit, ante*(*e*)*at, anteeunt*. Both *anteis* and *anteit* scan in poetry as two heavy syllables; the same is true of the infinitive *anteire* (with the scansion of the third syllable depending on context). Whether this suggests [antejs] [antejt] [antejr(e)] or [anti:s] [anti:t] [anti:r(e)] is, in itself, difficult to determine, though the attested spelling ⟨antire⟩ suggests the latter, and generally speaking vowel elision is more frequent in Latin (morpho-)phonology than desyllabification.[270] The only occurrence[271] of *ante*(*e*)*at* scans as heavy–light–light, thus clearly [an.te.at] and one of the two [e] vowels is lost. The participle *anteactus* 'past' occurs twice in the entire poetic corpus,[272] and scans as three syllables (heavy–heavy–X), which points to elision or desyllabification of the [e]. The occurrences of *anteambulo*(-)[273] 'who walks before' scan as four syllables (heavy–heavy–light–X) if one disregards the inflectional endings, which points to the same.

It would be interesting to see how the final vowel of *anti-/ante-* behaves in the environment of lowering before [r] (see 5.1.2.2), but this prefix does not combine with stems beginning with [r] at all.

[270] See the prevocalic deletion of back vowels in 5.2.2 or word-final deletion in hiatus in poetry, mentioned in 2.2.2.
[271] Ovid *Ars am.* 2.726.
[272] Ovid *Am.* 2.8.25, Tib. *El.* 3.7.189; it is also exceedingly rare in prose.
[273] Mart. *Epigr.* 2.18. 5 *anteambulo*, 3.7.2 *anteambulonis*, 10.74.3 *anteambulones*.

8.2.1.8. *vē-*

This marginal negative prefix is confined to a handful of forms:

(75) Words prefixed with *ve-*

vecors 'frenzied'
vepallidus 'very pale'
vesanus 'mad'
vegrandis 'undersized'
Vejovis a deity

A number of etymologies involving this prefix were proposed earlier for further words, e.g. *vestigium* 'trace', *vemens/vehemens* 'vehement', *vesica* 'bladder', but these are not now generally accepted (see de Vaan 2008 s.vv.).

8.2.1.9. *prae-*

The only glide-final prefix is frequent and occurs with all consonants as well as vowels, though vowel-initial stems with *prae-* are not particularly numerous. In poetry, *prae-* tends to scan as a light syllable before vowels, though contraction with the stem-initial syllable also occurs, and neither pattern is attested in more than a handful of instances. For contraction the only clear example is Catullus *Carm*. 64.120, where *praeoptarit* 'prefer' scans as heavy–heavy–light, which means that the entire sequence spelled ⟨praeop⟩ counts as a single syllable. Uncontracted short scansion is found in Verg. *Aen*. 7.524 (*praeustis* 'burnt at the point' light–heavy–heavy), Ov. *Metam*. 7.131 (*praeacutae* 'sharpened to a point' light–light–heavy–heavy), and three occurring forms of *praeire* 'go before' (i.e. *praeeunt, praeeunte, praeeuntibus*) all scan with two initial light syllables ([pra.je.unt] and [pra.je.un.t-]), while *prae-iret* with two initial heavy syllables in Stat. *Theb.* 6.519 ([praj.ji:.ret] with gemination of [j] in line with its redundant gemination in simplex forms). Lexicalised contraction is found in *praebere* 'put forward' (< *prae*+*habere*, in Plautus the uncontracted form with weakened stem-vowel *praehibere* is found).

The isolated verb *prehendere* 'grab' shows a variant *pre-* (as well as a stem unattested elsewhere in the language).

8.2.2. Prefixes ending in [r]

8.2.2.1. *per-*

This prefix is lexically frequent and combines, mostly without phonological interference, with any stem-initial segment. In three words the [r] sporadically and variably assimilates to [l]:

(76) [l]-initial stems prefixed with *per-*

perlegere ~ *pellegere* (Plautus) 'scan'
perlucere ~ *pellucere* (classical) 'transmit light'
perlicere ~ *pellicere* (classical) 'attract'

There is further the isolated verb *peierare* [pejjer**-**] next to its reassembled etymon *perjurare* (see 8.1).

8.2.2.2. *super-*

This prefix is rarer than the previous one, and is even more impervious to phonological alteration. There is only one item in which the final [r] assimilates to [l], *supellex/supellectilis* 'belongings'. In this word the assimilation of [r] to [l] is invariable; the form *superlectilis* without assimilation is attested altogether six times, all from the fourth–fifth centuries AD, clearly a symptom of the etymologising tendency in writing. In a few words the prefix appears as *supra-* (e.g. *suprascandere* 'surmount', also *superscandere*). Given that both *super* and *supra* are existing words ('over' preposition and adverb, respectively), this suggests that *super*-prefixed forms are closer to compounds than to other prefixed forms.

8.2.2.3. *subter-*

This prefix occurs in about ten words at most (e.g. *subterpositus* 'placed beneath', *subterfugere* 'run for shelter', *subterlabens* 'flowing beneath'); its final consonant remains intact in all of them.

8.2.2.4. *inter-*

This prefix is relatively frequent. Its final [r] only assimilates in the lexical item *intellegere* or *intelligere* 'understand'.[274]

8.2.2.5. *por-*

This moribund prefix occurs in *portendere* 'portend' and *porrigere* 'extend', *porricere* 'offer as sacrifice', and in *polliceri* 'promise' with assimilation of [r] to [l].

[274] Statius *Theb.* 7.571 uses the word *interligat*, which is not from *inter+legere* but from *inter+ligare* 'join'.

8.2.3. Nasal-final prefixes

8.2.3.1. *in-*

The behaviour of *in-*[275] shows the following particularities. The coronal nasal at the end of the prefix undergoes place assimilation before stops (place assimilation 1) and before [m] (place assimilation 2, for both types see 4.8). Although in writing only assimilation to labials is directly indicated with the spellings ⟨imp-⟩, ⟨imb-⟩, ⟨imm-⟩, there is no reason to doubt that before velars assimilation to [ŋ] took place (place assimilation 1), and this is, in fact, quite clearly indicated by grammarians.[276] Before the fricatives [s] [f] place loss resulting in a placeless nasal is most likely (but vacillation must have been great, see 4.6), followed by coalescence resulting in a long nasal vowel (see 5.3.4).

The nasal may undergo total assimilation to [r] and [l], though lack of assimilation appears to be significantly more frequent, especially in the classical and the preclassical periods, as far as the writing indicates this (see also Prinz 1953:45 sqq.). Before glides and vowels the written form of the prefix is unchanged (which implies a phonological [n]).

(77) Words prefixed with *in-*

example	transcription	gloss	process
imponere	[imp-]	‘put on’	place assimilation 1
inquirere	[iŋk-]	‘inquire’	place assimilation 1
inscius	[ĩːs-] ([ins-]?)	‘unaware’	place loss and coalescence
inferre	[ĩːf-] ([iɱf-]?)	‘take in’	place loss and coalescence
immittere	[imm-]	‘send in’	place assimilation 2
inrigare	[inr-] ~ [irr-]	‘make wet’	total assimilation[277]
inlicere	[inl-] ~ [ill-]	‘entice’	total assimilation

8.2.3.2. *con-*

The prefix *con-* was discussed in detail in 5.3.4, where the behaviour of the placeless nasal was explained. Here I recapitulate the main points of that section and add a number of others to make the picture full.

The behaviour of *con-* before consonants is somewhat similar to that of *in-*. The placeless nasal at the end of the prefix undergoes place assimilation before

[275] *In-* is, of course, two prefixes, not one. The negative prefix is found in e.g. *inscius* ’unaware’, the directional in e.g. *incurrere* ’run up against/to’. Since there does not seem to be any significant difference between the two in terms of their phonology (though Prinz 1953:45–46 indicates a small discrepancy in their readiness to assimilate), I lump them together here.

[276] See the references in Allen (1978:27 sqq). Note also that the usual etymologising tendency in the latter half of antiquity often replaces the ⟨imp-/imb-⟩ spellings with ⟨inp-/inb-⟩.

[277] Note that the [r] resulting from the assimilation does not induce the lowering of [i] (***errigare*).

stops (place assimilation 1) and before [m] (place assimilation 2). As with *in-*, in writing only assimilation to labials is directly indicated with the spellings ⟨comp-⟩, ⟨comb-⟩, ⟨comm-⟩, but it is certain that before velars assimilation resulting in [ŋ] took place (place assimilation 1).[278] Before the fricatives [s] [f] coalescence resulting in a long nasal vowel is most likely. Total assimilation to [r] is usual except for the relatively rarely used words *conridere* 'laugh together', *conradere* 'rake together', *conrodere* 'gnaw'. Assimilation to [l] is almost exceptionless with the lexemes *colligere* 'collect' and *collega/collegium* 'colleague/college'; with other [l]-initial stems the proportion of assimilated forms varies between 20–50% in the corpus, see 8.3.4 for a more detailed presentation.

With [n]-initial stems no geminate [nn] results but a [koːn-] sequence instead with dropping of the prefix-final nasal and compensatory lengthening of the [o] (*conivere* 'close the eyes', *conectere* 'connect', *conubium* 'marriage' etc.). It is also possible that the vowel was nasal rather than plain. The explanation I gave in 5.3.4 for the dropping of the nasal is that a sequence of a placeless nasal and [n] cannot undergo either place assimilation 1 or place assimilation 2, since such a sequence does not satisfy the structural description of either. Since a placeless segment is incomplete, it cannot surface and is thus deleted. I speculated in 5.3.4 that the placeless nasal may just possibly have coalesced with the preceding vowel instead of being deleted in this environment.

Before glides the nasal is present in the spelling, suggesting coalescence into a long nasal vowel. There is one exception: *conjicere* 'throw' is attested more than sporadically as ⟨coicere⟩, which probably suggests a totally assimilated nasal, i.e. [kojjikere]. Other words with glide-initial stems are occasionally found with no orthographic ⟨n⟩ in inscriptions (e.g. ⟨coiux⟩ 'spouse').

Before [w] there is some evidence of a labial pronunciation coming from the grammarian Marius Victorinus (4th century AD). He explicitly claims that the relevant forms are ⟨comvalescit⟩ 'convalesce', ⟨comvocat⟩ 'summon' with ⟨m⟩ rather than ⟨n⟩ (*Ars Grammatica* 4.65). The problem is not only that such forms are extremely rare generally, but also that Marius Victorinus's other claims seem to be so far-fetched (e.g. ⟨ovvertit⟩ 'turn back' and ⟨ovvius⟩ ' facing' instead of ⟨obvertit⟩, ⟨obvius⟩) that one feels one has to take even this apparently plausible piece of information regarding ⟨comvocat⟩ etc. with a pinch of salt. Note, however, that he does not claim the same for *in-*, which seems to be in line with my assumption that *in-* ended in a coronal nasal (see 8.2.3.1), whereas *con-* ended in a placeless nasal.

[278] Again similarly to *in-*, the usual etymologising tendency in the latter half of antiquity often replaces the ⟨comp-/comb-⟩ spellings with ⟨conp-/conb-⟩. Contrary to Prinz (1953:36) I do not believe that Cicero's remarks in *Orator* 159 point to phonetically unassimilated [konp-]. The relevant portion of the text is this: "Indoctus dicimus brevi prima littera, insatius producta, inhumanus brevi, infelix longa... quibus in verbis eae primae litterae sunt quae in sapiente atque felice, producte dicitur, in ceteris omnibus breviter; itemque composuit, consuevit, concrepuit, confecit" 'The first sound of *indoctus* is pronounced short, that of *insatius* long, that of *inhumanus* short, that of *infelix* long… in those words that begin with the same sound as *sapiens* and *felix* it is pronounced long; similarly *composuit, consuevit, concrepuit, confecit*' (translation mine). The point Cicero makes is simply that the vowel of the prefix is long in *consuevit* 'got used' and *confecit* 'accomplished' but short in *concrepuit* 'creaked' and *conposuit* 'composed'. It does not follow, as Prinz believes, that "the parallel is valid only if one assumes *n* in *conposuit*".

Besides the empirical issue regarding putative [komw-] there is a theoretical issue as well: how could a place feature spread from a glide to a consonant if glides have the same structure as vowels (i.e. they have no C-Place node, only a V-Place node, as explained in 2.3) and so their place features are not on the same tier as those of consonants? The most plausible assumption is that there was no assimilation at all, and so the preconsonantal placeless nasal coalesced with the preceding vowel. Thus the spelling ⟨con⟩ stood for [kõː] before glides as well as before fricatives. There was no spreading and no true labial nasal in the ⟨comvocat⟩/⟨convocat⟩-type words. This would also explain why Marius Victorinus gives examples of the ⟨in⟩ > ⟨im⟩ assimilation before the labial consonants [p b f m], but not before [w]: the glide does not induce assimilation in the nasal of either prefix, and the grammarian's variation in the spelling of the *con*-nasal is congruent with its lack of place, as opposed to that of *in*-.

As was pointed out in 4.8 and 5.3.4, before vowels the variant is *co*- with no nasal (*coarguere* 'prove', *coire* 'meet' etc.), thus hiatus is created by dropping an intervocalic consonant.[279] Metrical evidence does not show contraction in such cases. Lexicalised contraction is found in a few words (*cōgere* < *co+agere* 'coerce', *cōmere* < *co+emere* 'comb'),[280] but only with short vowels, thus the PASSPART of *cōgere* is *coāctus* and its PERF is *coēgi*. Note, however, that the variant *com*- is also attested before vowels in certain words in the preclassical as well as the classical era (notably *comesse* 'eat', *comestus* 'eaten'), and Romance languages also point to such formations (French *commencer* and Italian *cominciare* 'begin' go back to **com+initiare*). This shows very early lexicalisation, with the etymological *[m] intact in intervocalic position as opposed to its later development into a placeless nasal in word-final position (de Vaan 2008 s.v. *com*) and does not impinge on the synchronic phonology of the placeless nasal in any way.

(78) Words prefixed with *con*-

example	transcription	gloss	process
componere	[komp-]	'compose'	place assimilation 1
conquirere	[koŋk-]	'collect'	place assimilation 1
conscius	[kõːs-]	'privy'	coalescence
conferre	[kõːf-]	'carry'	coalescence
conubium	[koːn-] ([kõːn-]?)	'marriage'	loss with compensatory lengthening (or coalescence)
committere	[komm-]	'bring together'	place assimilation 2
conrigere	[korr-] ([kõːr]?)	'correct'	total assimilation
conlocare	[koll-] ([kõːl]?)	'put in place'	total assimilation
convocare	[kõːw-]	'summon'	coalescence

[279] The verb *urere* 'burn' gives *comburere* 'burn to ashes'. This may be due either to the analogical influence of *amburere*, or perhaps to the actual prefixation of *co*- to *amburere* rather than to *urere* (see Walde and Hoffmann 1956 s.v.). Actually, no [u]-initial stem was prefixed with *co(n)*- until the fourth century AD, when Marius Victorinus introduced the theological term *counitus/counitio* 'united/union'.

[280] But note the form *coemere* for the latter in Caesar *Bell. Gall*. 1.3.

8.2.3.3. *an-*

This prefix combines only with a handful of stems, all but one beginning with a consonant. It is historically a variant of *ambi-* (see 8.2.1.6); the phonological regularity governing their distribution (vowel- vs. consonant-initial stem) only broke down after the classical period. There is, I think, no reason to believe that its final nasal behaved differently from that of *in-*.[281]

(79) Words prefixed with *an-*

example	transcription	gloss	process
amputare	[amp-]	'cut off'	place assimilation 1
amplecti	[amp-]	'embrace'	place assimilation 1
anquirere	[aŋk-]	'inquire'	place assimilation 1
anceps	[aŋk-]	'equivocal'	place assimilation 1
anfractus	[ãːf-] ([amf-]?)[282]	'broken'	place loss and coalescence
amicire	[ami-]	'cover'	?

8.2.3.4. *circum-*

This prefix does not seem to be subject to any alternations before consonants. The spelling ⟨circum⟩ is invariable and is replaced by ⟨circu⟩ only before the stem *ire* 'go' (*circuire* 'go round') and its derivatives (such as *circuitus* 'circular motion', *circueunda* 'around which one turns'). *Circu*(*m*)- is exceedingly rare before other vowels (e.g. *circumagere* 'drive/sail round'). With *ire* there is an interesting imbalance between *circum-* vs. *circu-*: if the stem form begins with [i], the form *circu-* is more frequent, when the stem form begins with [e], *circum-* is more usual (thus *circu-it* but *circum-eunt* rather than vice versa, though all variants occur).

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[281] Two lexical items present interesting issues here. *Antestari* 'call as witness' appears to be *an+testari*, but Leumann (1977:234) suggests an etymology (accepted by de Vaan 2008) *ante-testari* with haplology. While semantically as well as phonologically plausible, it is synchronically irrelevant in that the outcome of the putative haplology is, in fact, identical to the prefix *an-*. The other word is *amicire* 'cover', in which the verbal stem is [-ikiːre], an unusual deviation from original [jakere] 'throw' (see de Vaan 2008 s.v. *iacio*), and the prefix is *am-*, which is explicable diachronically from *amb-* (though not in a straightforward manner), but in a synchronic phonological description it is not easily reconciled with the other prefix variants. Kent (1912) and in his wake Zirin (1970:38 sqq.) suggests that [ji] > [i] may have been a real sound change (on the basis of the light scansion of the first syllable of *adicere* 'throw', *conicere* in preclassical scenic poetry), and the [j] was restituted on the analogy of *jacere* (Kent 1912:38–39) or of forms like *conficere* 'accomplish' (Zirin 1970:39). If accepted, this would explain the stem-initial [i], but the stem-final [iː] would still be unaccounted for and unique among the many compunds of *jacere,* which regularly have [-jikere] (*reicere* 'throw back', *deicere* 'throw down', *conicere* 'throw' etc.).

[282] The labial rather than the coronal nasal is also indicated by Lucretius' spelling ⟨amfractus⟩, whereas ⟨imf-⟩ for *in+f-* is not found there.

As far as the last segment of the prefix is concerned, it is difficult to give a phonological interpretation of these data which is completely coherent with everything that has been said so far. The spelling without ⟨m⟩ before *ire* suggests a placeless nasal which is lost before a vowel much like that of *con-* (see 8.2.3.2 above). But a placeless nasal could not explain the spellings ⟨circumagere⟩ or ⟨circumeunt⟩ — add to this that the surface phonological form corresponding to these spellings is also uncertain. Did it include an actual [m] or a nasalised [u] before another vowel? Both would be somewhat problematic.

A non-phonological difference between *circum-* and *con-* may be relevant, however. Words prefixed with *circum-* are much more like compounds than words prefixed with *con-*: their meanings are usually more compositional, stem vowel weakening is hardly ever found in them (*circumcidere* 'cut around' and *circumcludere* 'enclose' were probably lexicalised early), and *circum-* can precede other prefixes (e.g. *circumobruere* 'wrap around' with *ob-*). In this respect *circum* resembles the other disyllables *retro* 'backwards', *intro* 'in', *extra* 'out', which formed compounds (if at all), but did not function as prefixes in the strict sense of the word. Since, on the other hand, *circuire* suggests prefixation rather than a compound boundary, and hence deletion of the placeless nasal just as is *coire,* the issue probably cannot be resolved definitively.

8.2.4. Coronal obstruent-final prefixes

8.2.4.1. *post-*

This prefix is rare in Classical Latin and shows no phonological interference with the stem. The only possible exception to this is *possidere* 'possess', which is believed to go back to *post*+*sedere* 'sit' (de Vaan 2008:552). If this etymology is correct, the stem vowel has undergone weakening, which is untypical with *post-*.

8.2.4.2. *ex-*

One of the frequent prefixes, *ex-* appears in the form *ē-* before all voiced consonants (though occasional spellings with ⟨ex⟩ are found):

(80) Words prefixed with *ex-*

extendere 'extend'
expellere 'expel'
excellere 'excel'
exire 'go out'

ēdere 'give out'
ēmanere 'stay away'
ēicere [e:jikere] 'throw out'
ēvincere 'defeat'

The replacement of *ex-* by *ē-* follows from a sound change in the prehistory of Latin which deleted [s] before all voiced consonants with compensatory lengthening. As was explained in 4.2, the consequences of this sound change are visible in the allomorphic patterns of some prefixes as well as elsewhere in the morphology and the lexicon, but it is no longer an active phonological rule in Classical Latin (and, in itself, would not account for the loss of the [k] anyway). Note, however, that a sequence in which [s] is preceded by [k] and followed by anything other than a voiceless stop or a vowel would be unsyllabifiable under the terms explicated in chapter 3. Thus some change in the shape of the prefix is forced by the phonotactics; but what exactly that change should be is not dictated by it.

With [s]-initial stems simplification of [kss] to [ks] took place (general degemination, see 4.5.1), and in the spelling the ⟨s⟩ of the stem is very often dropped in such cases:

(81) [s]-initial stem prefixed with *ex-*

⟨exilire⟩ 'jump out' < *ex-salire,* i.e. [ks] < [kss]

The only consonant which triggers assimilation in *ex-* is [f]. The spelling is either ⟨eff-⟩ or ⟨ecf-⟩ (*efferre/ecferre* 'take out' etc., though *effatus* 'who has spoken' and never ***ecfatus* in classical and postclassical Latin). If the spelling ⟨ecf-⟩ is taken to represent [ekf-] (the most plausible choice), a third variant [ek-] is identified. This can be analysed as resulting from a reanalysis of the *ex-s-* forms triggered by the degemination of [s]:

(82) Reanalysis of *ex-s-*

[eks]+[sali:re] > [eksili:re] (degemination) > [ek]+[sili:re]

The completely assimilated form ⟨eff-⟩ can, in theory, be analysed as including the variant [ek-], in which case the assimilation process only affects the consonant [k], not the sequence [ks].

On the other hand, since the [s] of *dis-* (see 8.2.4.3 below) assimilates systematically to [f] (and only to [f]), the emergence of the [ek-] variant can also be explained as resulting from assimilation followed by degemination:

(83) Assimilation and degemination in *ex-f-*

[eks]+[ferre] > [ekfferre] (assimilation) > [ek]+[ferre] (degemination)

Under this latter analysis, [ek-] is not a morpheme variant at all, it is simply the automatic result of the independently motivated and attested phonological rule of degemination.

8.2.4.3. *dis-*

This prefix shows variation very similar to that of *ex-*, diachronically deriving from the change presented in 4.2. Before voiced consonants of all kinds *dī-* is found.

(84) Words prefixed with *dis-*

distendere 'stretch'
discurrere 'run away'
disponere 'distribute'
dissentire 'disagree'

dīgerere 'disperse'
dīversus 'diverse'
dīluere 'wash away'
dīmittere 'send away'
dījudicare 'judge'

Some forms show both *dī-* and *dis-* before voiced consonants, e.g. *disjungere* ~ *dījungere* 'separate', while *disicere* [disjikere] 'scatter' is only attested with *dis-*.[283] In *dīrumpere* 'burst', assimilated (*dirrumpere*) as well as unchanged forms (*disrumpere*) are sporadically found in all ages from Plautus to St Augustine. In the archaic period a handful of assimilated forms of *dimminuere* ~ *dīminuere* 'shatter' are also found.

Only two vowel-initial stems combine with *dis-*, and in these the [s] historically underwent rhotacism:[284]

(85) Vowel-initial stems prefixed with *dis-*

diribere < *dis*+*habere* 'sort (votes)'
dirimere < *dis*+*emere* 'take away'

The only consonant to which the [s] assimilates regularly is [f]:

(86) [f]-initial stems prefixed with *dis-*

differre 'scatter'
diffundere 'pour out'
diffidere 'have no confidence'.

[283] But it is not entirely inconceivable that this was a usual spelling for the phonologically regular but "unwritable" [di:jikere].

[284] Note, however, that stem-initial [s] does not undergo rhotacism: *prosilire* 'jump forth', *desinere* 'desist', and so on. In 4.2 I argued that *dirimere* and *diribere* were lexicalised remnants from an earlier period, and rhotacism does not affect intervocalic [s] at prefix–stem boundaries, hence the productive *prosilire*-type. Combinations of *dis-* with vowel-initial stems were apparently avoided, as opposed to combinations of vowel-initial stems with [s]-final prefixes.

8.2.4.4. *trans-*

This prefix also shows the loss of [s] before voiced consonants, but the consistent application of this regularity is only triggered by coronals and [j]. Assimilation of [s] is not attested at all. When a geminate [s] would result, it is shortened by the specific degemination discussed in 4.5.2.

(87) Words prefixed with *trans-*

transportare 'carry over'
transtuli 'took across'
transcurrere 'run across'
transcendere ([trãːskendere] < [trãːs]+[skandere]) 'step over, cross'
transilire ([trãːsiliːre] < [trãːs]+[saliːre]) 'jump across'

trājicere (~ *transjicere* hapax leg.) 'throw across'
trāducere (overwhelmingly) ~ *transducere* 'lead across'
trādere (overwhelmingly) ~ *transdere* 'hand over'
trālucere, -lucidus (overwhelmingly) ~ *translucere, -lucidus* 'transmit(ting) light'
trānare ~ *transnare* (roughly equal) 'swim across'

translatus (! overwhelmingly) ~ *trālatus* 'taken across'
transvolare (overwhelmingly) ~ *trāvolare* 'fly across'
transversus (overwhelmingly) ~ *trāversus* 'crosswise'
transmittere (overwhelmingly) ~ *trāmittere* 'send over'
transmeare (overwhelmingly) ~ *trāmeare* 'travel across'
transgredi 'step over, cross'

The base variant *trans-* was used productively and independently of the phonological environment to form adjectives based on geographical names, e.g. *transrhenani*[285] 'those living beyond the Rhine' in Caesar, Tacitus and later historians or *transdanuviana* 'beyond the Danube' in Lactantius (4th c. AD).

The word *tranquillus* 'calm' is unexplained phonologically, as is the sporadically attested *trāferre* 'take across' (besides the much more frequent *transferre*).[286]

8.2.4.5. *ad-*

With the exception of [j] [w] the [d] in the prefix *ad-* assimilates to all consonants, though with varying consistency. The cline along which stem-initial consonants

[285] This is the only word in the corpus in which any variant of *trans-* is found before [r].

[286] Unless perhaps one assumes assimilation of [s] to [f] like with *dis-* in *differre* etc. and then shortening of the long fricative after the long vowel like in *transilire.* The phenomena are too isolated to allow anything more than speculation and, at any rate, all other [f]-initial stems show *trans-* (*transfugere* 'run across', *transfigere* 'transfix', *transformare* 'transform' etc.).

can be arranged according to how forcefully they act on the [d] of *ad-* looks like this, with examples below:[287]

(88) The consonants causing assimilation in *ad-*

p t k >> l r >> g s f >> m n (>> w j)

(89) Words prefixed with *ad-*

appetere ~ *adpetere* 'try to reach'
attinere 'hold'
accipere 'receive'
alloqui ~ *adloqui* (roughly equal) 'speak to'
alligare (more frequently) ~ *adligare* 'tie'
arripere (more frequently) ~ *adripere* 'grasp'
arrogare ~ *adrogare* (roughly equal) 'claim'
(*abbibere* ~ *adbibere* 'drink')
adgredi (more frequently) ~ *aggredi* 'go up to'
adferre (more frequently) ~ *afferre* 'bring'
adsiduus ~ *assiduus* (roughly equal) 'persistent'
adsistere (more frequently) ~ *assistere* 'stand near'
admovere (overwhelmingly) ~ *ammovere* 'move near'
adnumerare (overwhelmingly) ~ *annumerare* 'count'

The cline apparently has to do with sonority, though the relation is not straightforward, with liquids higher in the hierarchy than nasals and even fricatives and, as often, one has to count on analytic spelling. It also emerges from the manuscript tradition that assimilation to [k] was rare if it was followed by a second onset consonant (as in *adclamare* 'shout', *adclinis* 'inclined', *adclivis* 'sloping upwards', *adcredere* 'trust', *adcrescere* 'grow', *adquirere* 'acquire'). With some consonants, e.g. [p], the "readiness" to assimilate was lexically gradient, thus in *apparere* 'appear' virtually exceptionless, in *appetere* 'try to reach' very frequent, rarer in *adprehendere* 'grasp', and almost completely unattested in *adprobare* 'endorse'.[288]

The frequent verb *adesse* 'be present' seems to be lexically exempt from assimilation: the forms with the [s]-initial stem variant are almost always *adsum* 1SINGPRES, *adsunt* 3PLURPRES, *adsim* 1SINGPRESSUBJ etc. The perfect forms (which all begin with [f]) also mostly avoid assimilation (*adfui* 1SING etc.), but not as strictly as imperfective forms (the incidence of *affui* etc. is about 15% of all

[287] Stems beginning with [b] almost never figure with this prefix. A few occurrences of *adbibere* ~ *abbibere* 'drink' and archaic *adbitere* 'approach' are recorded, and in postclassical Latin *adbreviare* ~ *abbreviare* 'shorten, abbreviate' makes its appearance. Because of the scarcity of data, the place of [b] in the cline is not so clear as that of the other consonants, hence the omission. Stem-initial [s] is likely to have effected the devoicing of [d] to [t].

[288] Prinz (1949–50:91 sqq.); see also García González (1996).

occurrences vs. about 3% for *assum* etc.;[289] the general assimilation rate for *ad*+*s*- in other words is around 26% in the editions on which the Brepols-corpus is based, a proportion similar to that emerging from an investigation of manuscripts according to Prinz 1949–50:98–99).

When a stem begins with [s]+stop, the prefix variably appears in writing as ⟨ad⟩ or ⟨a⟩. The latter of the two represents assimilation of [d] to [s] followed by degemination before the following stop:

(90) [s]+stop-initial word prefixed with *ad*-

[ad]+[skandere] > [asskendere] > [askendere] (*ascendere* 'ascend')

The assimilation rate in these clusters is generally higher than for *ad*+*s*V-: for *ascendere* 'ascend', *aspicere* 'catch sight of', *aspergere* 'sprinkle' and *aspectare* 'watch' it is over 80%, for *astare* 'stand near', *aspirare* 'breath' and *ascire/asciscere* 'associate with oneself' over 30%, and for *aspernare* 'despise' 100%. Only two words, *ascribere* 'add in writing' and *astringere* 'tie', at about 20%, are below the non-pre-cluster average. It is noteworthy that the tendency to assimilate is so sharply divergent in the case of stop+sonorant complex onsets (where *ad*+CC << *ad*+CV) vs. initial clusters of an extrasyllabic [s] and a stop (where *ad*+CC >> *ad*+CV).[290]

8.2.5. Prefixes ending in [b]

8.2.5.1. *ob*-

The [b] in *ob*- usually undergoes assimilation to [k g f], occasionally to [m] with great differences in the degree of lexicalisation involved:[291]

(91) Words prefixed with *ob*-

occupare 'seize'
occulere, occultus 'hide/hidden'
occidere 'fall'
occīdere 'kill'
occumbere (~ *obcumbere* sporadically from late AD 4th c. on) 'fall'

[289] Though note that a pun is found in Plautus's *Poenulus* 279 which crucially assumes the assimilated pronunciation of *adsum* in spite of the manuscript tradition.

[290] As I pointed out in 2.1.2.9, the assimilation ratio of the only [sw]-initial stem prefixed with *ad*- (*adsuescere* 'get used to') is 24%, nearly identical to the assimilation ratio of [s]V-initial stems (26%). Given that there is only this one lexical item respresenting this particular phonological configuration, no general conclusions can be drawn apart from the trivial one that it does not follow the pattern of extrasyllabic [s]+stop clusters.

[291] In *omittere* < **ommittere* < **ob-mittere* 'release' degemination followed the assimilation. This historic degemination, triggered by the following heavy syllable, is referred to as the *Mamilla-Law,* see Tucker (1922).

(91) continued

occludere (mostly) ~ *obcludere* 'close'
obcaecare (mostly) ~ *occaecare* 'blind'
oggerere 'heap'
offendere 'strike'
offerre (~ sporadic *obferre*) 'put in one's path'
offundere (~ sporadic *obfundere*) 'pour'
offuscare (~ *obfuscare* from AD 4th c. on) 'darken'
obfui, -fuit etc. (overwhelmingly) ~ *offui, offuit* etc. 'hinder'
obmutescere (mostly) ~ *ommutescere* 'become dumb'
obmurmurare 'murmur in protest'[292]

The [b] underwent voice assimilation before [p t s]; before all other consonants and all vowels the prefix appears as *ob-*. Voice assimilation to [p t s] is not always indicated in writing, and the relation of written form to phonetic form is particularly difficult to disentangle at this point. Normally ⟨op⟩ is written before ⟨p⟩ but ⟨ob⟩ is written before ⟨t⟩ and ⟨s⟩:[293]

(92) Voice assimilation with *ob-*

⟨oppetere⟩ (overwhelmingly) ~ ⟨obpetere⟩ 'encounter'
⟨obtinere⟩ (overwhelmingly) ~ ⟨optinere⟩ 'maintain'
⟨obsidere⟩ (overwhelmingly) ~ ⟨opsidere⟩ 'occupy'

Is this a phonological difference indicating that voice assimilation was compulsory when voice was the only difference between the two adjacent stops, but optional when there was also a difference in place? Or is it merely a spelling convention? In the latter case, does it mean that voice assimilation was general but was not indicated in the spelling unless it resulted in a geminate? The problem is that parallels cannot be found within the language. In simplex forms voice assimilation is very often indicated, as in *actus* 'driven' and *scriptus* 'written', *scripsi* 'I wrote' (cf. 4.1). The prefix *ad-* (8.2.4.5) shows extensive assimilations, but that probably has to do with the fact that it ends in a coronal stop, which is strongly dispreferred in syllable coda. There are two other [b]-final prefixes (see the following two sections), but they generally behave differently from *ob-*.

[292] Note that the verbs that show overwhelmingly unassimilated *ob-* (*obcaecare, obfui, obmutescere, obmurmurare*) also show unweakened stem vowels.

[293] The standard etymology of the verb *ostendere* 'show' involves the prefix *ob-* in the form **obs-* plus the verb *tendere* 'stretch' with loss of the [b] in the cluster [bst] (or more likely [pst]). The problem is that the cluster [pst] occurs without simplification both at prefix-stem boundaries (*abstinere* 'keep away') and in simplex forms (*depstum* 'pastry', *consumpsti* 'you consumed'). Admittedly, though, the other two [b]-final prefixes show [s]-final variants before [t] (see the following two sections on *ab-* and *sub-*). A form analogous in etymology to *ostendere* is *oscen* 'divining bird' < *obs*+*can-* 'sing'.

8.2.5.2. *ab-*

This prefix occurs before all consonants except [b g]. Before the voiceless stops [k t] it appears as *abs-*:[294]

(93) Words prefixed with *ab-*

abesse 'be absent'
abire 'go away'
abstinere 'keep away'
abstrahere 'drag away'
abscondere 'conceal'

Before [p] it appears as *as-*, a form apparently dissimilated from *abs-* (these two verbs are the only examples):

(94) [p]-initial stems prefixed with *ab-*

asportare 'take away'
aspellere 'drive away'

Before [m] and [w] the variant form is *ā-*:

(95) [m]- and [w]-initial stems prefixed with *ab-*

āmovere 'remove'
āmittere 'send away'
āvertere 'turn away'
āvocare 'call away'

Before [f] this prefix only occurs in three verbs. Of these, *fui* is accompanied by *ā-*, as are the other labial consonants, but the other two, *fugere* and *ferre* combine with an etymologically unrelated prefix *au-*, which only occurs in these two words:

(96) [f]-initial stems prefixed with *ab-*

āfui (PERF of *abesse*) 'be absent'
aufugere 'run away'
auferre[295] 'carry away'

With the prefix *ab-* no assimilation takes place except for voice assimilation.

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[294] Note that as a preposition, *ab* also shows the variant *abs*, almost exclusively before *te* 'you', plus a handful of instances of *abs* before [t]- and [k]-initial words.

[295] *Auferre* being a three-way suppletive verb, it shows all the three variants of the prefix: *auferre* (IMPF), *abstuli* (PERF), *ablatum* (SUP).

It seems clear that the stop-final form of *ab-* was avoided before labial consonants: the prefix does not occur with labial stop-initial stems except *asportare* and *aspellere*, and with the other labial consonants it occurs in the form *ā-* (and *au-*). This looks like a case of phonologically conditioned allomorphy; the odd thing about it is that it does not affect the other two [b]-final prefixes (*obvertere* 'turn against/facing', *subvertere* 'overturn', *obmutescere* 'become dumb' vs. *āvertere* 'turn away', *āmovere* 'remove'). The tendency that seems to be very powerfully at work in the case of *ab-* is not so much the avoidance of a sequence of two labial consonants as the avoidance of homophony with the most strongly assimilating prefix *ad-*. The fact that *ab-* does not occur (or does not occur in its [b]-final form) before labials is probably due to the fact that such forms would have been very hard to distinguish from *ad* + labial consonant sequences.[296] Note that the two prefixes produce semantic opposites in several cases:

(97) *Ad-* and *ab-*prefixed semantic opposites

afferre (< *ad+ferre*) 'take there, to sb.' vs. *auferre* 'take from, away'
affuit (< *ad+fuit*) 'was present' vs. *āfuit* 'was absent'
admovere 'take, move there' vs. *āmovere* 'take away'

What would a putative ***ab+ponere* have sounded like? And what would have distinguished it from *apponere* (< *ad+ponere*)?

The same drive to avoid homophony cannot be invoked to explain the [s] of the *abs-* that appears before [t k] for at least two reasons. One is that with a putative ***abtinere* vs. *attinere* there is more room for differentiation; the other is that [s]-final variants before [t] (and occasionally before [p k]) appear with *sub-* as well (see next section), and marginally with *ob-* (see note 293), where there is no danger whatever of homophony.

8.2.5.3. *sub-*

This prefix has a variant *sus-* before voiceless stops, and also shows assimilation of [b] to peripheral consonants and [r]. The assimilation of [b] to [f] and [g] is practically compulsory, assimilation to [m] seems to be simply variable, and assimilation to [k] and [r] is lexically determined.

The choice of the *sus-* variant before voiceless stops is also lexically determined. Before [s] the variant *sub-* is found, but before [sp]-initial stems only *su-* is written, which represents the *sus-*variant with degemination. (Alternatively, such forms may be analysed as including *sub-* but with simplification of the [psp] cluster to [sp], similarly to the *asporto-*type variation seen above.)

[296] This was pointed out already by ancient grammarians, cf. Álvarez Huerta (2005).

(98) Words prefixed with *sub-*

subire 'go down'

sufferre (~ *subferre* sporadically from the 4th c. AD) 'endure'
suffundere (overwhelmingly) ~ *subfundere* 'pour'
suggredi 'approach'
suggerere (~ *subgerere* sporadically) 'pile up'

submergere (mostly) ~ *summergere* 'submerge'
submovere ~ *summovere* (roughly equal) 'remove'
submittere ~ *summittere* (roughly equal) 'put forth'
surripere 'steal'
surgere ~ *surrexi* PERF 'rise'
subrogare 'substitute'
subrepere (overwhelmingly) ~ *surrepere* 'creep'

succumbere 'sink/collapse'
succlamare 'shout'
succurrere 'run to'
succedere 'move below, approach'
suscipere 'support'
suscitare 'cause to rise'
succensere (more frequently) ~ *suscensere* 'be angry'

suspendere 'hang'
supponere 'place under'
supplicare 'implore'
supprimere 'press down'

sustinere 'support'
sustuli 'endure' PERF
subtemen 'weft'
subtilis 'fine'
subterere 'wear away'

subsidium 'reserves'
substruere 'build up'
subscribere (mostly) ~ *suscribere* 'inscribe'
suspicere (< *sus*+*spicere*) 'look up'
suspirare (< *sus*+*spirare*) 'sigh'

8.3. Generalisations

8.3.1. Combinatory restrictions

As was pointed out at the relevant entries in 8.2.1 above, some of the vowel-final prefixes display an odd restriction, which we may informally term "anti-reduplication effect", regarding the stems they can combine with. *Re-, sē-, ne-* and *vē-* do not combine with stems beginning with the same consonant. While in the case of *ne-* and *vē-* the significance of this observation is far from obvious because there are so few prefixed forms anyhow (seven with *ne-* and about five with *vē-*), and *sē-* is also a borderline case since it also does not combine with many stems, *re-* is remarkable in its inability to combine specifically with [r]-initial stems.[297] Note that there is a lexical-grammatical feature that connects these prefixes: along with *dis-* and *am(bi)-* they exist in the language only as prefixes, and not as prepositions (as opposed to *pro, prae, ante, ex, ad* etc.). The short-vowelled *re-* and *ne-* appear to behave according to the stem-initial pattern to be discussed in chapter 9, which restricts the choice of consonants in $\#C_iVC_i$ sequences (though I cannot argue that in the case of *ne-* this could not be accidental). They are also apart from the rest phonologically in that they are the only sonorant-initial as well as the only monomoraic prefixes (and thus very similar to reduplicative morphemes).[298]

8.3.2. Assimilations

8.3.2.1. Voice assimilation

As was explained in 4.1, voice assimilation is always regressive and only the feature specification [–voice] appears to spread, mainly because environments in which a voiced obstruent would follow a voiceless obstruent do not emerge. This is largely true of prefixed forms as well:

(99) Voice assimilation in prefixed forms

ad+*tenere* → *attinere* 'hold'
ad+*serere* → [atserere] (or *asserere*) 'claim (for)'

The only prefix-final voiceless obstruent is [s], which is usually deleted before any voiced consonant (see the discussion of *ex-, dis-* and *trans-* above):

[297] So much so that the current reflexes of the prefix (*re-, ré-, ra-, ri-*) still do not combine with [r]-initial stems in French or Italian.

[298] I noted above that *trans-/trā-* also does not combine with [r]-initial stems. This, however, appears to be a different kind of gap than that of ***re-r-*, since in simplex forms [r]V:[r] sequences are well-formed.

(100) Deletion of [s]

dis+*gerere* → *dīgerere* 'disperse'

How the regularly undeleted *transgredi* was actually realised is impossible to determine with certainty. There is further the word *postgenitus* 'born later', the only word in which *post-* is followed by a voiced obstruent. The realisation of this word is again uncertain, though a phonetic cluster [zdg] is, I think, very unlikely.[299]

8.3.2.2. Place assimilation

Both types of place assimilations are found with prefixed forms. In particular, they involve the assimilation of [n], [d] and the placeless nasal of *con-* to peripheral stops, of [b] to velar stops, and of [s] to [f]. In the case of [b] and [d] place and voice assimilation cooccur:

(101) Place assimilation in prefixed forms

con+*ponere* → *componere* 'compose' (place assimilation 1)
in+*quaerere* → [iŋkwi:rere] 'inquire' (place assimilation 1)
ad+*ponere* → *apponere* 'place near' (place assimilation 2, voice assimilation)
ad+*capere* → *accipere* 'receive' (place assimilation 2, voice assimilation)
sub+*gerere* → *suggerere* 'pile up' (place assimilation 2)
dis+*ferre* → *differre* 'scatter' (place assimilation 2)

In line with what was said about place assimilation processes in 4.8 it is generally true that coronal consonants undergo but do not trigger place assimilation, and non-coronals systematically trigger it but undergo it less frequently than coronals. No prefix in the relevant environment ends in a velar consonant (the [ek-] variant of *ex-* only occurs before fricatives).

8.3.2.3. Total assimilation

In Figure 34 I summarise the total assimilations that take place between prefix-final consonants and stem-initial consonants. Place assimilations and voicing assimilations are not indicated (see the previous two sections). A distinction is made between systematically attested assimilations (1, darker shade), sporadic assimilations (2, medium shade), isolates (3, lighter shade) and non-assimilating

[299] Note Cicero's interesting remark in *Orator* 157 in which he claims to prefer *posmeridianus* to *postmeridianus* 'afternoon'; this word is attested as *pomeridianus* in postclassical Latin.

types (empty box);[300] in the last type the cluster surfaces unchanged or is only affected by place and/or voicing assimilation. The marking *n/a* in the table means that the clusters in question do not emerge for some reason (nasal place loss and coalescence before fricatives and historical [s]-deletion before voiced segments).

Figure 35 highlights the place assimilations that take place in the stop/stop and the fricative/fricative relations. It summarises information given in 8.3.2.2 as well as 4.8.

It is clear from the data in Figure 34 that the assimilations are governed largely by the Syllable Contact Law (cf. 3.4). Total assimilation is likely to take place if the sonority of C_1 is lower than the sonority of C_2.[301] This is borne out by the fact that nothing assimilates (totally) to stops, only stops assimilate to fricatives and nasals, both stops and nasals assimilate to liquids, and the glide [j] does not assimilate to anything. That is, Figure 34 is by and large the inverse of Figure 13 given in 3.4. On the other hand, nothing ever assimilates to [w], and assimilation to [j] is sporadic, which means that C+glide clusters are tolerated much better at prefix–stem boundaries than in simplex forms.

$C_2 \rightarrow$ / $C_1 \downarrow$			stop	fricative		nasal		liquid		glide	
				s	f	n	m	l	r	j	w
stop	d			1							
	b	(*ob-*) (*sub-*)							1		
fricative	s	(*dis-*) (*trans-*)				n/a		n/a		n/a	
						n/a				n/a	
nasal				n/a				1		2	
liquid								2		3	
glide	j	(prae-)									

Legend:
1 – systematically attested assimilations
2 – sporadically attested assimilations
3 – isolated instances of assimilation
empty box – no assimilation
n/a – cluster does not emerge for independent reasons

Figure 34: Total assimilations at prefix–stem boundary

[300] Admittedly, this four-way categorisation is an oversimplification, since what I call sporadic here in some cases conflates type-level and token-level variability, and also lexically determined allomorph selection. The data are explained in the relevant sections on each prefix separately.

[301] More formally we could say that the condition on total assimilation is that the [son] and [cont] features of C_2 must have more [+] specifications that those of C_1.

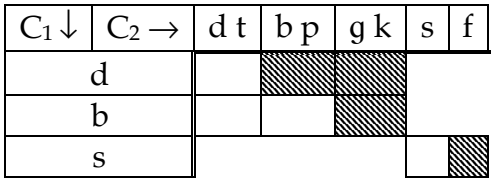

Figure 35: Systematically attested place assimilations between stops and between fricatives at prefix–stem boundary

Thus the Syllable Contact Law, a sonority-based principle, appears to operate as a static filter in the case of simplex forms and as a filter inducing assimilation processes at these morpheme boundaries. The clusters that are of special interest at this point are those which are rising-sonority or equal-sonority clusters (i.e., at variance with the Syllable Contact Law) *and* which are practically never remedied by assimilation.[302] Some of these clusters are identical in both segmental composition and syllabification to clusters found in simplex forms (*viz.* [pt], [ps] and [rw], as in *obtinere* 'maintain', *obsidere* 'occupy' and *pervadere* 'go through', respectively). But some are not; in particular, these latter are [bd bn sm] (e.g. *subdere* 'put underneath', *obnunciare* 'bring bad news', *transmittere* 'send over', respectively), and the glide-final clusters [dj dw bj bw sw[303] nw rj]. The cluster [bl] is found internally too, but at prefix–stem boundary it is always heterosyllabic (*oblectare* 'delight'), thus in spite of the identical segmental composition its syllabification is not the same as that of its word-internal counterpart (see 3.3).

If one wishes to make a phonologically based generalisation about these stable, categorically non-assimilating equal- and rising-sonority clusters, they clearly present two separate issues. One is that given the lack of active assimilatory capacity on the part of glides, and the compulsory regressive direction of assimilations in Latin,[304] most C+glide clusters that emerge at prefix–stem boundaries surface intact. If we discount these, we are left with [ps pt bd bn sm bl].[305] Of these, the coronal-final clusters (i.e. all except [sm][306]) are covered by what can be termed Generalised Place Condition (cf. 10 in 3.4), which is no longer restricted to [obs][obs] and [nas][nas] clusters:

[302] Thus I do not include here clusters such as [bm] [dn] or [rl] because these are variably repaired to [mm] [nn] [ll], respectively, e.g. *submovere* ~ *summovere* 'remove', *adnumerare* ~ *annumerare* 'count' and *perlucere* ~ *pellucere* 'transmit light'. By contrast, I include [rj] in the list of non-remedied clusters in spite of the single item *peierare* 'forswear' discussed above.

[303] The cluster [sw] is found in simplex forms too, but only word-initially as a complex onset, never as a heterosyllabic cluster.

[304] Which is, of course, not to deny that some progressive assimilations are generally believed to have happened in the prehistory of the language, e.g. **wel-si* > *velle* 'want'.

[305] Although [br] should fall under the generalisation to be made, it is not included here because it variably undergoes assimilation with *sub-*, though not with *ob-*.

[306] This [sm] is that found with *trans-* only. This prefix ends in a non-assimilating [s], and thus it creates the only exception to the Generalised Place Condition in (102).

(102) The Generalised Place Condition (valid at prefix–stem boundary; cf. Cser 2012a:61)

> Heterosyllabic clusters are well-formed irrespective of sonority relations if C_1 is non-coronal and C_2 is coronal (i.e. [ps pt bd bn bl] do not undergo assimilation). If C_2 is a non-coronal other than [w], only sonority relations are decisive (i.e. [bf df bm dm] undergo obligatory or optional/variable assimilation, but the falling sonority clusters do not; by undergoing place assimilation, the clusters [bg dg sf nm] and the placeless nasal + [m] comply with the same clause).

8.3.3. Non-assimilatory allomorphy

8.3.3.1. [s]-allomorphy

The allomorphy displayed by *dis-/dī-*, *trans-/trā-* and *ex-/ē-* is diachronically explicable as resulting from the loss of [s] in [s]+C[voiced] sequences, which, however, is no longer an active rule in the synchronic phonology of Classical Latin (see 4.2). With *trans-/trā-*, the regularity is already relaxed so that only coronal consonants trigger the dropping of [s] (*trā-ducere* vs. *trans-gredi*, on the assumption that the spelling of the latter represents phonological reality). By contrast, the loss of [s] in *dis-* fails to be triggered by [j] in *dis(j)icere* and *disjungere/dījungere*.

8.3.3.2. Vowel-triggered allomorphy

Whenever a vowel-initial stem combines with a vowel-final prefix, one of three things happens: (i) the two adjacent vowels are contracted to a single long vowel, as in *dē(e)st* 'is absent', *prōmere* 'take out'; (ii) the resulting hiatus is filled with the stop [d], as in *red-ire* 'go back', *prod-ire* 'go forth', or (iii) the resulting hiatus is made to templatically (but not melodically) conform to the hiatus pattern whereby V_1 must be short, as in *prŏ-avus* 'great-grandfather', *dĕ-hinc* 'hence'.

As was seen, the prefix *con-* actually loses its final (placeless) consonant before vowels and thereby hiatus is created, as in *co-actus* 'coerced'. (Also recall the strange *circu-it* ~ *circum-eunt* 'go round' 3SING ~ 3PLUR quasi-alternation.)

8.3.3.3. [b]-allomorphy

The [b]-final prefixes *ab-* and *sub-* show the [s]-final variants *abs-/as-* and *sus-*, respectively, before voiceless stops, and *sub-* also before [sp] (*abstinere* 'keep away', *suscipere* 'support', *suspicere* 'look up'); for *ob-* a variant *os-* can only be identified etymologically *(ostendere* 'show', *oscen* 'divining bird'). It is difficult to bring this allomorphy into the orbit of phonological generalisations (as opposed to the hiatus-triggered allomorphy above). While a [pk] cluster is certainly ill-formed

phonotactically, the cluster [psk] (as in *abscondere* 'conceal') is also unattested in simplex forms, though with respect to the latter one could argue that the insertion of an extrasyllabic [s] somehow improves the cluster by separating the two stops from each other. On the other hand, the *sustinere* 'support' vs. *subterere* 'wear away' allomorphy results in clusters that are equally well-formed in simplex forms ([st] and [pt]).

The appearance of *ā-* (and *au-*) instead of *ab-* before labial consonants, which was discussed above, can be attributed to the homophonic clash with the prefix *ad-*.

8.3.4. On the nature of prefix-variation

As we have seen, variation is a pervasive feature of prefixes and prefixed forms. This variation itself is of several kinds and several factors contribute to its patterns. In this section I will summarily describe four such factors.

In some cases variation is determined lexically. The choice of *sus-* vs. (assimilating) *sub-* depends entirely on the lexical identity of the stem: e.g. *suscitare* 'cause to rise' vs. *succumbere* 'sink/collapse' and *sustinere* 'support' vs. *subterere* 'wear away' in spite of the identical stem-initial consonants. However, when the variant *sub-* is picked by a [k]-initial stem, as in *succumbere*, the [b] → [k] assimilation is no longer variable, it is obligatory. In the case of the exceptional stem *censere* 'assess' the choice is not determined: both *succensere* and *suscensere* 'be angry' exist.[307]

Most instances of prefix-variation are not, or largely not, lexically determined. The assimilation of the nasal to stem-initial liquids, as in *con-* and *in-*, is a case in point. What I will take a closer look at here, for exemplification, is the *conl-* ~ *coll-* assimilation, which appears to present a mixture of lexical vs. non-lexical (probably frequency-based) conditioning.

The facts are the following.[308] The words *collega/collegium* 'partner in office/associates', which are attested 1231 times in the corpus, show assimilated forms in 95% of their occurrences, which is much higher than the ratio of assimilated forms for the other *conl*-words except one, *colligere* 'collect', which shows 90%. This probably means that *collega/collegium* are lexically specified as assimilating items. The rest of these words assimilates between 20–90% of all occurrences, and the more frequent a word is, the higher this ratio. The data for the most frequent *conl*-words apart from *collega/collegium* are given in Figure 36.[309] If we compare this to the assimilation patterns of *ad-* before [t]-initial stems (Figure 37), a very different picture emerges where there is clearly no correlation and what one sees is, in all likelihood, genuine spelling variation.

[307] But note that this verb may well represent historical contamination from two unrelated stems, cf. de Vaan (2008 s.vv. *-cendo* and *-censeo*).

[308] The data presented here were culled from the corpus. The pattern they display generally coincides with that reported in Prinz (1949–50 and 1953).

[309] The lexical items in the chart subsume derivatives like *collaudatio, collocatus* etc.

lexical item	number of occurrences in the corpus	proportion of assimilated forms (%)
colligere 'collect'[310]	4500	90
conlocare 'put in place'	1903	48
conlatus 'carried'	1387	37
conloqui 'speak to'	970	32
conlaudare 'praise'	312	31
conlabi 'collapse'	290	20

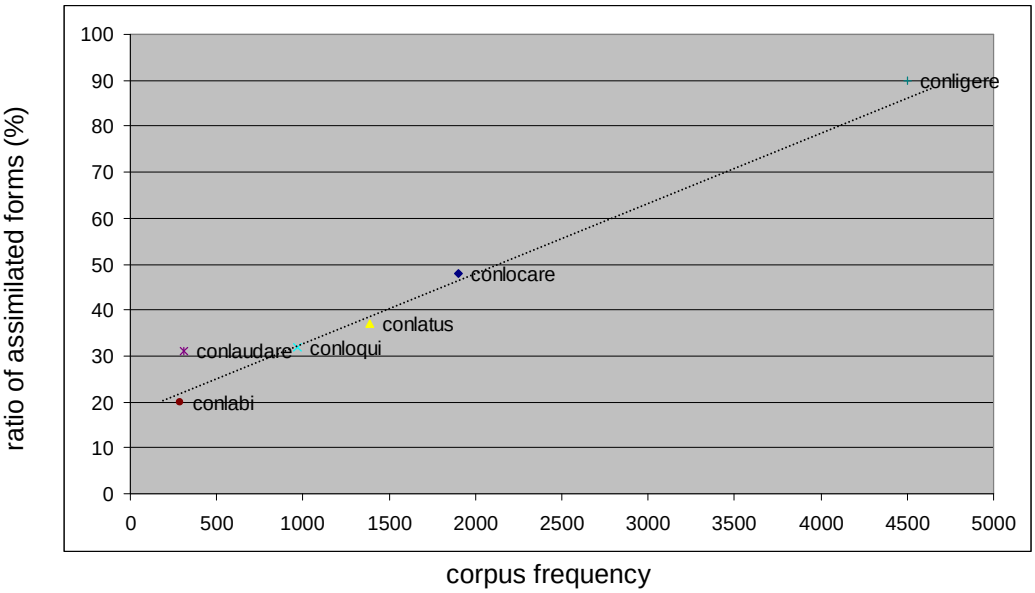

Figure 36: Ratio of *con-l*-assimilation

[310] With *colligere* there is a little uncertainty in that the database does not distinguish between homographous (and homophonous) forms of *colligere* 'collect' and *colligare* 'bind'. The number 4500 was conjectured on the basis of the number of non-homographous forms.

lexical item	number of occurrences in the corpus	proportion of assimilated forms (%)
adtribuere 'assign'	610	54
adtingere 'touch'	873	63
adtinere 'belong'	672	65
adtrahere 'draw'	515	43
adtendere 'stretch'	3534	46
adterere 'rub'	423	58

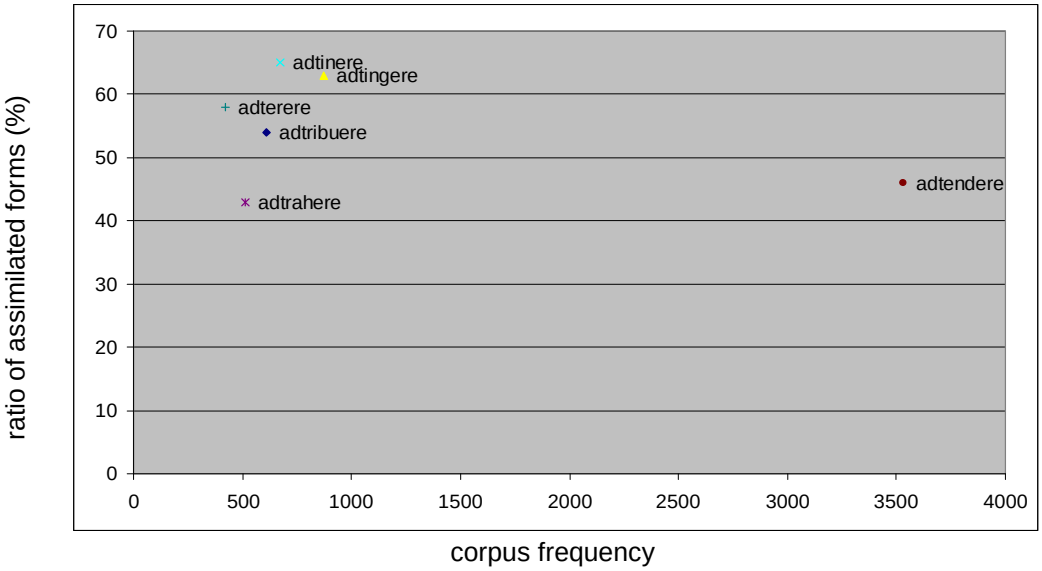

Figure 37: Ratio of *ad-t*-assimilation

The third point to be considered is that some prefixes were used in and after the classical era to create new lexical items, and in some such cases complex forms were produced in palpable disharmony with the observable phonological regularities. A case in point is Caesar's designation for the tribes that inhabited the region beyond the river Rhine: *trans-rhenani*.[311] For non-linguistic reasons it seems highly probable that this word was made up by him (or someone in his environment). Its formation is completely transparent by the standards of Latin morphology as it existed in the 1st century BC. But phonologically, the choice of the prefix variant *trans-* is infelicitous: not only is *trans-* incompatible with a following voiced coronal (see *trā-ducere, trā-lucere, trā-nare*), neither form of the prefix ever combines with an [r]-initial word. Similarly, when Suetonius described

[311] First occurrence: *Bell. Gall.* 4.16.

the colour of Augustus' and Nero's hair as being of a particular shade of colour, he used *sub-flavus* (from *flavus* 'yellowish, fair'). This word, which is attested only at these two loci in the entire corpus,[312] is again completely transparent and at the same time phonologically irregular in that *sub-f-* overwhelmingly gives *suff-*.[313]

The last point is, in all likelihood, a diachronic extension of the third. It is clear from the historical lexicology of Latin that in the late period, especially in the language of Christianity, where a plethora of new words were coined to render religious and theological notions, the allomorphic rules relevant to prefixes often ceased to apply. Mention has been made of the *re*+vowel formations beginning with Tertullian around 200 AD and then multiplying in the 4th–5th centuries (cf. 8.2.1.5), and also of the *ambi*+consonant formations that begin with a hapax by Apuleius and then gain some currency in the last two centuries of Antiquity (cf. 8.2.1.6). These forms, the distant ancestors of modern English words like *reinforce* or *co-defendant*, clearly show that these points of grammar inherited from Classical Latin were given up with the passage of time.[314]

[312] *De vita Caesarum. Augustus* 79.2 and *Nero* 51.1.

[313] But note that the prefix *sub-* tends to combine unassimilated with adjectives to produce diminutives, cf. Prinz (1949–50:102).

[314] Another interesting example is provided by Cl. Mamertus (5th c. AD) in his *De statu animae* 1.21: *anima... vitam corporis nec anticipat nec posticipat* 'the soul neither precedes nor survives life in the body' (translation mine). The neologism *posticipat* cca. 'survive, exist after', a word occurring only here in the entire corpus, is parallel in form to its time-honoured semantic opposite *anticipat* 'get ahead of, anticipate', but since it involves a bound morpheme after *posti-* (itself an otherwise unattested variant of *post-*), which is unusal, it actually increases the cohesion between stem and prefix, contrary to the general trend.

9. Perfective reduplication and stem-initial patterns

The problem I look at in this chapter, which has a greater emphasis on diachrony than most of this work, is the phonologically conditioned shrinking of perfective reduplication. Morphological devices like reduplication may or may not be stable over long periods of time. In the case of Indo-European, perfective reduplication gradually died out in all branches of the family. In Latin, however, as opposed to the other ancient Indo-European languages, reduplication was first confined almost exclusively to voiceless stop-initial verb stems, and this remained a relatively stable pattern until the comprehensive demise and restructuring of Latin morphology in the transitory period leading to Romance. The question I address here is whether this shrinking of the lexical domain of perfective reduplication results from phonological properties of the language and if so, what aspect of Latin phonology it is in particular that explains it (cf. Cser 2009b).

9.1. Perfective reduplication in Latin

As was seen in chapter 6, one of the basic formal contrasts in the Latin verb system is that between what are by tradition called aspects: imperfective vs. perfective (the third aspect, called instant, was not marked morphologically). The markers of the perfective were quite varied and their choice was mostly lexically determined. The more frequently encountered agglutinative markers are [w], [u] and [s] (*ama-v-i* 'I loved', *mon-u-i* 'I warned', *scrip-s-i* 'I wrote') and pure vowel alternation is also often found (*ag-o* 'I do' vs. *ēg-i* 'I did'). Reduplication is found in classical and preclassical Latin in 25 verbs altogether. This is their exhaustive list (arranged in order of decreasing frequency of stem-initial consonant):

(103) Reduplicated perfects in Latin (all forms 1SINGPERF vs. INF)

pe-pigi ← *pangere* 'hit' (also *pacisci* 'make contract')
pe-perci ← *parcere* 'spare'
pe-peri ← *parere* 'give birth'
pe-pedi ← *pedere* 'fart'
pe-puli ← *pellere* 'beat'
pe-pendi ← *pendēre* and *pendere* 'hang' INTRS and TRS, respectively
po-posci ← *poscere* 'ask'
pu-pugi ← *pungere* 'stab'
s-po-pondi ← *spondere* 'promise'

(103) continued

te-tigi ← *tangere* 'touch'
te-tendi ← *tendere* 'stretch'
te-tini ← *tenere* 'hold'
to-tondi ← *tondere* 'shear'
te-tuli ← *tulere* 'carry'
tu-tudi ← *tundere* 'shove'
s-te-ti ← *stare* and *sistere* 'stand' and 'stop', respectively
ce-cidi ← *cadere* 'fall'
ce-cīdi ← *caedere* 'cut down'
ce-cini ← *canere* 'sing'
cu-curri ← *currere* 'run'
s-ci-cidi ← *scindere* 'cleave'
di-dici ← *discere* 'learn'
de-di ← *dare* 'give'
fe-felli ← *fallere* 'delude'
mo-mordi ← *mordere* 'bite'

If we tabulate the stem-initial consonants of these 25 verbs, what we find is a clear preponderance of voiceless stops:

(104) Reduplicating consonants (= stem-initial or following stem-initial [s])

[p] = 9
[t] = 7
[k] = 5
[d] = 2
[f] = 1
[m] = 1

In order to understand the diachronic as well as the synchronic context of perfective reduplication, the following points seem important.

(i) There is no reason to doubt that reduplication was a highly general process in the formation of Proto-Indo-European perfective verb forms.[315] The supposedly most archaic languages, Greek, Sanskrit and Old Persian, preserve it in its general, lexically and phonologically mostly unrestricted form: Gr *le-loipa,* Skt *ri-rec-* vs. CL *liqui* '(I) left', all going back to a Proto-Indo-European root *$*l(e)jk^w$-; Gr *ne-neuka* 'I nodded', Skt *nu-no-* 'praise' vs. CL *nui* 'I nodded', all from PIE *$*n(e)w$-, and the list could be continued. Gothic preserves about the same number of reduplicated perfects as Latin, but phonologically that class is so

[315] Although probably not all verbs had perfective forms. The fullest treatment of the history of the Latin perfective is Meiser (2003). For a more general background see further the authoritative treatment of Rix et al. (2001, esp. 21–22), also Szemerényi (1990:312–321), Clackson (2007:114–156).

heterogenous that it does not allow for any meaningful generalisation: *l[e]-lōt* (cf. E *let*), *h[e]-hāh* (cf. E *hang*), *s[e]-slēp* (cf. E *sleep*) and about twenty others.

(ii) It appears that in Proto-Indo-European reduplicated forms were, strictly speaking, phonotactically anomalous in that very few roots can be reconstructed with initial C_iVC_i sequences (e.g. **b^{h}ab^{h}ā* 'bean').[316] In other words, a word form beginning with a C_iVC_i sequence could hardly be anything else but a reduplicated form. It may well be the case that its widespread use in Proto-Indo-European was due to its salient phonological difference from other inflected forms.

(iii) In the prehistory of Latin — much like in Germanic —, the Proto-Indo-European perfective and aorist aspects collapsed into one past-like category (referred to as perfective in Latin grammar). With this, reduplication ceased to function as a consistent marker of perfective verb forms.

(iv) In Latin, perfective reduplication appears as typical eroding morphology. This is apparent from the following facts:

- it is restricted to 25 verbs, mostly frequently used items (see the list in 103);
- it is no longer productive, it does not occur with recent borrowings or with verbs of transparent derivational morphology, denominatives etc. (*custod-* 'guard (noun)' → *custodire* 'guard (verb)' → *custodi(v)i* 1SINGPERF);
- It is on the retreat within the documented period too (preclassical *tetuli* > classical *tuli* 'carry', *tetini* > *tenui* 'hold', *scicidi* > *scidi* 'cleave', all 1SINGPERF);
- Isolated survival occurs (*memini* 'remember' is formally perfective, but no corresponding imperfective exists; etymologically related forms are already remote: *monere* 'warn', *mens* 'mind');[317]
- Contamination occurs (*pepigi*, originally fom *pangere* 'hit', functions as perfective of *pacisci* 'make a contract');
- For some verbs, the phonological distance between the base (or the imperfective) and the reduplicated perfective form is great (as in *pangere* → *pepigi* 'hit'); such forms arguably verge on suppletion.

Before I proceed, three minor points need to be added for clarity.

(i) At this point I completely leave out of consideration the remnants of other kinds of reduplication. Proto-Indo-European also had imperfective reduplication (seen in CL *si-stere* 'stop' above), sporadic aorist reduplication (as evidenced in Greek *ag-agein* 'to have done' etc.) as well as yet other, unclassifiable

[316] Of the 1182 (verb) roots included in Rix et al. (2001), only five have the same consonant before as after the root vowel. Of these, **g^{h}e̯g^h-* 'pant' is marked as uncertain (p. 196–197), **skek-* 'jump' is probably onomatopoeic (p. 551–2), **h$_1$eh$_1$s-* 'sit' is marked as probably reduplicated because of its "unusual root structure" (p. 232), the others are **ses-* 'rest' (and its putative derivative **sesT-* 'grow', p. 536–7), and **h$_2$seu̯s-* 'dry' (p. 285). Note that no perfect stem can be reconstructed for any of these roots.

[317] The lack of a corresponding imperfective form justifies the exclusion of *memini* from the list in (103). I entertain a vague suspicion that native speakers in the classical period may have associated *memini* with the semantically closely related (and etymologically unrelated, but incidentally also reduplicated) words *memor* 'one who remembers' and *memoria* 'memory, remembrance' much more readily than with *monere* or *mens.*

kinds of reduplication (see CL *me-mor* 'one who remembers', *ca-cumen* 'peak' etc.). The little that remains of these in Latin had been lexicalised and plays no part whatsoever in the morphology.

(ii) Likewise I do not discuss the vowel that appears in perfective reduplication. In the majority of verbs it is [e] (e.g. *cecini*), but sometimes a rounded vowel is copied (*cucurri*) from the stem. Note also that the stem vowel often alternates and a nasal ~ zero alternation is found in some verbs (*tangere* → *tetigi*).

(iii) An extrasyllabic [s] is disregarded by reduplication (*steti, scicidi, spopondi,* see 3.3).

The question to which I now turn is this: can the fact that perfective reduplication is practically confined to voiceless stops be explained on a phonological basis? What is the diachronic process whereby a highly general morphological device is restricted to such a small, phonologically defined set of lexical items? One hypothetical possibility is that the analogical pull of prefixed forms extended the phonological pattern of "real" prefixes to reduplication and those reduplicated forms that fell outside the pattern were not maintained. This hypothesis can be safely dismissed since, as was seen elsewhere (see the relevant parts of chapter 8), consonant-initial prefixes except *re-, ne-, sē-* and *vē-* combined with stems beginning with identical consonants quite freely, and, being heavy syllables, they were prosodically unlike reduplication.

Another possible answer, which I find more plausible, is that reduplicated forms assimilated phonotactically to non-reduplicated (and non-prefixed) stem forms and those which were phonotactically anomalous in the relevant sense were discarded. To check the plausibility of this claim it is in order now to look at consonant repetition patterns in stem-initial position.

9.2. Stem-initial patterns

In stem-initial position C_iVC_i sequences are found in no small number in Latin (*populus* 'people', *cicer* 'peas', *coxa* 'hip bone', *bubulcus* 'ox-driver' etc.). If one disregards interjections (known to often contravene phonotactic regularities in many languages, like CL *fafae*) these words display a clear preference for certain consonants: those found in stem-initial C_iVC_i are [p t k b[318] s]; marginally [l m w], and a single word with [j]. Examples are given in (105).

With a long vowel intervening between the two identical consonants, the choice is somewhat wider. Although the actual examples are not particularly numerous, they appear to be phonologically less restricted as regards the consonant: *rārus* 'rare', *dūdum* 'for a long time', *nōnus* 'ninth' etc.

As can be seen, voiceless stops figure prominently in the list in (105). What this means at face value is that the phonological shape of stems, with a restricted set of initial C_iVC_i sequences, is mirrored fairly faithfully by the set of reduplicated perfects, which exhibit a similar phonological restriction.

[318] It is interesting to note that [b] is the least frequent consonant initially, see appendix 1.

In view of what we know about the phonological prehistory of Latin, much of this comes as no surprise. In intervocalic position many consonants underwent changes that would have radically diminished the similarity between the reduplicative morpheme and the base. Intervocalic [j] was lost, [s] turned into [r], and two of the Proto-Indo-European aspirated plosives turned into voiced unaspirated stops, whereas word-initially they were replaced by fricatives. Liquids would have been dispreferred on account of their general tendency for dissimilation, which is evident for [l] in Latin, and — though more subtly — for [r] as well (see chapter 10).[319] By and large, these developments left the language with potential reduplication in the voiceless and the voiced stops and the nasals.

(105) Stem-initial C_iVC_i (non-exhaustive but representative list):

poples 'knee'
papaver 'poppy'
populus 'people'
toties 'so many times'
titubare 'wobble'
titulus 'inscription'
cicatrix 'scar'
cucumis 'cucumber'
cacumen 'peak'
bubulcus 'ox-driver'
bibax 'drunkard'
sessio 'sitting'
sesqui- 'and a half, and one' (in compounds)
susurrus 'whisper'
mamma 'breast'
lalisio 'colt of wild ass'
vovere 'vow'
jeiunus 'starving', phonologically [jejjuːnus]

This seemingly self-explanatory account was proposed by Sommer (1902:596) and adopted by Meiser (2003:154–155 and passim), but it is not without problems. First, as forms like the Greek perfective *sesōka* from *sōzein* 'save' show (in spite of the general loss of intervocalic [s] in that language), morphologically motivated restitution or analogical extension was an option, as it in fact happened to Latin *fefelli,* which should have been ***febelli*. Also note that it is generally believed (see e.g. Baldi 2002:378, Meiser 2003:149–150) that the reduplications with rounded vowels (*momordi, tutudi* etc.) are novel formations *vis-à-vis* Proto-Indo-European. Second, the traditional account does not explain the complete

[319] It is interesting that the time-honoured but not generally accepted etymology of the prefix *re-* proposed in Leumann (1977:560) derives it via dissimilation from the perfective reduplication of the root **lejk*^{w}*-/lojk*^{w}*-/lik*^{w}-, i.e. Pre-Latin **leloiquai* (IMPF *linquere*) > *reliqui*, which was, in turn, reanalysed as a prefix *re-* + a non-reduplicated perfective form.

absence of [n] and the conspicuous underrepresentation of voiced stops and [m] in Latin, or the absence of reduplicated verbs beginning with etymological *[g^w] (> [w]), *[w] (> [w]), or *[g^h] (> [h]; though the general weakness of this latter sound may have played a role). From this I conclude that sound changes *per se* do not explain the pattern found in Latin.

A related issue is that of frequency. It is not clear how the preponderance of voiceless stops in reduplication relates to the general frequency patterns exhibited by the consonants of Latin. The textual frequencies I have calculated show that — as has indeed been known before — voiceless stops are markedly frequent initially (see appendix 1). At the same time, [s] [m] and [n] are among the most frequent initial consonants, both [d] and [t] lag behind them, and so does [f] by a considerable margin. At any rate, while I refrain from pronouncing anything definitive on the issue, not least because of the absence of lexical frequency data, I strongly doubt if the preponderance of voiceless stops in reduplication is simply a fortuitous by-product of overall frequency patterns and/or sound changes.

Taking it as at least a plausible hypothesis that stem-initial patterns are responsible for the way perfective reduplication narrowed down in Latin, the following question arises. If, as noted earlier, root-initial C_iVC_i can hardly be reconstructed for Proto-Indo-European, how did Latin C_iVC_i-initial stems emerge in the first place? There is no single answer. The etymologies proposed for such stems are quite varied, and uncertainty is a recurring feature in them. Some are explained via sound changes that resulted in identical consonants fortuitously, such as *pek^w- > *coqu-/coc-* 'cook' via regular distance assimilation of [p] to [k^w] and the delabialisation of [k^w] to [k] before consonants and rounded vowels, or *coxa* 'hip' perhaps from PIE **kog-* with voicing assimilation to the *-s-* suffix. Some appear to be lexicalisations of regular (imperfective) reduplication, such as *cicatrix* 'scar' or *titulus* 'inscription',[320] though the details of, and the motivation for, the process as well as the putative roots often remain in the dark. Some appear to involve *some* sort of reduplication, but what exactly that reduplication was and what is to be identified as root often remains not satisfactorily explained (e.g. *populus* 'people' or *cacumen* 'peak', the latter perhaps from a root **kew-* 'bend'). Some appear to be borrowings, e.g. *cocles* 'one-eyed' from Greek *kuklōps* perhaps via Etruscan. Yet others may involve analogical formations based on native words (*bubulcus* 'ox-driver' on the analogy of *subulcus* 'swineherd'?). Finally, words like *susurro* 'whisper' are evidently onomatopoeic.

The few examples presented here suffice to show that the proliferation of C_iVC_i-initial stems in Latin was due to a confluence of independent factors. There is thus no real answer to the question posed at the beginning of the previous paragraph. The phonotactic possibility of stem-initial C_iVC_i sequences restricted to the consonants in (105) is an emergent pattern established gradually in the course of the transition from Proto-Indo-European to Latin, the endpoint of a lengthy process whose details are not all clear and will not be further explored here.

[320] At least according to Walde and Hoffmann (1956 s.v.); but note that de Vaan (2008) gives "etymology unknown" for *cicatrix* and does not include *titulus* at all.

9.3. Conclusion to chapter 9

I have looked at the demise of perfective reduplication in Latin and sought to answer the question why this process of erosion followed a phonologically rather strictly defined path. The small set of remaining reduplicated perfects is not a random collection of leftovers from the ruins of earlier morphology (as it is in Gothic), but in including mostly stems beginning with voiceless stops, it displays remarkable phonological coherence in the documented period of the language. To understand why this should be so I have looked at the relevant phonotactic properties of non-reduplicated stem forms. It appears quite clearly that, for a variety of reasons, the number of stems beginning with [pVp], [tVt], [kVk], [bVb] and [sVs] increased in the prehistory of Latin. The fact that this occurred and that voiceless stops figure more prominently in this configuration than other types of consonants may well have given rise to a new phonotactic pattern in which such stem-initial sequences were now legitimate (as opposed to Proto-Indo-European). It seems to be a plausible explanation that perfective verb forms remained reduplicated only if they conformed to this new phonotactic pattern.

The discussion highlights an interesting contrast between Proto-Indo-European and Latin. In Proto-Indo-European the phonotactic ″irregularity″ of reduplication, i.e. the phonological contrast between root-initial sequences and reduplicated sequences, enhanced the perceptual salience of reduplicated forms and thus helped generalise and maintain reduplication as a multifaceted morphological device. In Latin the opposite happened: it was phonotactic ″regularity″, i.e. conformity to the phonotactic patterns of stems that helped maintain a small set of reduplicated perfects until the complete reshuffling of Latin morphology and phonology as the language was replaced by Romance.

10. On the phonology of liquids

In the phonology of Latin liquids there are at least two points that are universally known in linguistic circles. One is the phonologically conditioned allomorphy displayed by the suffix *-alis/-aris,* the other is rhotacism, i.e. the archaic [s] > [r] / V_V change, which left behind a fair number of alternations still extant in the classical period (*flos* ~ *florem* 'flower' NOM ~ ACC etc., see 4.4). The purpose of this chapter is to take a closer look at the issue of liquids in Latin and to set it in a wider context of cooccurrence restrictions. In particular, it will be demonstrated that the time-honoured formulations of the *-alis/-aris* alternation in adjectives are erroneous in that they leave out of consideration the general blocking effect of noncoronal consonants as well as the relevance of the distance between the stem liquid and the suffix liquid. It will also be demonstrated that the pattern of dissimilation is, in fact, more general than is usually suggested and subsumes several suffixes that contain [l]. Furthermore, I will argue that virtually the only suffix that did not take part in the dissimilation, diminutive *-Vl(l)-*, gave rise by virtue of this very property to a specific pattern of "*l*-heavy" words. I also look at cooccurrence restrictions on [r], which are far less conspicuous but nevertheless demonstrable and interact with morphology in interesting ways.

10.1. The incidence of liquids in general

Latin possessed two liquids, [l] and [r]. While the distribution of these two segments is very similar phonologically (they are both allowed only next to a vowel and constitute clusters with much the same consonants, though [l] is found in fewer clusters than [r]), their respective incidences differ greatly in morphological terms. In particular this means the following.

- [r] occurs:
  - in the prefixes *per-, prae-, pro-, re-*, all frequent lexically (plus marginal *por-*)
  - in five of the six inflectional suffixes of the passive voice
  - in the genitive plural suffix of the majority of nouns, adjectives and pronouns
  - in the suffix of the comparative of adjectives
  - in a number of nominal and adjectival derivational suffixes as well as one verbal derivational suffix (to be discussed below)

- [l] occurs:
  - in none of the prefixes
  - in none of the inflectional suffixes
  - in a number of nominal and adjectival derivational suffixes (to be discussed below)

Both segments also occur in gemination fairly frequently (e.g. *ille* 'that', *error* 'error'), but only between two vowels, as is generally the case with geminates in Latin. A more interesting question is to what extent their respective multiple occurrences combine, i.e. what constraints appear to be operative on ...[l]...[l]... and ...[r]...[r]... sequences. It is to this question that I now turn.

10.2. Cooccurrence constraints on [l]

Multiple occurrences of (nongeminate) [l] within stems are rare; the only words that show this are listed in (106).

(106) Multiple [l]'s within stems

lolium 'darnel'
lolligo 'squid'
lalisio 'wild donkey'
lilium 'lily'
ululare 'bark'[321]

Apart from stems, [l] only figures in derivational suffixes. Some of these are found in so few words that meaningful generalisations cannot be made about them (e.g. the *-il* suffix in *pugil* 'boxer" or the *-ela* in *querela* 'complaint") though, having looked at them I can safely assert that while their inclusion in this chapter would greatly increase it in length, it would not add anything of consequence to its conclusions, and would definitely not detract from their validity. The more productive, or at least quantitatively significant, suffixes will be discussed in the following sections.

10.2.1. The *-alis/-aris* allomorphy: data

The well-known story[322] of the *-alis/-aris* allomorphy is that the default variant is *-alis* (107), but if the stem includes [l] in any position, the alternative allomorph *-aris* appears (108). If an [r] follows the [l] in the stem, the *-alis* variant comes back (109).

[321] The word *ululare* is probably best classified as onomatopoeic.

[322] As is found in many textbooks (e.g. Kenstowicz 1994:509, Roca 1994:54–57, Odden 2005:241) as well as in the major handbooks (Steriade 1995:153 sqq., Alderete and Frisch 2006:385) and much of the literature in general (for an extended argument based on the "received interpretation" of this allomorphy see e.g. Boersma 1998:437–440). The version popularised in the past twenty years essentially goes back to Steriade (1987) and tends to surface in the context of Underspecification

(107) *navalis* 'naval'
regalis 'royal'
hiemalis 'winter' ADJ
autumnalis 'autumn' ADJ
Augustalis 'related to Augustus'…

(108) *consularis* 'consular'
popularis 'popular'
militaris 'military'
lunaris 'lunar'
stellaris 'stellar'
Saliaris 'related to Salius-priests'

(109) *litoralis* 'belonging to sea-shore'
lateralis 'side-, lateral'
floralis 'floral'
pluralis 'plural'…

An important factor first reported in Cser (2010a) is that intervening non-coronal consonants also systematically block the dissimilation (110).[323] And, evidently, if both a non-coronal and an [r] follow the stem [l], the variant will again be the *-alis* allomorph (111).

(110) *legalis* 'legal'
fluvialis 'belonging to river'
pluvialis 'rainy'
glacialis 'icy'
umbilicalis 'umbilical'
intellectualis 'sensible'
vulcanalis 'related to Vulcanus'
cloacalis 'related to canal'[324]
Flavialis 'related to Flavius'
glebalis 'consisting of clods'
localis 'local'
fulminalis 'projectile'

Theory, whose details need not concern us here. Hurch (1991), a little-known article, brings up problematic data that were not cited in the literature subsequently. Before Steriade (1987), the issue of lateral dissimilation received squib-like treatment in an exchange by Watkins (1970) and Dressler (1971). In the classical historical and philological tradition, the most important of the earlier works is Leumann (1917). Paucker (1885) surveys vast amounts of relevant data. Kent (1936) is yet another important paper on dissimilation (not only that of liquids).

[323] Note that modern intuition works along the same lines, cf. *labial, global, subliminal*.

[324] Pre- and postclassical word.

(111) *liberalis* 'gentlemanly'
larvalis 'ghostly'
latrocinalis 'belonging to robbers'[325]
sepulcralis 'sepulchral'
fulguralis 'related to lightning'

The conditions erroneously attributed to this allomorphy in fact work for another, etymologically related suffix, nominal *-al/-ar*. Here we simply have *-ar* if there is an [l] in the stem and *-al* if not, compare (112) and (113). Note that non-coronals have no blocking effect, witness *lacunar, laquear* and *lupanar* in (113) as opposed to *fluvialis, glacialis* etc. in (110). *Lupercal*, the name of a grotto on the Palatine hill, is the only instance with this suffix of an [l] in the stem being followed by both an [r] and a non-coronal before the suffix.

(112) *animal* 'animal'
vectigal 'toll'
tribunal 'judgment-seat'
capital 'head-dress'
cubital 'cushion'
feminal 'pudendum muliebre'
quadrantal 'a liquid measure'

(113) *pulvinar* 'cushion'
calcar 'spur'
exemplar 'copy'
torcular 'wine or oil press'
lacunar 'panelled ceiling'
laquear 'panelled ceiling'
lupanar 'brothel'
nubilar 'barn'

10.2.2. The phonology of the *-alis/-aris* allomorphy

It seems that there are two kinds of phonological conditions operating on the adjectival *-alis/-aris* allomorphy. One has to do with what kind of consonant separates the lateral in the stem from the liquid in the suffix, the other with the distance counted in morae between the two liquids. We have seen that the blocking consonant is either an [r] or a non-coronal consonant. If we assume the feature set given below (Table 21 repeated from Table 2 in 2.3), we see that the blocking consonants are either those that are most dissimilar to [l] (i.e. non-coronals), or [r], which is the most similar consonant to [l]. Those that are mid-way between the two extremes do not block the dissimilation (i.e. coronals other than [r]) or there is no data for them. This is what I spell out in the difference matrix in Table 22.

[325] Postclassical word.

		l	r	j	w	m	n	b	d	g	p	t	k	f	s	h
place	Coronal	✓	✓				✓		✓			✓			✓	
	Dorsal			✓	✓					✓			✓			
	[high]			+	+					+			+			
	[back]			–	+					+			+			
	Labial				✓	✓		✓			✓			✓		
manner	[son]	+	+	+	+	+	+	–	–	–	–	–	–	–	–	–
	Laryngeal	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	[voice]	+	+	+	+	+	+	+	+	+	–	–	–	–	–	+
	[nas]	–	–	–	–	+	+	–	–	–	–	–	–	–	–	–
	[cont]	+	+	+	+	–	–	–	–	–	–	–	–	+	+	+
	[lat]	+	–				–		–			–			–	

Table 21. Distinctive features for Classical Latin consonants (repeated from Table 2)

manner	4	t		*p*		**k**	
	3	*d* n s		*f* **m b**		**g**	
	2		*h*				
	1	**r**				*j*	**w**
l		0	1	2	3	4	5
		place					

Legend:
- **blocking consonant** (**r, m, b, g, k, w**)
- non-blocking consonant (t, n, s)
- *no data* (*d, j, h, p, f*)

difference: **1** (2) 3 4 **5 6 7 8**

Table 22. Difference matrix with respect to [l]

With respect to the distance between the stem-liquid and the suffix-liquid the generalisation is that there have to be at least three morae between them for blocking to be effective. Something similar was, in fact, suggested in Hurch (1991), where it is explicitly said that "distance in real time" plays a role, but since the other phonological condition (the nature of the intervening consonant) is not stated correctly, Hurch attributes all the *glacialis*-type exceptions (which I list more fully in 110 above) to distance, and claims furthermore that the role of "real time" is gradual.

With one exception, the three morae are always there when the blocking consonant is [r] mainly because a [lr] cluster is ill-formed in Latin, so there is always at least one vowel between the stem [l] and the [r], plus the long [a] of the suffix (*floralis, pluralis*).[326] The only exception is *sepulcralis* 'sepulchral', which behaves in a perfectly regular fashion.

[326] Both examples are with long stem vowels and thus with a distance of four morae. I have not actually found a single word with a similar profile but with a distance of three morae only, i.e. with a short vowel in the *-l_ralis* environment.

With non-coronal consonants there are two examples which show that two morae are too little to separate the two liquids and effectively block the dissimilation: *palmaris* 'related to victory' and *vulgaris* 'vulgar'.

Two caveats are in order at this point. One is that there are woolly edges with forms that are problematic in some way. A straightforward counterexample (perhaps the only really hard one) to both the traditional account and to this one is *letalis* 'deadly', about which there is not much to say. Other (apparently) problematic forms include the following:

aquilonalis 'northern' — a hapax found in Vitruvius's *De architectura* as part of a technical description (perhaps created by the author), and then not used by anyone else to the extent that the corpus indicates this. About three hundred years after Vitruvius the regular form *aquilonaris* is attested in St Augustine.

liminaris 'edge-', specifically in *trabs liminaris* 'crossbeam' — another hapax at least as far as classical Antiquity is concerned, only found in Vitruvius's *De Architectura*, but reappearing in the language of the fourth-century church fathers St Augustine (once) and St Jerome (five times).

coquinaris 'kitchen-' — this word appears only twice, both of its occurrences date from the preclassical period (Plautus and Varro), and one of the two (that attributed to Varro) is found in a fragment preserved in another text of questionable fidelity.

Palatualis 'name of a feast' — a hapax found only in Ennius, a preclassical poet, and preserved only in a fragment cited in a later text in the middle of a list of *-alis*-final adjectives, which may have interfered with the form of the word in this particular locus.

The other point to note is that there is a certain amount of variation, as indeed one would expect. A case in point is the adjective *Latiaris* 'belonging to Latium', which is attested in the irregular form *Latialis*, but only 4 times as opposed to 34 times for the regular form with *-aris*.

10.2.3. Adjectives in *-ilis/ile*

This suffix was fairly frequent in Latin, and it showed no allomorphy, unlike *-alis,* but it seems that it was not added to stems including an [l], unless the stem [l] was followed by a non-coronal consonant (compare 114 and 115).

(114) *-ilis* with no [l] in stem

docilis 'docile'
fragilis 'fragile'
humilis 'lowly'
habilis 'skilful'...

(115) *-ilis* with [l] in stem

plectilis 'plaited'
flexilis 'pliable'
fluviatilis 'river-'
pluviatilis 'rain-'
labilis 'slippery'
plicatilis 'foldable'
sculptilis 'carved'
librilis 'of a pound'
electilis 'choice'
supellectilis 'belongings'

There are two counterexamples to this in the classical period, the two words under (116), where the stem ends in [t].

(116) [l] + [t] + *ilis*

altilis 'fattened'
volatilis 'flying'

In the postclassical period, a handful of neologisms that resemble the words in (116) show that [t]-final stems were giving way, e.g. *solutilis* 'easily breaking up', a hapax in Suetonius (early 2nd century AD), *conflatile* 'cast image' (first attestation cca. 300 AD), *ambulatilis* 'walking' (attested once in Vitruvius but after that only in the 4th century AD). There are, however, no comparable words with the rest of the coronals (no instances of *-l-n-lis, -l-d-lis, -l-s-lis* throughout the Latin-speaking period except for Pliny's hapax *clusilis (concha)* '(shell) capable of closing').

10.2.4. Non-coronal C + V + [l] suffixes

A group of suffixes includes a lateral preceded by a non-coronal consonant (117 through 119).

(117) *-culus/-cula/-culum*

poculum 'cup'
periculum 'danger'
osculum 'kiss'
flosculus 'flower'
folliculus 'bag'
plusculum 'more'
muliercula 'wife'
plebecula 'mob'...

(118) *-bulum*

pabulum 'food'
stabulum 'habitation'
vestibulum 'fore-court'
latibulum 'den'
pulsabulum 'implement for stringed instruments'

(119) *-bilis/-bile*

credibilis 'credible'
mutabilis 'changeable'
flebilis 'deplorable'
tolerabilis 'tolerable'
placabilis 'appeased'
volubilis 'turning'...

As one would expect, these suffixes are completely insensitive to the presence of a lateral in the stem, and the suffix-initial non-coronal consonant may be seen as the segment blocking any form of lateral dissimilation. This may be one reason why these suffixes (or at least those in 117and 119) became so highly productive in Late Latin and Romance (cf. Fr *soleil* < Late Latin **soliculus,* It *ginocchio* < *genuculum,* or the ubiquitous Romance *-Vb(i)le* suffix also borrowed by English).[327]

10.2.5. Diminutives

As we have seen, the data strongly suggest that multiple laterals were avoided within a word, but non-coronal consonants had a blocking effect on lateral dissimilation of any kind. There is, however, a pattern that clearly defies any putative constraint on heteromorphemic laterals, *viz.* that found in diminutive formation. Some diminutives are formed with the suffix seen in (117). The more interesting cases are those in which diminutive [l] or [ll] is preceded only by a (short) vowel: *-ell-, -ill-, -ul(l)-, -ol-*. These suffixes freely combine with stems that contain [l] in any position, cf. (120), especially towards the end of the list.

[327] Historically, however, dissimilation from an original (**-tlo-* >) **-klo-* to **-kro-* may have occurred in some words if the stem contained [l], cf. *periculum* 'danger', *poculum* 'cup' (cf. 117) vs. *sepulcrum* 'grave', *simulacrum* 'image', see Kent (1936).

(120) Diminutives in -V[l]-

labellum 'lips'
flagellum 'whip'
columella 'column'
Claudilla PROPER NAME
hilarulus 'mirthful'
litterulae 'letters'
pallidulus 'pale'
glandula 'tonsil'
cultellus 'knife'
clitellae 'saddle'
gladiolus 'dagger'
luteolus 'yellow'
filiolus 'son'
palliolum 'mantle'
ollula 'jug'
paullulum 'a little'
puellula 'girl'
villula 'mansion'
pullulus 'young animal'
bellulus 'pretty'

It is evident that no constraint applies to the lateral consonants in words of this kind. Quite the contrary: it appears that the conspicuous presence of several [l]'s was a productive and salient feature of diminutives. This is amply testified by the "freshness" of these forms in authors like Plautus (*Edepol papillam bellulam* 'By Pollux, nice little breasts' *Casina* 848), Juvenal (*Nullum, quod tibi filiolus vel filia nascitur ex me* 'is it not [a merit] that you have a boy or a girl from me?' *Sat*. 9.82–3) or Catullus (*collocate puellulam* 'marry off the girl' *Carm*. 61.184), and grammarians were keenly aware of this odd quality of [l], see for instance Martianus Cappella, who describes the articulation of all consonants in neutral terms, e.g. *K lingua palatoque formatur* ('*k* is formed on [or by] the tongue and the palate') except for [l], which in his words *lingua palatoque dulcescit* ('sweetens on the tongue and the palate' *De nuptiis* 3.261, all translations in this paragraph mine). It seems that these "*l*-heavy" words constituted a pattern in themselves, and their salience was due precisely to the fact that they were phonologically irregular by virtue of the sequence of laterals they contained.

10.3. Cooccurrence constraints on [r]

As regards the other liquid [r] the conditions on multiple occurrences within a word seem to be somewhat more elusive than for [l]. It appears that different constraints hold for final, initial and internal syllables. In final syllables, two instances of [r] are always separated by a short vowel, never a long vowel. This is

trivially explained by the prehistoric sound change V: > V / _[r]# in polysyllables.[328] In initial syllables two instances of [r] are always separated by a long vowel; the configuration **#(C)(C)[r]V[r] is strictly banned. This constraint manifests itself in three ways: (i) no stem begins with the sequence [r]V[r], C[r]V[r] or [s]C[r]V[r]; (ii) the prefix *re-* never combines with [r]-initial stems (anti-reduplication effect, cf. 8.2.1.5 and 8.3.1); (iii) no [r]-initial verb has a reduplicated perfect (see chapter 9). On the other hand, there are numerous instances of two [r]'s separated by a long vowel in initial syllable:

(121) [r]V:[r] in initial syllable

rārus 'rare'
rōris (GENSING from *rōs* 'dew')
rūris (GENSING from *rūs* 'countryside')
prūrire 'stick out'...

In internal syllables the constraint appears to be that two [r]'s must be separated by at least a long vowel (apart from geminate [rr]), unless a morphological boundary of a certain kind intervenes. The morphological constructions that allow a [r]V[r] sequence to surface are twofold: (i) combinations involving the prefix *per-* (the only [r]-final prefix of any frequency): *perurbanus* 'highly polite', *perargutus* 'well argued', *pererro* 'wander over' etc.; (ii) any inflectional ending (of which many include [r], for details see chapter 6): *morerer* 'die' PASSPASTSUBJ1SING, *ureris* 'burn' PASSSUBJ2SING, *quererētur* 'complain' PASSPASTSUBJ3SING, *currere* 'run' INF, *cucurrerim* 'run' PERFSUBJ1SING etc.

There is an interesting minor pattern involving the nominalising affixes *-or* and *-ur* that seems to be relevant to this point. The facts are the following. The nominalising suffix *-or* has a short vowel in the nominative singular, i.e. the zero-suffixed form, but a long vowel in the oblique cases (*pudor* ~ *pudōrem* ~ *pudōris* 'decency' NOMSING ~ ACCSING ~ GENSING etc.). This suffix freely combines with stems ending in [r] as the length alternation guarantees the well-formedness of the [r]-sequences:

(122) *-ror*-final words (NOMSING ~ GENSING)

error ~ *errōris* 'error'
horror ~ *horrōris* 'horror'
terror ~ *terrōris* 'terror'
maeror ~ *maerōris* 'grief'
furor ~ *furōris* 'rage'

[328] The shortening took place before most consonants, not only [r]; this is what historically underlies most of the alternations described as shortening in 5.3.1.

By contrast, the similar but invariably short-vowelled *-ur* ending (which is replaced in some stems by *-or-* in the oblique cases) does not combine with [r]-final stems:

(123) *-ur*-final words (NOMSING ~ GENSING)

fulgur ~ *fulguris* 'lightning'
cicur ~ *cicuris* 'tame'
sulpur ~ *sulpuris* 'sulphur'
augur ~ *auguris* 'bird-watching oracle'
robur ~ *roboris* 'oak'
iecur ~ *iecoris* (or *iecinoris*) 'liver'
ebur ~ *eboris* 'ivory'
femur ~ *femoris* (or *feminis*) 'thigh'

The fact that there are no *-rur*-final words (as opposed to the *-ror*-final words like *error*) cannot be explained on the basis of the well-formedness of the zero-suffixed nominative, because those forms would not infringe any phonological constraint; they can only be explained from the rest of the paradigm, where non-alternating *-ur* would yield internal [rur] (or [ror]) sequences, whereas *-or* yields internal [ro:r]. The difference in the incidence of the two suffixes thus receives a straightforward phonotactic explanation on the assumption that affixation with *-or* and *-ur* does not represent the same type of morphological configuration as inflection or prefixation.

11. The issue of ⟨gn⟩-initial stems

11.1. Introduction

In the phonology of Classical Latin, the entity written ⟨gn⟩ is something of a puzzle, especially in word-initial position. Its reconstructible history has a clear beginning and and endpoint: it started out as Proto-Indo-European *[gn] and finished as (Late) Latin [n], as in the word *gnatus* 'son'. The details and the precise chronology of the loss of the initial [g], however, are not entirely clear. I will not attempt it here to settle the second issue, *viz.* the chronology of the process (at least in absolute terms); at any rate, it is generally agreed that by classical times (beginning with the mid-1st century BC) the initial stop was lost and its retention in writing was an archaism. What will be addressed here is the process of the phonological demise of the original initial [g], which raises interesting questions in view of the data, and lends itself, I will argue, to an autosegmental analysis.

The argument to be presented crucially hinges on prefixed forms of ⟨gn⟩-initial stems. These show an interesting asymmetry in the particular prefixes that could attach to such stems in that an older and a more recent layer can be quite clearly distinguished, the former with the prefixes *ad-*, *con-* and (negative) *in-*, the latter with almost all others (a few prefixes are not attested with such stems at all, which is probably not a phonological issue). It will be demonstrated that this curious asymmetry can be explained if we assume that at a certain stage in the prehistory of the Latin language ⟨gn⟩-initial stems involved, in initial position, a floating C-Place node dominating a Dorsal node which, in turn, dominated the features [+high, +back]. Thus the loss of initial [g] was a two-stage depletion process, with all manner features, the Laryngeal node as well as the root node disappearing first, the C-Place node only later; the delimitation of the prefixes that could combine with these stems to the three listed above dates from the stage preceding the disappearance of the floating C-Place node.

Analyses involving floating features have long been present in the phonological literature. As is well known, such analyses initially involved tonal phenomena but were then extended to non-tonal (melodic) features to explain harmony phenomena or to describe certain types of non-segmental morphological constituents.[329] In this chapter it is neither a harmony phenomenon nor a morphological entity that is analysed in terms of a floating node; it is argued that a handful of stems involved such a structure and this influenced their behaviour with respect to concatenative morphology (prefixation).

[329] For an excellent survey see Zoll (1996). Well-known analyses involving floating non-tonal features include, among others, Chaha labialisation and palatalisation (McCarthy 1983), Terena nasalisation (Durand 1990:254, there taken from Bendor-Samuel 1960), Japanese Rendaku (Itô and Mester 1986), and some aspects of vocalic alternations in Hungarian suffixes (Kornai 1994). I discussed ⟨gn⟩-initial stems recently in Cser (2011).

11.2. ⟨gn⟩ in simplex forms

As was explained in 2.1, word-medial ⟨gn⟩ is most likely to have represented [ŋn]. To recapitulate the arguments from that section, (i) it is known that stops historically underwent nasalisation before nasals, (ii) inscriptional evidence points to a velar nasal in such words as *ignis* 'fire', (iii) the change [e] > [i] happened before orthographic ⟨gn⟩ just as it did before all occurences of the velar nasal; (iv) the spelling of prefixed ⟨gn⟩-initial stems points in the same direction, with the consistent omission of the letter for the prefix-final nasal, as in ⟨ignoscere⟩ 'forgive'.

Word-initially ⟨gn⟩ is slightly more problematic than medially because (i) it is restricted to a handful of words; (ii) in all these words except the proper name *Gnaeus* it is variably replaced by ⟨n⟩ and (iii) an initial cluster [ŋn] would be very odd phonotactically in that there are no onset clusters consisting of two sonorants either internally or initially (see 3.2). The exhaustive list of attested lexemes with initial ⟨gn⟩ is the following:

(125) ⟨gn⟩-initial words

Gnaeus proper name
gnarus (overwhelmingly) ~ *narus* 'expert'
gnatus (esp. preclass.) ~ *natus* (overwhelmingly)[330] 'born, son'
gnavus ~ *navus* (more frequently) 'diligent'
gnoscere (sporadically) ~ *noscere* 'know'
gnobilis (2 preclassical occurrences) ~ *nobilis* 'noble'

Etymologically, all these words apart from *Gnaeus*[331] go back to two Proto-Indo-European stems, **genh*$_3$- (> *gnarus, gnavus, gnobilis*, cf. English *can, know*) and **genh*$_1$- (> *gnatus,* cf. English *kin*). It is clear that the gross diachronic process we are interested in here began with PIE *[gn-] and finished at some point in Late Latin with [n-], but what happened in between and which stage does Classical Latin belong to?

I am going to argue that the middle stage of the process involved a floating C-Place node in the place of the original *[g] stem-initially. Later the stems beginning with the floating C-Place node were gradually relexicalised either without it (i.e. with a single initial [n]) or, when prefixed, with a [ŋn] cluster (like medially) and the phonological forms of alternating lexemes split into two. This relexicalisation was caused by prefixation in the first place, and is also evidenced best by it, so it is to the prefixation of ⟨gn⟩-initial stems that I now turn.

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[330] Zirin (1970:27–28) cites data that show a distinction between the noun 'son' and the participle 'born' in manuscripts of Plautus in that the former is always written with ⟨gn⟩, the latter variably.

[331] Though note that a remark found in Paulus' epitome of Festus' dictionary referred to as *De verborum significatu* (2nd c. AD?) implies that this name was related to the common noun *naevus* (<**gnaevus*?) 'birth-mark' (*gneus et corporis insigne et praenomen a generando dicta… apparet* 'it is clear that [the word] gn[a]eus, 'mark on the body' as well as a first name, derives from engendering (*generare*)', here cited from the *Oxford Latin Dictionary* s.v. *Gnaeus*, translation mine).

11.2. Prefixed ⟨gn⟩-initial stems

In Table 23 all the prefixed words based on ⟨gn⟩-initial stems are listed with comments.

stem	prefix	prefixed form	gloss	comment
(*g*)*narus*	*in-*	*ignarus*	'ignorant'	much more frequent than (*g*)*narus*, and attested all through the period of written Latin
	pro-	*prognariter*	'deftly'	once in Ennius and once in Plautus (3rd–2nd c. BC)
	per-	*pergnarus*	'very deft'	once in Apuleius (2nd c. AD) and once in Sallust (1st c. BC, debated occurrence)
(*g*)*navus*	*in-*	*ignavus*	'idle'	much more frequent than (*g*)*navus*, attested all through the period of written Latin, and also more complete morphologically in that only *ignavus* has comparative and superlative forms
nobilis	*in-*	*ignobilis*	'ignoble'	very frequent and attested all through the period of written Latin
	per-	*pernobilis*	'most noble'	first occurrence in Cicero (once; 1st c. BC), then a handful later
	prae-	*praenobilis*	'most noble'	Apuleius (2nd c. AD), then Prudentius (4th c. AD) and a handful later
	con-	*cognobilis*	'cognisable'	first in M. P. Cato (3rd–2nd c. BC), then a handful in classical and later times, but semantically clearly from *cognoscere*, not from *nobilis* (though the stems are etymologically related)
(*g*)*noscere*	*in-*	*ignoscere*	'forgive'	all three significantly more frequent than (*g*)*noscere* and widely attested in most paradigmatic forms (perfective and third stem forms)
	ad-	*agnoscere* (also ⟨adgn-⟩, ⟨adn-⟩)	'acknowledge'	
	con-	*cognoscere*	'recognise'	
	per-	*pernoscere*	'thoroughly know'	fairly rare word; perfective only attested in Plautus (3rd–2nd c. BC) and Terence (2nd c. BC) with one exception, third stem not attested at all
	inter-	*internoscere*	'distinguish'	once in Pacuvius (2nd c. BC), then Lucretius (1st c. BC) and some occurrences later; third stem not attested at all
	prae-	*praenoscere*	'know in advance'	Cicero (1st c. BC), Ovid (1st c. BC–AD), then most occurrences in Christian Latin; perfective forms 5 altogether; third stem not attested at all

stem	prefix	prefixed form	gloss	comment
	dis-	*dinoscere*	'distinguish'	Horace (1st c. BC), Ovid (1st c. BC–AD), then fairly popular later, especially with Christian writers; perfective forms attested only at the end of the 4th c. AD; third stem not attested at all; the spelling ⟨dignoscere⟩ is introduced by Tertullian (c. AD 200)
	re-	*renoscere*	'recognise'	first in a 4th c. AD text of dubious authenticity, then a handful of occurrences in the 5th c.; no perfective or third stem forms attested
	re- + *con-*	*recognoscere*	'remember'	first attested in Cicero and Vergil (1st c. BC), then very frequently, especially in Christian writers
	ad- + *con-*	*adcognoscere* (also ⟨acc-⟩)	'acknowledge'	handful of occurrences in Varro (1st c. BC), Seneca, Petronius, Quintilian (1st c. AD) and Tertullian (1st–2nd c. AD)
(*nō-*)	*in-*	*ignorare*	'not know'	frequent and attested all through the period of written Latin
(*g*)*natus*	*con-*	*cognatus*	'relative'	fairly frequent words, attested from earliest times
	pro-	*prognatus*	'son'	
	con-	*connatus*	'born together'	once in Tertullian (1st–2nd c. AD), then a handful in later Christian writers
	pro-	*pronatus*	'born'	only in Tertullian (1st–2nd c. AD) and Commodianus (3rd c. AD)
	ad-	*agnatus* (also ⟨adn-, adgn-⟩)	'born after father's death'	once in Accius (*agnatio,* 2nd c. BC), then Varro, Cicero (1st c. BC) and later
	in-	*innatus*	'innate'	a fairly rare word, attested from Plautus (3rd–2nd c. BC) and Terence (2nd c. BC) on
	ex-	*enatus*	'growing out'	a rare word, first attested in Pacuvius (2nd c. BC), then in Horace (1st c. BC) and Livy (1st c. BC–AD)
	re-	*renatus*	'born again'	attested with some frequency from Lucretius (1st c. BC) onwards, popular especially with Christians
	inter-	*internatus*	'growing between'	a rare word, first attested in Livy (1st c. BC–AD)
	sub-	*subnatus*	'growing underneath'	hapax in a 1st c. BC text of dubious authorship
-gna(*n*)*t-*	*prae-*	*praegna*(*n*)*s*	'pregnant'	frequent and attested from earliest times on; stem in this form only occurs in this particular word

Table 23: Prefixed ⟨gn⟩-initial stems (exhaustive list)

A careful examination of the data very strongly suggests a distinction between two types of prefixed forms, one of which is likely to be more archaic and the other more recent. The five features that tend to cluster in the older forms and distinguish them from the newer ones are the following:

- earlier attestation
- higher frequency in the corpus
- more complete paradigms
- written with ⟨gn⟩ rather than ⟨n⟩
- sometimes less transparent meaning

While these criteria do not pattern together in all cases, they quite clearly distinguish between many of the prefixed ⟨gn⟩-words (e.g. *ignoscere* 'forgive' vs. *praenoscere* 'know in advance' or *cognatus* 'relative' vs. *internatus* 'growing between'). In general, prefixation with *ad-*, *con-* and negative *in-* appears to be more archaic in the set of ⟨gn-⟩ words than all other cases of prefixation (with a few exceptions to which I will return below). The common feature of these three prefixes is that they end in the consonants that are most prone to assimilation: [d], [n] and the placeless nasal.

How can one possibly explain this? What is the phonological structure that accounts for the odd distribution of prefixes on ⟨gn⟩-initial words and how did it develop? As I see it, the diachronic process can be desribed in three stages through which the phonological representation of ⟨gn⟩-initial words changed.

Stage 1: [gn-]. At the earliest stage, identical in the relevant respect to that reconstructed for Proto-Indo-European, these words began with [gn] (and possibly internal [gn] still existed unchanged).[332] This cluster was somewhat untypical of Proto-Indo-European, though not unheard of, and it resulted from the loss of a vowel between the two consonants through ablaut (cf. English *knee* ~ Latin *genu*, or Latin *genitus* 'engendered, born' vs. *gnatus* 'son'). It is clear that this phonological form does not explain why prefixation with certain morphemes was preferred to prefixation with others; it is hardly conceivable that the prefix **ad-* or **ŋ-* (> *in-*) would have resulted in phonologically well-formed words but a liquid- or vowel-final prefix such as those historically underlying *per-* and *de-*, respectively, would not. Even if one assumed phonological simplification as in (126), the conspicuous absence of vowel-final prefixes from the archaic set would still be unexplained.

[332] There is one word, *niti* 'lean on', which may go back to a PIE **kn*-initial root (de Vaan 2008:410). It is, however, not attested with initial ⟨gn⟩ apart from a lexicographic reference of a somewhat troubled history, discussed in Stephens (1980). The change [kn] > [gn] /#_ is claimed to be unlikely in Stephens (1978) on typological grounds, *viz.* that languages typically do not have initial voiced obstruent + nasal clusters without also having initial voiceless obstruent + nasal clusters, that is, since [gn-] presupposes [kn-], the latter is unlikely to be replaced by the former.

(126) Putative sound changes in prefixed [gn]-initial stems

[ŋgn] > [ŋn] (e.g. in the etymon of *cognoscere* 'recognise')
[dgn] > [ggn] > [gn] (> later [ŋn]) (e.g. in etymon of *agnoscere* 'acknowledge'),

It may be surmised that at this stage prefixation was indeed freer with these stems and the restriction seen in (early) documented Latin dates from a later (but still prehistoric) stage.

Stage 2: floating C-Place. At some point in the prehistory of Latin, initial [g] was lost as a full segment and what remained in its place was a floating C-Place node dominating a Dorsal node which, in turn, dominated the features [+high, +back]. This change, which only took place in the environment #_[n], can be formalised as in Figure 38.

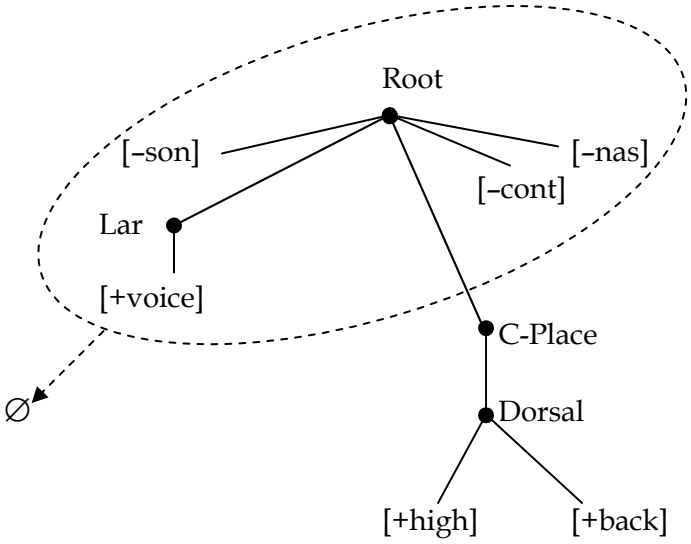


Figure 38: Loss of structure in initial [gn]

The lexical representation of words like *gnatus* thus involved the configuration shown in Figure 39. The realisation of this configuration on the surface must have involved a degree of variation whose details are no longer fully recoverable. Assuming that floating (unlinked) features and nodes could not surface it is conceivable that the floating C-Place node was deleted; it is also possible that a conservative surface realisation [gn] persisted for some time.

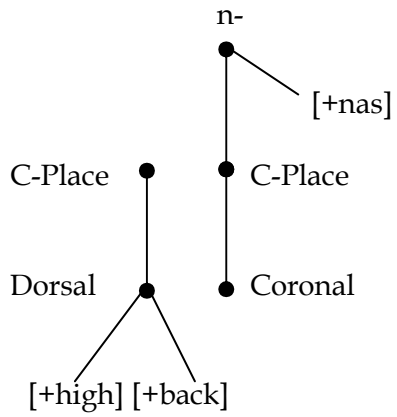


Figure 39: Representation of initial ⟨gn⟩ at stage 2 (irrelevant details omitted)

At this point it will be clear why the set of prefixes that attach to ⟨gn⟩-initial stems was restricted to *ad-, con-* and *in-* precisely at this stage. The most readily assimilating consonants are [d], [n] and the placeless nasal; it is primarily coronals that delink their place specification and relink to the place specification of the following consonant, and the placeless nasal evidently needs a place specification to be able to surface (see 4.8 and 8.3.2.2). What happens in the case of the ⟨gn⟩-initial words is the same process, in particular place assimilation 2. Whenever one of the above three prefixes was associated with such a stem, the floating C-Place node with a Dorsal specification triggered assimilation in the same way as any stem-initial velar (or labial) consonant, i.e. it spread leftwards, the only direction allowed in Latin. But when a non-assimilating consonant (such as [r], which does not undergo place-assimilation at all) or a vowel would have been adjacent to the floating C-Place node, the reassociation of the C-Place node could not take place and thus an ill-formed word would have emerged with a stranded floating node in non-initial position. Figures 40 and 41 illustrate this with *ignoscere* vs. the then impossible ***re(g)noscere*.

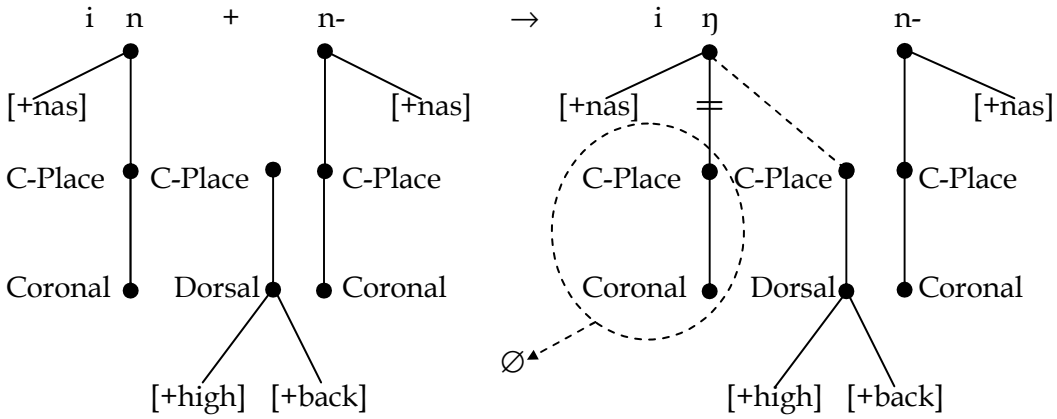


Figure 40: Assimilation in *in*+⟨gn⟩ (irrelevant details omitted)

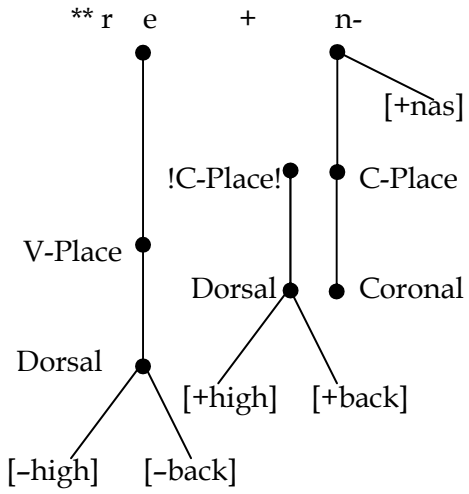


Figure 41: No assimilation in *re*+⟨gn⟩ (irrelevant details omitted)

As was explained in 2.3, vowels do not have a C-Place node and the primary place features of consonants and the place features of vowels are found on different tiers; this explains why vowels cannot associate with the floating C-Place node and produce something like ***runoscere* from *re*+$_{[Dorsal]}$*noscere*. Note further that the internal cluster in a word like *regnum* 'kingdom' is, of course, well-formed since it does not involve a floating C-Place node; this is the difference between such words and ***re*+*gnoscere*.

With *con-*, ending in a placeless nasal, the process is the same (Figure 42) except that the two defective entities that meet at the morpheme boundary are perfect complements and so nothing needs to be delinked and deleted:

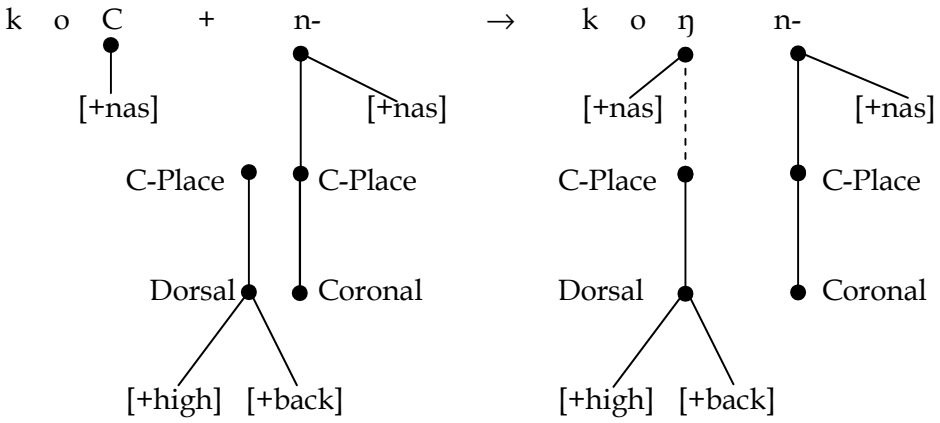


Figure 42: Assimilation in *con*+⟨gn⟩ (irrelevant details omitted)

With *ad-* the place assimilation process is formally the same (Figure 43); the only difference is that the outcome of the relinking of the floating C-Place to the [d] is [g], and the resulting [gn] cluster has yet one more local process to undergo, scil. [gn] → [ŋn], which eventually levelled out the variation internally. If this process is postulated for Classical Latin, it can only be as a fossilised remnant of the historical nasalisation of stops in pre-nasal position.

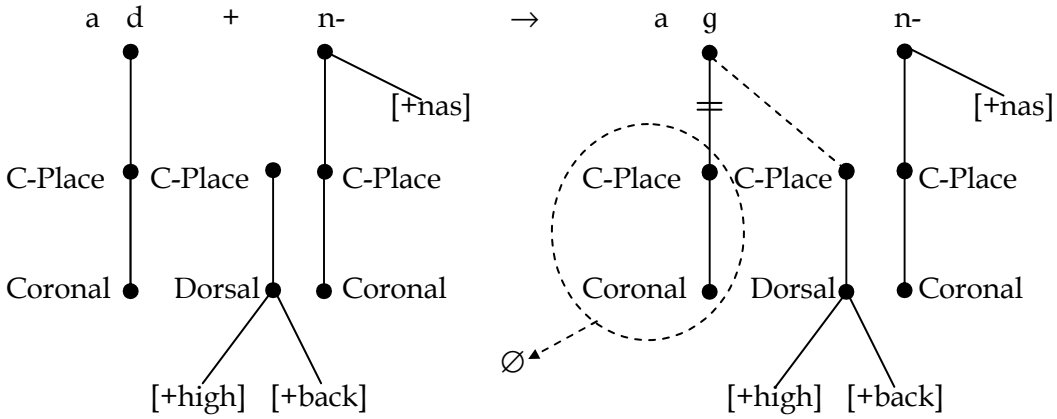


Figure 43: Assimilation in *ad*+⟨gn⟩ (irrelevant details omitted)

Concerning the hypothesis of the floating C-Place node at stage 2 there is one more possible objection that needs to be addressed. Given that the [b]-final prefixes also assimilate more or less systematically to stem-initial velars (*sub* + *gerere* → *suggerere* 'pile up', *ob* + *gerere* → *oggerere* 'heap', see 8.2.5), why do we not find forms like ***sugnoscere* [suŋn-] < [sugn-] < [sub] + [Dorsal][n-] next to *suggerere* and *oggerere*? The answer to this question is that, in all likelihood, the absence of such words is not due to their phonological shape (which would indeed be well-formed) but to semantic reasons and pure lexical contingencies. A possible argument for this position is that none of the three [b]-final prefixes combined with any of the ⟨gn⟩-initial stems even in the latest period of native Latinity, by which time the floating C-Place node was certainly lost; as is shown in (Table 23) above, the only such form attested is the hapax *subnatus* found in a text of unclear provenance.

Stage 3: relexicalisation without floating C-Place. For a while the alternations of the *noscere* ~ *i*[ŋ]*noscere, natus* ~ *co*[ŋ]*natus* type maintained the representations with the floating C-Place node even if it was not realised phonetically (in word-initial position). But it is clear that the literary period saw the gradual disappearance of the floating C-Place node and the lexical split of words in which it occurred. The unprefixed forms were relexicalised with a single initial [n], whereas the prefixed forms were relexicalised with a fully specified [ŋn] sequence which was no different from the [ŋn] sequence found internally in the *regnum* and *ignis*-type words, and from this point on the relation between these unprefixed and prefixed forms was no longer motivated phonologically. This made it possible for other prefixes to attach to ⟨gn⟩-initial (now phonologically [n]-initial) stems, hence the novel formations like *renatus* 'born again', *praenoscere* 'know in advance', *pernobilis* 'most noble'. Interestingly, the phonologically no longer motivated, lexicalised relation between unprefixed and prefixed ⟨gn⟩-words also made it possible for authors like Tertullian to introduce the deliberately archaising form (spelling variant?) ⟨dignoscere⟩ for the novel formation *dinoscere* 'dinoscere', itself made possible by the relexicalisation of *noscere* 'know'.

As for the morphological structure of the forms involved, at stage 2 the morpheme boundary in prefixed forms of the *ignoscere*-type actually divided the prefix-final nasal in that its C-Place node was on the right of the boundary, being part of the stem, but its root node and its manner features were on the left of the boundary, being part of the prefix; at stage 3, however, the morpheme boundary was between the two nasals, with the prefix variants [iŋ] [koŋ] [aŋ] reanalysed as lexically selected exceptional allomorphs before certain [n]-initial stems.

11.3. Problematic words

Problematic items remain, however, and I will now turn to these.

(i) *Gnaeus*. This name is consistently written in this way and abbreviated *Cn* throughout Antiquity. This could, in theory, indicate that the loss of the floating C-Place node did not take place. But if we consider that this was a proper name, scribal conservatism is likely to have been especially strong and need not point to anything particular about the phonology of this word. It is, of course, also conceivable that a spelling pronunciation [gnajjus] existed until the end of Classical Latin, maybe even later.

(ii) *prognatus* 'son'. There is no doubt this is one of the early prefixed forms of *gnatus* 'born' along with *cognatus* 'relative' and possibly *agnatus/agnatio* 'born/birth after father's death'. Why then does it have *pro-*, a prefix that otherwise does not attach to ⟨gn⟩-initial stems for reasons discussed above? As I see it, there are three possible explanations. One is that this word was reanalysed as a single word already at stage 1, which is possible but unprovable without circularity. The other explanation could be analogical interference from *cognatus*, which was well-formed at stage 2 as well. This explanation suffers from the weakness that traditional analogical accounts generally face in that it basically acknowledges the isolated nature of the interference: why did *cognatus* give rise to *prognatus* but not *cognoscere* to ***prognoscere*, and so on? The third possibility is that the word *prognatus* is originally not composed of *pro*+*gnatus* but of *prod*+*gnatus*. The appearance of the prevocalic variant of the prefix (cf. *prod*+*ire* 'go forth') in this word would be unusual, but not inconceivable. The regularity governing the distribution of the variants of *pro-* is known not to be watertight: the [d]-less variant appears with a shortened vowel when attached to some vowel-initial stems as in *prŏavus* 'forefather', but the same variant is also found with many [f]-initial words such as *prŏfugus* 'fugitive', where the shortening of the prefix vowel is unexplained (see 8.2.1.2). On the other hand, if original *prod*+*gnatus* rather than *pro*+*gnatus* is assumed, this word falls into the same category as the *ad*-words, and its phonology is then perfectly regular.

(iii) *praegna(n)s* 'pregnant'. This word is odd on several counts. On the one hand, it is clearly an early formation attested frequently from the beginnings of Latin literacy and including a stem form *gnat-* or *gnant-*, which is not found anywhere else in the lexicon, though it is obviously related to the stem of *gnatus* (historically **gnato-s*). On the other hand, the prefixation of *prae-* to ⟨gn⟩-initial words is predicted not to happen if the above arguments are to hold. Furthermore, the synchronic phonology of this word in Classical Latin is also unusual: a cluster [jŋn] (if that is what this word included), or indeed any cluster consisting of three sonorants, is unattested even at prefix–stem boundary. The only explanation that I can think of is that this word was lexicalised already at stage 1, and thus it escaped the phonologically motivated restriction that resulted, at stage 2, from the replacement of initial [g] by a floating C-Place node before [n]. This scenario is made plausible by the isolated stem-variant, and it implies a parallel between *praegna(n)s* and *prehendere* 'grab', where the latter shows an isolated prefix-variant as well as a stem not attested anywhere else in the language, both good indicators of early lexicalisation. The problem of the synchronic phonology of the form still remains, however.

(iv) *innatus* 'innate'. This word is attested from preclassical times on, though not with any great frequency. It is exceptional in including the locative (rather than the negative) *in-*, and its form is also a counterexample to the hypothesis detailed above in that it is not ***ignatus*. I do not have much in the way of explanation apart from the seemingly trivial remark that the form of this word may be due to early vacillation in the lexical form of the stem.

(v) *ignominia* 'disgrace', *cognomen* 'surname', *agnomen* 'nickname'. These words are prefixations of the stem *nomen* 'name', which is not a ⟨gn⟩-stem, and yet, the prefixed form shows *-gn-* instead of the etymologically correct ***innominia,* ***connomen, adnomen*.[333] This has long been explained with reference to the analogical influence of *gnoscere* and its prefixed variants.[334]

11.4. Conclusion to chapter 11

I have argued in this chapter that in the initial cluster *[gn] the velar stop was lost diachronically in two stages: first it was replaced by a floating C-Place node dominating a Dorsal node which, in turn, dominated the features [+high, +back]; this floating C-Place node was subsequently also lost. The argument crucially hinges on the observation that those prefixes that end in assimilating consonants

[333] The last of these is attested once, in the *Historia Augusta (Verus 3.5)*, cf. also the verb *adnominare* 'take as wife' in St Augustine.

[334] See Walde and Hoffmann (1956 s. v.) and, more recently, de Vaan (2008:412).

([d] [n] and the placeless nasal) combined with *[gn]-initial stems earlier than the rest of the prefixes. This can be explained if one assumes that with prefixes ending in non-assimilating consonants and vowels, to which the place node of consonants could not spread for structural reasons, the resulting form would have included a stranded floating C-Place node and would thus have been ill-formed. After the loss of the stem-initial floating C-Place, prefixation was no longer constrained in this way and new forms were free to appear.

12. Summary of research results

The purpose of this concluding chapter is to summarise those points that I regard as results emerging from my own original research, the first full description of Classical Latin phonology done in an autosegmental framework, based on an electronic database. Some of these results were anticipated in my earlier publications, but even in those cases I often reassessed the evidence, revised my own assumptions, arrived at different conclusions or improved the analysis in various ways.

- Regarding the segmental inventory:
  - the most detailed assessment to date of the contour segments (the issues of diphthongs: the phonological equivalence of all vowel + sonorant sequences, and the issue of the labiovelars: the indecisive nature of the evidence);
  - the introduction of the placeless nasal (including its structure, its distribution and its role in morphology and in phonological processes);
  - the application of one particular feature geometry to the general description of Latin phonology (and not just single issues).

- Regarding syllable structure:
  - a comprehensive description and analysis that assumes coda glides and extrasyllabic [s];
  - the formulation of the Place Condition as it applies to Latin, and a more detailed analysis of syllable contact than has hitherto been ventured.

- Regarding processes affecting consonants and vowels:
  - the motivation of Latin rhotacism on the basis of featural incompatibility;
  - the precise characterisation of the degemination processes;
  - the separation of the two place assimilation processes;
  - the interactions of the placeless nasal with other types of segments;
  - in general, the autosegmental / feature geometric representation of Latin segmental processes.

- Regarding inflectional morphology:
  - the unified treatment of nominal and verbal inflection;
  - the precise characterisation of the phonological environments triggering all types of allomorphy;

- the demonstration of contiguity, a crucial feature in the functioning of vowel sonority as trigger for allomorphy;
- the consistent treatment of *i*-stem verbs as heteroclitic rather than as a separate class;
- the structurally parallel analysis of allomorphy in the verbal imperfective and perfective;
- as a result, a highly simplified analysis of latin inflectional allomorphy in general.

- Regarding resyllabification:
  - the phonological motivation for the avoidance in poetry of sequences of a word ending in a short vowel and a word beginning with an extrasyllabic [s] in the same line.

- Regarding prefixation:
  - the relation between sonority, place of articulation and assimilations at prefix–stem boundaries as captured in the Generalised Place Condition;
  - the phonological motivation of the differential behaviour of *con-* vs. other nasal-final prefixes;
  - the statistical analysis of *conl-/coll-* variation.

- Regarding perfective reduplication:
  - the explication of the persistence of a small set of reduplicating verbs as resulting from conforming to stem-initial patterns untypical of Proto-Indo-European but typical of Classical Latin.

- Regarding liquids:
  - the precise characterisation of the conditioning factors of the *-alis/-aris* alternation;
  - the identification of diminutives as a phonologically anomalous and therefore salient lexical class;
  - the characterisation of the cooccurrence restrictions obtaining of [r].

- Regarding ⟨gn⟩-initial stems:
  - the chronological layering of prefixed ⟨gn⟩-initial stems;
  - the explanation of this chronological layering with the help of a proper formalisation of the stem-initial cluster;
  - the precise characterisation of the diachronic process of the loss of initial [g].

Appendix 1

The textual frequency of consonants in Classical Latin

The textual frequency of consonants was calculated from a selective corpus of texts representing a variety of authors and genres from the 1st century BC and the 1st century AD. The texts in particular are the following:

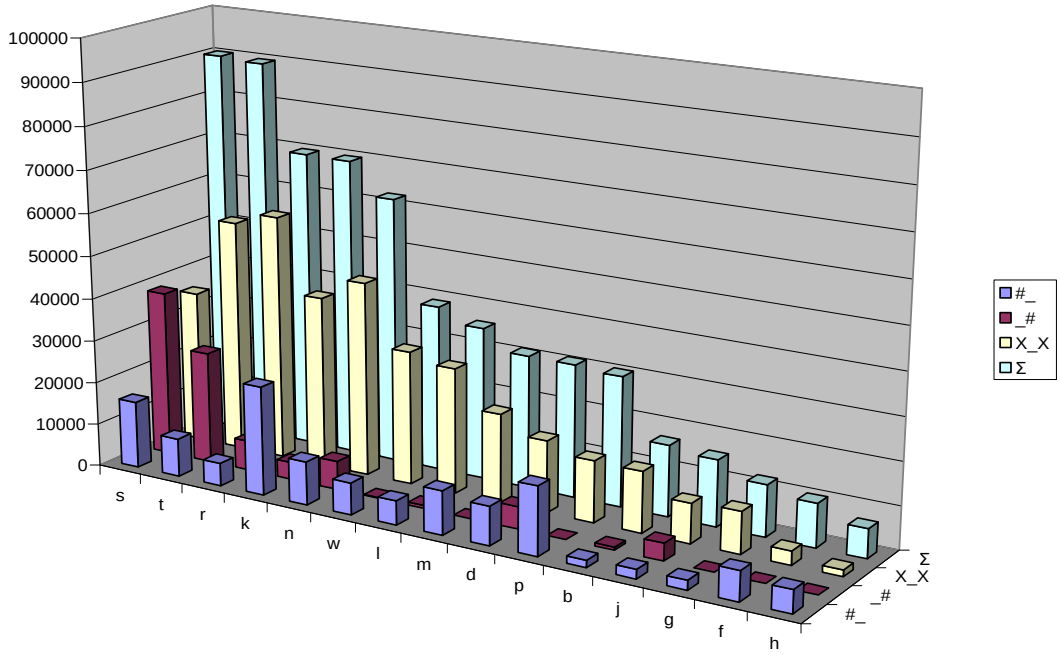
Res gestae divi Augusti (also known as the *Monumentum Ancyranum*)
Julius Caesar's *Commentarii de bello civili*
Cicero's *Brutus, De legibus, Pro Archia poeta* and *Pro Quinctio*
Ovid's *Amores*
Persius's *Saturae*
Sallust's *Bellum Catilinae*
Statius's *Silvae*
Vergil's *Georgica*

These texts altogether comprise 191 025 words and 1 101 173 characters. The frequencies of consonants are given in the following charts. The notes provide details that may be useful for those who assume a segmental analysis different from mine (in particular, monosegmental [k^w] ⟨qu⟩, [g^w] ⟨(n)gu⟩, [aj] ⟨ae⟩, [oj] ⟨oe⟩, [aw] ⟨au⟩ instead of the biphonemic sequences that I argued for in chapter 2, and VN sequences instead of the long nasal vowels).

Chart 1. The frequency of consonants, in order of decreasing overall frequency

	#_	_#	X_X	Σ
s	15691	38716	35781	90188
t[335]	8958	26203	54468	89629
r	5330	6981	57476	69787
k[337]	25515	4046	40119	69680
n[339]	10146	6655	45504	62305
w[340]	7444	144	31277	38865
l	5620	711	29374	35705
m[341]	10260	0	20859	31119

	#_	_#	X_X	Σ
d	9083	5194	16789	31066
p[336]	15993	0	14388	30381
b	1678	689	14273	16640
j[338]	2131	4085	9297	15513
g	2281	0	9819	12100
f	6907	0	3277	10184
h	5324	0	1490	6814



[335] The data for [t] include 235 initial and 373 medial ⟨th⟩.

[336] The data for [p] include 244 initial and 303 medial ⟨ph⟩.

[337] The data for [k] include the 20225 occurrences of ⟨qu⟩; of these, 9723 are initial, 10502 are medial. The data for [k] also include 111 initial and 497 medial occurrences of ⟨ch⟩.

[338] The data for medial [j] include the 592 occurrences of tautosyllabic [oj]. The data for [j] also include the 9045 occurrences of ⟨ae⟩, of which 3944 are final, 5101 are medial (with respect to the [j], not the ⟨ae⟩).

[339] The data for [n] do not include the 3527 occurrences of ⟨ns⟩ and the 565 occurrences of ⟨nf⟩.

[340] The data for [w] include the 20225 occurrences of ⟨qu⟩, all medial (scil. with respect to [w], not to ⟨qu⟩). They also include the 282 occurrences of [ŋgw], all medial. Furthermore, they include the 3676 tautosyllabic [aw] sequences, all medial (with respect to [w], not to ⟨au⟩). The 144 final occurrences of [w] are all made up by the four [ew]-final words *(e)heu, neu, seu, ceu*, see chapter 2. The word *hau* does not occur in the corpus at all.

[341] The data for [m] do not include the 27475 final occurrences of graphic ⟨m⟩.

Chart 2. Initial, final and medial frequency separately

	#_
k	25515
p	15993
s	15691
m	10260
n	10146
d	9083
t	8958
w	7444
f	6907
l	5620
r	5330
h	5324
g	2281
j	2131
b	1678

	_#
s	38716
t	26203
r	6981
n	6655
d	5194
j	4085
k	4046
l	711
b	689
w	144
m	0
p	
g	
f	
h	

	X_X
r	57476
t	54468
n	45504
k	40119
s	35781
w	31277
l	29374
m	20859
d	16789
p	14388
b	14273
g	9819
j	9297
f	3277
h	1490

Appendix 2

Authors and works mentioned in the text

Here I give the list of all the authors mentioned in the text. Only those of their works are mentioned by title to which specific reference was made. The list is given alphabetically as well as chronologically.

(1) Alphabetical list of authors

Name in commonly used form	**Full name**	**Works referred to**	**Date**
Accius	Lucius Accius		2nd c. BC
Apuleius	Lucius Apuleius (Platonicus)		2nd c. AD
Arnobius	Arnobius		cca 300 AD
St Augustine	Aurelius Augustinus (Hipponensis)		354–430 AD
Boethius	Anicius Manlius Severinus Boethius		480–524/525 AD
Cato	Marcus Porcius Cato		234–149 BC
Catullus	Gaius Valerius Catullus	*Carmina*	cca 85–55 BC
Cicero	Marcus Tullius Cicero	*Brutus, De legibus, Pro Archia poeta, Pro Quinctio*	106–43 BC
Claudianus Mamertus	Claudianus Mamertus	*De statu animae*	5th c. AD
Claudius Claudianus	Claudius Claudianus		cca 400 AD
Commodianus	Commodianus		3rd c. AD
Ennius	Quintus Ennius	*(Annalium fragmenta)*	cca 239–169 BC
Festus	Sextus Pompeius Festus	*Epitoma operis de verborum significatu Verrii Flacci*	2nd c. AD?
Horace	Quintus Horatius Flaccus	*Saturae (=Sermones), Epodi*	65–8 BC
St Jerome	Eusebius Sophronius Hieronymus		cca 340–420 AD
Julius Caesar	Gaius Julius Caesar	*Commentarii de bello gallico, Commentarii de bello civili*	100–44 BC
Juvenal	Decimus Junius Juvenalis	*Saturae*	late 1st c. – early 2nd c. AD
Lactantius	Lucius Caecilius Firmianus Lactantius		cca 300 AD
Livy	Titus Livius		59 BC – 17 AD
Lucanus	Marcus Annaeus Lucanus	*Bellum civile* (=*Pharsalia*)	39–65 AD

Lucilius	Gaius Lucilius	*(Saturarum fragmenta)*	2nd c. BC
Lucretius	Titus Lucretius Carus	*De rerum natura*	cca 97–55 BC
Marius Victorinus	Marius Victorinus	*Ars grammatica*	4th c. AD
Martialis	Marcus Valerius Martialis	*Epigrammata*	cca 40 – 103 AD
Martianus Cappella	Martianus Minneius Felix Cappella	*De nuptiis Philologiae et Mercurii*	5th c. AD
Ovid	Publius Ovidius Naso	*Amores, Ars amatoria, Heroides, Metamorphoses, Tristia*	43 BC–17/18 AD
Pacuvius	Marcus Pacuvius		early 2nd c. BC
Paulinus Nolanus, St Paul of Nola	Pontius Meropius Anicius Paulinus	*Carmina*	353–431 AD
Persius	Aulus Persius Flaccus	*Saturae*	34–62 AD
Petronius	Gaius Petronius Arbiter	*Satyrica*	cca 27–66 AD
Plautus	Titus Maccius Plautus	*Casina, Miles gloriosus, Poenulus*	cca 254–184 BC
Pliny (the elder)	Gaius Plinius Secundus (Plinius Maior)	*Naturalis historia*	23–79 AD
Pomponius Bononiensis	Lucius Pomponius Bononiensis	*(Atellanarum fragmenta)*	early 1st c. BC
Propertius	Sextus Propertius	*Elegiae*	1st c. BC
Prudentius	Aurelius Prudentius Clemens	*Liber Peristephanon*	348 – cca 405 AD
Quintilian	Marcus Fabius Quintilianus		1st c. AD
Sallust	Gaius Sallustius Crispus	*Bellum Catilinae*	86–34 BC
Seneca	Lucius Annaeus Seneca		cca 4–65 AD
Silius Italicus	Tiberius Catius Asconius Silius Italicus	*Punica*	cca 25–100/101 AD
Statius	Publius Papinius Statius	*Silvae, Thebais*	1st c. AD
Suetonius	Caius Suetonius Tranquillus	*De vita Caesarum*	cca 75–150 AD
Terence	Publius Terentius Afer		1st half of 2nd c. BC
Tertullian	Quintus Septimius Florens Tertullianus		cca 150/170–230 AD
Tibullus	Albius Tibullus	*Elegiae*	1st c. BC
Valerius Flaccus	Gaius Valerius Flaccus Setinus Balbus	*Argonautica*	1st c. AD
Varro	Marcus Terentius Varro		116–27 BC
Velius Longus	Velius Longus	*De orthographia*	1st half of 2nd c. AD
Vergil	Publius Vergilius Maro	*Aeneis, Georgica*	70–19 BC
Vitruvius	Marcus Vitruvius Pollio	*De architectura*	beg. of 1st c. BC – beg. of 1st c. AD
(unknown author – Quintus Cornificius?)		*Rhetorica ad Herennium* (*De ratione dicendi ad C. Herennium*)	early 1st c. BC
(unknown author(s))		*Historia Augusta*	4–5th c. AD?

(2) Chronological list of authors

Name in commonly used form	**Full name**	**Works referred to**	**Date**
Plautus	Titus Maccius Plautus	*Casina, Miles gloriosus, Poenulus*	cca 254–184 BC
Ennius	Quintus Ennius	*(Annalium fragmenta)*	cca 239–169 BC
Cato	Marcus Porcius Cato		234–149 BC
Terence	Publius Terentius Afer		1st half of 2nd c. BC
Pacuvius	Marcus Pacuvius		early 2nd c. BC
Accius	Lucius Accius		2nd c. BC
Lucilius	Gaius Lucilius	*(Saturarum fragmenta)*	2nd c. BC
Varro	Marcus Terentius Varro		116–27 BC
Pomponius Bononiensis	Lucius Pomponius Bononiensis	*(Atellanarum fragmenta)*	early 1st c. BC
Cicero	Marcus Tullius Cicero	*Brutus, De legibus, Pro Archia poeta, Pro Quinctio*	106–43 BC
Julius Caesar	Gaius Julius Caesar	*Commentarii de bello gallico, Commentarii de bello civili*	100–44 BC
Lucretius	Titus Lucretius Carus	*De rerum natura*	cca 97–55 BC
Sallust	Gaius Sallustius Crispus	*Bellum Catilinae*	86–34 BC
Catullus	Gaius Valerius Catullus	*Carmina*	cca 85–55 BC
(unknown author – Quintus Cornificius?)		*Rhetorica ad Herennium* (*De ratione dicendi ad C. Herennium*)	early 1st c. BC
Vitruvius	Marcus Vitruvius Pollio	*De architectura*	early 1st c. BC – early AD 1st c.
Vergil	Publius Vergilius Maro	*Aeneis, Georgica*	70–19 BC
Horace	Quintus Horatius Flaccus	*Saturae (=Sermones), Epodi*	65–8 BC
Livy	Titus Livius		59 BC – 17 AD
Propertius	Sextus Propertius	*Elegiae*	1st c. BC
Tibullus	Albius Tibullus	*Elegiae*	1st c. BC
Ovid	Publius Ovidius Naso	*Amores, Ars amatoria, Heroides, Metamorphoses, Tristia*	43 BC–17/18 AD
Seneca	Lucius Annaeus Seneca		cca 4–65 AD
Pliny	Gaius Plinius Secundus (Plinius Maior)	*Naturalis historia*	23–79 AD
Silius Italicus	Tiberius Catius Asconius Silius Italicus	*Punica*	cca 25–100/101 AD
Petronius	Gaius Petronius Arbiter	*Satyrica*	cca 27–66 AD
Persius	Aulus Persius Flaccus	*Saturae*	34–62 AD
Lucanus	Marcus Annaeus Lucanus	*Bellum civile* (*=Pharsalia*)	39–65 AD
Martialis	Marcus Valerius Martialis	*Epigrammata*	cca 40 – 103 AD
Quintilian	Marcus Fabius Quintilianus		1st c. AD

Statius	Publius Papinius Statius	*Silvae, Thebais*	1st c. AD
Valerius Flaccus	Gaius Valerius Flaccus Setinus Balbus	*Argonautica*	1st c. AD
Suetonius	Caius Suetonius Tranquillus	*De vita Caesarum*	cca 75–150 AD
Juvenal	Decimus Junius Juvenalis	*Saturae*	late 1st c. – early 2nd c. AD
Festus	Sextus Pompeius Festus	*Epitoma operis de verborum significatu Verrii Flacci*	2nd c. AD?
Velius Longus	Velius Longus	*De orthographia*	1st half of 2nd c. AD
Tertullian	Quintus Septimius Florens Tertullianus		cca 150/170–230 AD
Apuleius	Lucius Apuleius (Platonicus)		2nd c. AD
Commodianus	Commodianus		3rd c. AD
Arnobius	Arnobius		cca 300 AD
Lactantius	Lucius Caecilius Firmianus Lactantius		cca 300 AD
Marius Victorinus	Marius Victorinus	*Ars grammatica*	4th c. AD
St Jerome	Eusebius Sophronius Hieronymus		cca 340–420 AD
Prudentius	Aurelius Prudentius Clemens	*Liber Peristephanon*	348 – cca 405 AD
Paulinus Nolanus, St Paul of Nola	Pontius Meropius Anicius Paulinus	*Carmina*	353–431 AD
St Augustine	Aurelius Augustinus (Hipponensis)		354–430 AD
(unknown author(s))		*Historia Augusta*	4–5th c. AD?
Claudius Claudianus	Claudius Claudianus		ar. 400 AD
Claudianus Mamertus	Claudianus Mamertus	*De statu animae*	5th c. AD
Martianus Cappella	Martianus Minneius Felix Cappella	*De nuptiis Philologiae et Mercurii*	5th c. AD
Boethius	Anicius Manlius Severinus Boethius		480–524/525 AD

References

Adams, James N. (2003) *Bilingualism and the Latin Language.* Cambridge: Cambridge University Press.

Adams, James N. (2007) *The Regional Diversification of Latin 200 BC – AD 600.* Cambridge: Cambridge University Press.

Adams, James N. (2013) *Social Variation and the Latin Language.* Cambridge: Cambridge University Press.

Albright, Adam (2005), The morphological basis of paradigm leveling. In:, Laura J. Downing, Tracy A. Hall and Renate Raffelsiefen (eds) *Paradigms in phonological theory*. Oxford: Oxford University Press, 17–43.

Alderete, John D., Stefan A. Frisch (2006) Dissimilation in grammar and the lexicon. In: De Lacy (ed.) 379–398.

Allen, William S. (1973) *Accent and Rhythm.* Cambridge: Cambridge University Press.

Allen, William S. (1978²[1965]) *Vox Latina.* Cambridge: Cambridge University Press.

Álvarez Huerta, Olga (2005) Neutralisation consonantique en latin. In: Touratier (ed.) 135–155.

Anderson, Andrew R. (1909) Some questions of Plautine pronunciation. *Transactions of the American Philological Association* 40:99–107.

Anttila, Arto (1997) Deriving variation from grammar. In: Frans Hiskens et al. (eds) *Variation, Change and Phonological Theory.* Amsterdam–Philadelphia: John Benjamins, 35–68.

Aronoff, Mark (1994) *Morphology by Itself.* Cambridge, MA: MIT Press.

Bailey, Charles-James N. (1970) Towards specifying constraints on phonological metathesis. *Linguistic Inquiry* 1:347–349.

Bakkum, Gabriël C. L. M. (1989) Complex s-onsets in Latin and Italic. In: Marius Lavency, Dominique Longrée (eds) *Actes du Ve Colloque de Linguistique Latine.* Louvain-la-Neuve: Peeters, 17–27.

Baković, Eric (2011) Opacity and ordering. In: Goldsmith et al. (eds) 40–67.

Baldi, Philip (1994) Some thoughts on Latin rhotacism. *General Linguistics* 34:209–215.

Baldi, Philip (2002) *The Foundations of Latin.* Berlin–New York: Gruyter.

Ballester, Xavério (1996) *Fonemática del Latín Clásico. Consonantismo. Monografías de filología latina*. [Zaragoza:] Departamento de Ciencias de la Antigüedad, Universidad de Zaragoza.

Bendor-Samuel, John T. (1960) Some problems of segmentation in the phonological analysis of Terena. *Word* 16:348–355.

Benua, Laura (1995) Identity effects in morphological truncation. In: Jill Beckman, Suzanne Urbanczyk, Laura Walsh (eds) *Papers in Optimality Theory.* Amherst, MA: University of Massachusetts Graduate Linguistic Student Association.

Bermúdez-Otero, Ricardo (2006), Diachronic phonology. In: de Lacy (ed.) 497–518.

Bermúdez-Otero, Ricardo, Graeme Trousdale (2012) Cycles and continua: on unidirectionality and gradualness in language change. In: Terttu Nevalainen, Elizabeth C. Traugott (eds) *The Oxford Handbook of the History of English*. New York: Oxford University Press, 691–720.

Biville, Frédérique (1994) Existait-il une diphthongue *ui* en latin? In: Herman József (ed.) *Linguistic Studies on Latin.* Amsterdam: Benjamins, 3–18.

Blevins, Juliette (1995) The sylable. In Goldsmith (ed.) 206–244.

Boersma, Paul (1998) *Functional Phonology.* The Hague: Holland Academic Graphics.

Boldrini, Sandro (2004) *Fondamenti di prosodia e metrica latina*. Roma: Carocci.

Booij, Geert (1995) *The Phonology of Dutch.* Oxford: Oxford University Press.

Brandenstein, Wilhelm (1951) Kurze Phonologie des Lateinischen. Appendix to Franz Althelm's *Geschichte der lateinischen Sprache*. Frankfurt am Main: Klostermann.

Buck, Carl Darling (1899) Notes on Latin orthography. *The Classical Review* 13:116–9, 156–167.

Burton, Sir Richard Francis (1894) Translation of C. Valerius Catullus' *Carmina*. Private edition.

Butler, Harold E. (1912) Translation of Propertius' *Elegies*. Loeb Classical Library, London: Heinemann.

Butler, Harold E. (1920) *Quintilian. With an English Translation*. Cambridge, MA: Harvard University Press; London: Heinemann.

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.

CIL = *Corpus inscriptionum latinarum* (1862–) various editors. Leipzig and Berlin.

Clackson, James (2007) *Indo-European Linguistics. An Introduction*. Cambridge: Cambridge University Press.

Clackson, James (2011) The forms of Latin: Inflectional morphology. In: James Clackson (ed.) *A Companion to the Latin Language*. Oxford: Wiley–Blackwell, 105–117.

Clackson, James, Geoffrey Horrocks (2007) *The Blackwell History of the Latin Language*. Oxford: Blackwell.

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

Clements, George N. (1990) The role of the sonority cycle in core syllabification. In: John Kingston, Mary E. Beckman (eds) *Papers in Laboratory Phonology I*. Cambridge: Cambridge University Press, 283–333.

Clements, George N. (2009) Does sonority have a phonetic basis? In: Eric Raimy, Charles A. Cairns (eds) *Contemporary Views on Architecture and Representation in Phonology*. Cambridge, MA: MIT Press, 165–175.

Clements, George N., Elizabeth Hume (1995) The internal organization of speech sounds. In: Goldsmith (ed.) 245–306.

Clements, George N., S. Jay Keyser (1983) *CV Phonology: A Generative Theory of Syllable Structure*. Cambridge, MA: MIT Press.

Cole, Jennifer (1995) The cycle in phonology. In: John Goldsmith (ed.) 70–113.

Collinge, Neville E. (1985) *The Laws of Indo-European*. Amsterdam: John Benjamins.

Corte, Francesco Della (ed. 1984–1991) *Enciclopedia Virgiliana* 5 vols. Rome: Istituto della Enciclopedia Italiana.

Côté, Marie-Hélène (2000) *Consonant Cluster Phonotactics: A Perceptual Approach*. PhD Thesis, Massachusetts Institute of Technology.

Cser, András (1999) Diphthongs in the syllable structure of Latin. *Glotta* 75:172–193.

Cser, András (2003) *The Typology and Modelling of Obstruent Lenition and Fortition Processes*. Budapest: Akadémiai.

Cser, András (2009a) *The Phonotactics of Classical Latin Consonants*. Habilitation Dissertation, Pázmány Péter Catholic University.

Cser, András (2009b) The history of perfective reduplication and stem-initial patterns. *Acta Antiqua Academiae Scientiarum Hungaricae* 49:107–115.

Cser, András (2010a) The Latin *-alis/aris* allomorphy revisited. In: Franz Rainer et al. (eds) *Variation and Change in Morphology: Selected papers from the 13th International Morphology Meeting*. Amsterdam: John Benjamins, 33–52.

Cser, András (2011) The floating C-Place node in Latin. *Journal of Linguistics* 47:65–85.

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

Cser, András (2012b) Resyllabification and metre: the issue of *s impurum* revisited. *Acta Antiqua Academiae Scientiarum Hungaricae* 52:363–373.
Cser, András (2013) Segmental identity and the issue of complex segments. *Acta Linguistica* 60:247–264.
Cser, András (2013) The nature of phonological conditioning in Latin inflectional allomorphy. *Acta Linguistica Hungarica* 62:1–35.
Davidson, Joseph (1813) Translation of the *Epistles* of Ovid. London: Nunn.
de Lacy, Paul (ed. 2006) *The Cambridge Handbook of Phonology.* Cambridge: Cambridge University Press.
de Lacy, Paul (2006) *Markedness: Reduction and Preservation in Phonology.* Cambridge: Cambridge University Press.
Dennison, Walter (1906) Syllabification in Latin inscriptions. *Classical Philology* 1:47–68.
Deroy, Louis (1980) La prononciation du graphème ⟨AE⟩ en latin. *Revue de philologie, de littérature et d'histoire anciennes.* III. Série 54 (106) 209–225.
Devine, Andrew M., Laurence D. Stephens (1977) *Two Studies in Latin Phonology*. Saratoga, CA: Anma Libri.
Devine, Andrew M., Laurence D. Stephens (1994) *The Prosody of Greek Speech.* Oxford: Oxford University Press.
Dressler, Wolfgang (1971) An alleged case of non-chronological rule insertion. *Linguistic Inquiry* 2:597–599.
Duff, James (1927) Translation of *Punica* by Silius Italicus. Cambridge, MA: Harvard University Press.
Durand, Jacques (1990) *Generative and Non-Linear Phonology*. New York: Longman.
Eichner, Heiner (1992) Indogermanische Phonemsystem und lateinische Lautgeschichte. In: Panagl, Krisch (eds) 55–79.
Embick, David (2010) Localism versus globalism in morphology and phonology. Cambridge, MA: MIT Press.
Emonds, Joseph Embley (2014) The phonological basis of Latin case patterns. *Topics in Linguistics* 14 (no pagination; DOI: 10.2478/topling-2014-0011).
Emonds, Joseph Embley, Phillip Spaelti (2005) Fully distributing morphology: The phonology and syntax of Latin case inflections. *Theoretical and Applied Linguistics at Kobe Shoin* 8:1–20.
Fabb, Nigel, Morris Halle (2008) *Meter in Poetry.* Cambridge: Cambridge University Press.
Flobert, Pierre (1990) Le témoignage épigraphique des apices et des I longae sur les quantités vocalique en latin impérial. In: Gualtiero Calboli (ed.) *Latin vulgaire, latin tardif II*. Tübingen: Niemeyer, 101–110.
García González, Juan José (1996) Asimilación de prefijos en inscripciones latinas. In: Alfred Bammesberger, Friedrich Heberlein (eds) *Akten des VIII. Internationalen Kolloquiums zur Lateinischen Linguistik*. Heidelberg: Winter, 94–107.
Gess, Randall (2004) Phonetics, phonology and phonological change in OT: Another look at the reduction of three-consonant sequences in Late Latin. *Probus* 16:21–41.
Godel, Robert (1953) Les semi-voyelles en latin. *Studia Linguistica* 7:90–114.
Goldsmith, John A. (1990) *Autosegmental and Metrical Phonology.* Oxford and Cambridge, MA: Blackwell.
Goldsmith, John A. (ed. 1995) *The Handbook of Phonological Theory.* Oxford: Blackwell.
Goldsmith, John, Jason Riggle, Alan C. L. Yu (eds, 2011) *The Handbook of Phonological Theory*, 2nd edition. Oxford: Wiley–Blackwell
Gordon, Matthew (2002) A phonetically driven account of syllable weight. *Language* 78:51–80.

Gordon, Matthew (2004) Syllable Weight. In: Bruce Hayes, Robert Kirchner, Donca Steriade (eds) *Phonetically Based Phonology.* Cambridge: Cambridge University Press, 277–312.

Gordon, Matthew (2006) *Syllable Weight. Phonetics, Phonology, Typology.* New York–Oxford: Routledge.

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

Gorman, Kyle (to appear), Exceptions to rhotacism (Proceedings of The Forty-Eighth Annual Conference of the Chicago Linguistic Society, University of Chicago, Illinois, ling.auf.net/lingbuzz/001643/current.pdf, accessed 16 March 2015).

Greenough, James B. (1900) *Bucolics, Aeneid*, and *Georgics* of Vergil. Edition and translation. Boston: Ginn.

Gruber, James F. (2006) The prosodic domain of roots: Output oriented faithfulness in Classical Latin. *Georgetown University Working Papers in Theoretical Linguistics* 6:127–165.

Gussenhoven, Carlos (2007) A vowel height split explained: Compensatory Listening and Speaker Control. In Jennifer Cole, José I. Hualde (eds) *Laboratory Phonology* 9. Berlin–New York: Mouton de Gruyter. 145–172.

Gussmann, Edmund (2002) *Phonology: Analysis and Theory.* Cambridge: Cambridge University Press.

Hall, Tracy Allan (2006) Segmental features. In: de Lacy (ed.), 311–334.

Halporn, James W., Martin Ostwald, Thomas G. Rosenmeyer (1963) *The Meters of Greek and Latin Poetry.* London: Methuen.

Harris, James W. (1983) *Syllable Structure and Stress in Spanish: A Nonlinear Analysis*, Cambridge, MA: MIT Press.

Harris, John (1994) *English Sound Structure.* Oxford: Blackwell.

Herman, József (1996) The End of the History of Latin. *Romance Philology* 49:364–382.

Herman, József (2000) *Vulgar Latin.* Translated by R. Wright. University Park, PA: Pennsylvania University Press.

Hoenigswald, Henry M. (1949a) Antevocalic u-Diphthongs in Latin. *Language* 25:392–394.

Hoenigswald, Henry M. (1949b) A Note on Latin Prosody: Initial s impure after short vowel. *Transactions and Proceedings of the American Philological Association* 80:271–280.

Hoenigswald, Henry M. (1992) Silbengrenze und Vokalschwächung im Lateinischen. In: Panagl, Krisch (eds) 81–85.

Hooper, Joan B. (1976) *An Introduction to Natural Generative Phonology*. New York: Academic Press.

Hurch, Bernard (1991) On adjacency and related concepts. In: Pier Marco Bertinetto, Michael Kenstowicz, Michele Loporcaro (eds) *Certamen Phonologicum II.* Torino: Rosenberg & Sellier, 43–63.

Husband, Richard Wellington (1910) The Diphthong -ui in Latin. *Transactions and Proceedings of the American Philological Association* 41:19–23.

Inkelas, Sharon (2011) The Interaction Between Morphology and Phonology. In: Goldsmith et al. (eds) 103–140.

Itô, Junko, Armin Mester (1986) The phonology of voicing in Japanese: theoretical consequences for morphological accessibility. *Linguistic Inquiry* 17:49–73.

Itô, Junko, Armin Mester (1993) Licensed segments and safe paths. *Canadian Journal of Linguistics* 38:197–213.

Jacobs, Haike (1992) The interaction between the evolution of syllable structure and foot structure in the evolution from Classical Latin to Old French. In: Christiane Laeufer

and Terrell Morgan (eds) *Theoretical Analyses in Romance Linguistics*. Amsterdam: Benjamins, 55–79.

Jany, Carmen, Matthew Gordon, Carlos M. Nash, Nobutaka Takara (2007) How universal is the sonority hierarchy? A cross-linguistic acoustic study. In: *Proceedings of the 16th International Congress of Phonetic Sciences*, Saarbrücken, Germany, 6–10 August, 2007, 1401–04.

Jasanoff, Jay H. (2004), *Plus ça change…*: Lachmann's Law in Latin. In: John H. W. Penney (ed.) *Indo-European perspectives — studies in honour of Anna Morpurgo Davies*, Oxford: Oxford University Press, 405–416.

Juret, (Abel-)Claude (1913) *Dominance et résistance dans la phonétique latine.* Heidelberg: Winter.

Juret, Abel-Claude (1921) *Manuel de phonétique latine.* Paris: Hachette.

Keil, Henricus (ed. 1855–78) *Grammatici Latini.* Leipzig: Teubner.

Kenstowicz, Michael (1994) *Phonology in Generative Grammar*. Oxford: Basil Blackwell.

Kenstowicz, Michael (1997) Quality-sensitive stress. *Rivista di Linguistica* 9:157–187.

Kent, Roland G. (1912) Dissimilative Writings for ii and iii in Latin. *Transactions and Proceedings of the American Philological Association* 43:35–56.

Kent, Roland G. (1932) *The Sounds of Latin. A Descriptive and Historical Phonology.* Linguistic Society of America (=*Language* 8:11–216, *Language Monograph* 12).

Kent, Roland G. (1936) Assimilation and Dissimilation. *Language* 12:245–258.

Kiparsky, Paul (1982a) From cyclic phonology to lexical phonology. In: Harry van der Hulst and Norval Smith (eds) *The Structure of Phonological Representations* vol 1. Dordrecht: Foris, 131–175.

Kiparsky, Paul (1982b) Lexical phonology and morphology. In: In-Seok Yang (ed.) *Linguistics in the Morning Calm.* Seoul: Hanshin, 3–91.

Kiparsky, Paul (to appear) Paradigm effects and opacity. Stanford, CA: CSLI.

Kiss, Zoltán (2007) *The Phonetics–Phonology Interface.* PhD Dissertation, Eötvös Loránd University.

Kornai, András (1994) *On Hungarian Morphology.* Budapest: Hungarian Academy of Sciences.

Labrune, Laurence (2012) *The Phonology of Japanese*. Oxford: Oxford University Press.

Lehmann, Winfred P. (1994) Gothic and the Reconstruction of Proto-Germanic. In: Ekkehard König, Johan van der Auwera (eds) *The Germanic Languages.* New York–London: Routledge, 19–37.

Lehmann, Christian (2005) La structure de la syllabe latine. In: Touratier (ed.) 157–206.

Leonard, William E. (1921) *Lucretius: On the nature of things.* New York: E. P. Dutton.

Leumann, Manu (1917) *Die lateinischen Adjektiva auf -lis.* Strassburg: Trübner.

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

Levin, Juliette (1985) *A metrical theory of syllabicity*. PhD dissertation, MIT.

Lindsay, William M. (1894) *The Latin Language: An Historical Account of Latin Sounds, Stems and Flexions.* Oxford: Clarendon.

Lodge, Ken (2009) *Fundamental Concepts in Phonology.* Edinburgh: Edinburgh University Press.

Lowenstamm, Jean (1981) On the maximal cluster approach to syllable structure. *Linguistic Inquiry* 12:575–604.

Maniet, Albert (1955) *L'évolution phonétique et les sons du latin ancien dans le cadre des langues indo-européennes.* Louvain–Paris: Nauwelaerts.

Mascaró, Joan (1976) *Catalan Phonology and the Phonological Cycle.* PhD dissertation, MIT.

Matthews, Peter H. (1974) *Morphology: An Introduction to the Theory of Word Structure.* Cambridge: Cambridge University Press.

McCarthy, John J. (1983) Consonantal Morphology in the Chaha Verb. In: Michael Barlow, Daniel Flickinger, Michael Wescoat (eds) *Proceedings of West Coast Conference on Formal Linguistics* 2. Stanford: Stanford Linguistics Department, 176–188.
McCarthy, John J. (2003) Comparative markedness. *Theoretical Linguistics* 29:1–51.
Meillet, Antoine (1928) *Esquisse d'une histoire de la langue latine.* Paris: Hachette.
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.
Mester, R. Armin (1994) The quantitative trochee in Latin. *Natural Language and Linguistic Theory* 12:1–61.
Miller, Brett (2012) Sonority and the larynx. In: Parker (ed.) 257–288.
Mohanan, Karuvannur Puthanveettil (1986) *The Theory of Lexical Phonology.* Dordrecht: Reidel.
Moralejo, José-Luis (1991) Vocalis ante vocalem: corripitur an distrahitur? In: Robert Coleman (ed.) *New Studies in Latin Linguistics.* Amsterdam–Philadelphia: John Benjamins, 35–45.
More, Brookes (1922) Translation of Ovid's *Metamorphoses*. Boston: Cornhill.
Morén, Bruce (2003) The Parallel Structures Model of Feature Geometry. In: Johanna Brugmann, Anastasia Riehl (eds) *Working Papers of the Cornell Phonetics Laboratory*, vol. 15. New York: Ithaca, 194–270.
Mozley, John H. (1928) *Statius. With an English translation.* London: Heinemann; New York: Putnam's.
Murray, Robert, Theo Vennemann (1983) Sound change and syllable structure in Germanic Phonology. *Language* 59:514–528.
Nevins, Andrew (2011) Phonologically conditioned allomorph selection. In: Oostendorp et al. (eds) 2357–2382.
Niedermann, Max (1953[3][1906]) *Phonétique historique du latin.* Paris: Klinksieck.
Odden, David (2005) *Introducing Phonology*. Cambridge: Cambridge University Press.
Oniga, Renato (2014) *Latin: A linguistic introduction.* Oxford: Oxford University Press.
Oostendorp, Marc van, Colin J. Ewen, Elizabeth Hume, Keren Rice (eds) *The Blackwell Companion to Phonology.* Malden, MA–Oxford: Wiley-Blackwell.
Padgett, Jaye (2008) Glides, vowels, and features. *Lingua* 118:1841–2030.
Palmer, Leonard R. (1954) *The Latin Language.* London: Faber and Faber.
Panagl, Oswald, Thomas Krisch (eds 1992) *Latein und Indogermanisch. Akten des Kollokviums der Indogermanischen Gesellschaft, Salzburg 23.–26. September, 1986.* Innsbruck: Institut für Sprachwissenschaft.
Parker, Stephen George (2002) *Quantifying the Sonority Hierarchy.* PhD dissertation, University of Massachusetts Amherst.
Parker, Steve (2003) The psychological reality of sonority in English. *Word* 54:359–399.
Parker, Steve (2008) Sound level protrusions as physical correlates of sonority. *Journal of Phonetics* 36:55–90.
Parker, Steve (2011) Sonority. In: Oostendorp et al. (eds) 1160–1184.
Parker, Steve (ed. 2012) *The Sonority Controversy.* Berlin: De Gruyter.
Parsons, Jed (1999) A New Approach to Saturnian Verse and Its Relation to Latin Prosody. *Transactions of the American Philological Association* 129:117–137.
Paucker, Carl (1885) Materialien zur lateinischen Wörterbildungsgescgichte V. Die Nomina derivata auf alis (aris) und arius. *Zeitschrift für Vergleichende Sprachforschung* 27:113–156.
Piggott, Glyne L. (1999) At the right edge of words. *Linguistic Review* 16:143–85.

Pillinger, O. Stephen (1983) Latin degemination: an autosegmental approach. In: Harm Pinkster (ed.) *Latin Linguistics and Linguistic Theory.* Amsterdam–Philadelphia: John Benjamins, 243–260.

Prinz, Otto (1949–50) Zur Präfixassimilation im antiken und im frühmittelalterlichen latein. *Archivum Latinitatis Mediae Aetatis* 21:87–115.

Prinz, Otto (1953) Zur Präfixassimilation im antiken und im frühmittelalterlichen latein. *Archivum Latinitatis Mediae Aetatis* 23:35–60.

Pulgram, Ernst (1970) *Syllable, Word, Nexus, Cursus.* The Hague: Mouton.

Pulgram, Ernst (1975) *Latin-Romance Phonology: Prosodics and Metrics.* München: Wilhelm Fink.

Ramsay, George Gilbert (1918) Translation of Juvenal and Persius. Loeb Classical Library, London: Heinemann.

Raven, David S. (1965) *Latin Metre: An Introduction*. London: Faber and Faber.

Reynolds, Leighton Durham, Nigel Guy Wilson (1974) *Scribes and Scholars: A Guide to the Transmission of Greek and Latin Literature*. Oxford: Clarendon.

Ribbeck, Otto (ed. 1894) *Vergilii opera.* Leipzig: Teubner.

Ridley, Sir Edward (1905) Translation of *Pharsalia* by M. Annaeus Lucanus. London: Longmans, Green, and Co.

Ringe, Don (2006) *A Linguistic History of English. Volume I: From Proto-Indo-European to Proto-Germanic*. Oxford: Oxford University Press.

Rix, Helmut, Martin Kümmel, Thomas Zehnder, Reiner Lipp, Brigitte Schirmer (2001² [1998]) *Lexikon der indogermanischenVerben: die Wurzeln und ihre Primärstammbildungen*. Wiesbaden: Reichert.

Roberts, Philip J. (2009) *An Optimality-Theoretic Analysis of Lachmann's Law.* MPhil Thesis, University of Oxford.

Roberts, Philip J. (2012) Latin rhotacism: A case study in the life cycle of phonological processes. *Transactions of the Philological Society* 110:80–93.

Roca, Iggy (1994) *Generative Phonology*. London: Routledge.

Rosén, Hanna (1999) *Latine loqui. Trends and Directions in the Crystallisation of Classical Latin.* München: Wilhelm Fink.

Safarewicz, Jan (1974) *Linguistic Studies.* The Hague: Mouton.

Saussure, Ferdinand de (1916) *Cours de linguistique générale*. Lausanne and Paris: Payot.

Seebold, Elmar (1967) Die Vertretung idg. *gʷh* im Germanischen. *Zeitschrift für Vergleichende Sprachwissenschaft* 81:104–133.

Selkirk, Elisabeth (1984) On the major class features and syllable theory. In: Mark Aronoff, Richard T. Oehrle (eds) *Language Sound Structure.* Cambridge, MA: MIT Press, 107–136.

Sen, Ranjan (2006) Vowel Weakening Before *Muta cum Liquidā* Sequences in Latin: A Problem of Syllabification? *Oxford University Working Papers in Linguistics, Philology and Phonetics* 11:143–161.

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? Talk given at Symposium on Historical Phonology, Edinburgh, 13–14 January 2014.

Sen, Ranjan (2015) *Syllable and Segment in Latin*. Oxford: Oxford University Press.

Seo, Misun (2011) Syllable contact. In: Oostendorp et al. (eds) 1245–1262.

Shackleton Bailey, David Roy (ed. 1997) *M. Annaei Lucani De bello civili libri X.* Stuttgart: Teubner.

Sihler, Andrew L. (1995) *New Comparative Grammar of Greek and Latin*. Oxford: Oxford University Press.

Smart, Christopher, Theodore Alois Buckley (1863) Translation of the works of Horace. New York: Harper & Brothers.

Sommer, Ferdinand (1902) *Handbuch der lateinischen Laut- und Formenlehre: eine Einführung in das sprachwissenschaftliche Studium des Lateins.* Heidelberg: Winter.

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

Stausland Johnsen, Sverre (2009) The Development of Voiced Labiovelars in Germanic. In: Stephanie W. Jamison, H. Craig Melchert, Brent Vine (eds) *Proceedings of the 20th Annual UCLA Indo-European Conference.* Bremen: Hempen, 197–211.

Stephens, Laurence (1978) Universals of Consonant Clusters and Latin GN-. *Indogermanische Forschungen* 83:290–300.

Stephens, Laurence (1980) Latin *gn-:* further considerations. *Indogermanische Forschungen* 85:165–175.

Steriade, Donca (1982) Greek prosodies and the nature of syllabification. PhD dissertation, MIT. Published New York: Garland Press, 1990.

Steriade, Donca (1984) Glides and Vowels in Romanian. *Papers from the Berkeley Linguistics Society* 10:47–64.

Steriade, Donca (1987) Redundant Values. In: Anna Bosch, Barbara Need, Eric Schiller (eds) *Papers from the 23rd Annual Regional Meeting of the Chicago Linguistic Society. Part two: Parasession of Autosegmental and Metrical Phonology.* Chicago: Chicago Linguistic Society, 339–362.

Steriade, Donca (1988) Gemination and the Proto-Romance syllable shift. In: David Birdsong and Jean–Pierre Montreuil (eds) *Advances in Romance Linguistics.* Dordrecht: Foris, 371–409.

Steriade, Donca (1995) Underspecification and Markedness. In: Goldsmith (ed.) 114–174.

Steriade, Donca (1999) Alternatives to syllable-based accounts of consonantal phonotactics. In Osamu Fujimura, Brian D. Joseph, Bohumil Palek (eds) *Proceedings of the 1998 Linguistics and Phonetics Conference.* Prague: Karolinum, 205–242.

Steriade, Donca (to appear) The cycle without containment: Latin perfect stems.

Stuart-Smith, Jane (2004) *Phonetics and Philology. Sound Change in Italic.* Oxford: Oxford University Press.

Sturtevant, Edgar H. (1912) The Pronunciation of cui and huic. *Transactions and Proceedings of the American Philological Association* 43:57–66.

Sturtevant, Edgar H. (1916) The Monophthongization of Latin ae. *Transactions and Proceedings of the American Philological Association* 47:107–116.

Sturtevant, Edgar H. (1920) *The Pronunciation of Greek and Latin.* Chicago: Chicago University Press.

Sturtevant, Edgar H. (1939) The pronunciation of Latin qu and gu. *Language* 15:221–223.

Sturtevant, Edgar H., Roland G. Kent (1915) Elision and Hiatus in Latin Prose and Verse. *Transactions and Proceedings of the American Philological Association* 46:129–155.

Szemerényi Oswald (1980) Latin verbs in *-uō -uere.* In: Herbert J. Izzo (ed.) *Italic and Romance: Linguistic studies in honour of Ernst Pulgram.* Amstedam: John Benjamins, 9–32.

Szemerényi Oswald (1990[4]) *Einführung in die vergleichende Sprachwissenschaft.* Darmstadt: Wissenschaftliche Buchgesellschaft.

Szigetvári, Péter (2008) What and where?, In: Joaquim Brandão de Carvalho, Tobias Scheer and Philippe Ségéral (eds) *Lenition and Fortition.* Berlin–New York: Mouton de Gruyter, 93–129.

Touratier, Christian (2005) Système des consonnes. In: Touratier (ed.) 61–134.

Touratier, Christian (ed. 2005) *Essais de phonologie latine.* Aix-en-Provence: Université de Provence.

Trubetzkoy, Nikolai S. (1969) *Principles of Phonology.* Translated by Chr. A. M. Baltaxe. Berkeley and Los Angeles: University of California Press.
Tucker, Thomas George (1922) On a Latin Phonetic Rule. *The Classical Quarterly* 16:102–103.
Uffmann, Christian (2007) *Vowel epenthesis in loanword adaptation*. Tübingen: Max Niemeyer.
Vaan, Michiel de (2008) *Etymological dictionary of Latin and the other Italic languages.* Leiden: Brill.
Väänänen, Veikko (1981[3]) *Introduction au latin vulgaire.* Paris: Klincksieck.
Vainio, Raija (1999) *Latinitas and Barbarismus according to the Roman Grammarians*. Turku: Department of Classics, University of Turku.
Vennemann, Theo (1988) *Preference Laws for Syllable Structureand the Explanation of Sound Change: With Special Reference to German, Germanic, Italian and Latin.* Berlin: Mouton de Gruyter.
Walde, Alois, Johann B. Hofmann (1956) *Lateinisches etymologisches Wörterbuch.* Heidelberg: Winter.
Ward, Ralph L. (1951) Stop Plus Liquid and the Position of the Latin Accent. *Language* 27:477–484.
Watbled, Jean-Philippe (2005) Théories phonologiques et questions de phonologie latine. In: Touratier (ed.) 25–57.
Watkins, Calvert (1970) A case of non-chronological rule insertion. *Linguistic Inquiry* 1:525–7.
Weiss, Michael (2009) *Outline of the Historical and Comparative Grammar of Latin.* Ann Arbor: Beech Stave Press.
West, Martin Litchfield (1982) *Greek Meter*. Oxford: Oxford University Press.
Wiese, Bernd (2013) On Latin nominal inflection: the form–function relationship. *Morphology* 23:179–200.
Williams, Theodore C. (1910) Translation of Vergil's *Aeneid*. Boston: Houghton Mifflin.
Wright, Roger H. P. (2002) *A Sociophilological Study of Late Latin.* Turnhout: Brepols.
Yip, Moira (1991) Coronals, consonant clusters and the Coda Condition. In: Carole Paradis and Jean-François Prunet (eds) *The Special Status of Coronals: internal and External Evidence.* San Diego, CA: Academic Press, 61–78.
Zec, Draga (2007) The syllable. In de Lacy (ed.) 161–194.
Zirin, Andrew R. (1970) *The Phonological Basis of Latin Prosody.* The Hague: Mouton.
Zoll, Cheryl Cydney (1996) *Parsing Below the Segment in a Constraint Based Framework*. PhD dissertation, University of California, Berkeley.

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