Osthoff's Law in Latin

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Abstract

The sound change known as Osthoff's Law, shortening a long vowel before a resonant-consonant cluster, was first explicitly described to have applied in the prehistory of Greek by Osthoff (1884). Since then, the existence of a similar sound change in Latin has been controversial in the literature, with claimed examples such as **vēntus* > *ventus* 'wind'. At one end, Simkin (2004) argues that Osthoff's Law never took place in Latin; at the other, Weiss (2009) claims at least three independent rounds of Osthoff's Law in the history of the Italic branch. I summarize the synchronic facts about pre-cluster vowel length in classical Latin using a comprehensive survey of the Latin lexicon, with a historical explanation for the vowel length in every form containing a cluster. I argue that Osthoff's Law happened in Latin (contra Simkin), but only once (contra Weiss), around the 2nd century BCE.

Keywords

Latin – Sabellic – Osthoff's Law – phonology – relative chronology

1 Introduction

In Osthoff (1881, 1884), Hermann Osthoff proposed the sound change known as Osthoff's Law (abbreviated as 'OstL'):

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Jeder lange vocal ist in der stellung vor sonorlaut [...] und einem weiteren consonant innerhalb desselben wortes urgriechisch verkürzt worden. [Every long vowel is shortened in the position before a resonant and another consonant within the same Proto-Greek word.]

OSTHOFF 1884: 84–85; my translation

Osthoff originally proposed OstL for Greek, but the change has since been argued to have taken place in Germanic, Celtic, Balto-Slavic, and Latin. This paper is the first work dedicated specifically to the question of OstL in Latin: the evidence for it, and when in the history of Latin it was active. My goal is to do this by summarizing the synchronic facts about pre-cluster vowel length with a survey of the whole Latin lexicon, together with a historical discussion of each form and an explanation for the length of each vowel. I conclude that OstL did apply in Latin, some time in or after the 2nd century BCE.

In section 1, I discuss the background to OstL elsewhere in Indo-European and in Latin. In section 2, I give all the data relevant to the question of whether or not OstL applied in Latin, consisting of etymologies that appear to have undergone OstL and those that contain surface sequences of long vowels followed by *RC* clusters (i.e. synchronic ‘counterexamples’ to OstL). I conclude the positive examples give evidence for OstL applying in Latin in much the same environments as Osthoff concluded for Greek. In section 3.1, I discuss some further exceptions, and the sound changes that need to be ordered later than OstL to explain them; in section 3.2, I give a chronology of OstL relative to other Latin sound changes. Section 4 concludes the paper.

1.1 *OstL in Indo-European*

As Sihler (1995) comments, ‘Osthoff’s Law’ is properly the name for the Greek sound change proposed by Osthoff (1881) in the quote above, but here I use it to refer to similar sound changes in Latin and other Indo-European branches. Osthoff’s sound law started with his (1879) etymology of the dative plural ending *-ois*; the vowels of both Sanskrit *-ais* and Lithuanian *-ais* must reflect a PIE instrumental plural ending with a long vowel **-ōis*, and so Greek *-ois* (and not **-ōis*) comes from a shortening of long vowels in some position in the word (Collinge, 1985). In Osthoff (1881), he proposed that this shortening applied to all long vowels before *RC* clusters, as in the Greek *Zeús* next to Sanskrit *dyáus* with the reflex of a long **ē*; Simkin (2004) points out that this converges on the idea Schmidt (1877) had used to explain the short vowels in forms like *éstan(t)* ‘they stood’ < **e-stā-nt*.

‘Before *RC* clusters’ is a pre-theoretic way of describing this environment, and (as a phonological rule) seems to operate without reference to syllable

structure; it corresponds to “before coda resonants in non-final syllables and coda resonant-consonant sequences in final syllables”, assuming the grammar syllabifies *RC* sequences with the resonant in a coda. Byrd (2015) assumes a special exemption for final syllables, citing Ringe (2008) as taking word-final resonants in ancient IE languages to be extrametrical; this would mean OstL does apply to all coda resonants. Yates (2015) gives a detailed description within Optimality Theory. There are some shortening rules before single word-final resonants, e.g. the *-m#*, *-r#* and *-l#* shortenings listed by Weiss (2009) for Latin, but these must be separate changes to OstL: they have their own idiosyncratic restrictions (the shortening before *-l#* only applies to polysyllables, for example).

As well as in Greek, OstL has been claimed to apply in Celtic (e.g. Osthoff 1881; McCone 1996), Balto-Slavic (e.g. Osthoff 1879), Germanic (e.g. Ringe 2008), and Latin (e.g. Parker 1986, Weiss 2009). As we've commented with Sanskrit *-ais* < **-ōis*, OstL did not apply in Indo-Iranian, and it seems not to have applied in Tocharian either (Ringe 2008; see later discussion of *ventus*). Trivially, then, we can't treat OstL as a PIE process. I'll argue later, in section 3, that the application of OstL is fed by several late sound changes acting specifically within Latin: this means the Latin version of OstL is independent of similar-looking laws in other branches, and that we can give specific detail of when in the history of Latin OstL took place.

The existence of OstL at all in Latin isn't universally accepted: Simkin (2004: 49) comments in passing that “the whole case for OstL in Latin” is “not indisputable”. At the other end of the scale, Weiss (2009) argues for three separate rounds of OstL in Latin, based on the etymologies he takes to involve OstL combined with the relative chronology of Latin sound changes argued for by Parker (1986); I'll discuss Weiss' case in section 3. I take the general position that, by Ockham's razor, we should prefer a single round of OstL to three separate rounds; when possible, we should prefer analyses that don't involve proposing new sound changes. My conclusion in this case will be that this more parsimonious analysis is in fact possible, and so we can conclude that OstL applied once in the history of Latin, at some point in the 2nd century BCE or later.

2 Data

In this section, I give all the evidence I've been able to find that bears on the existence, and dating, of OstL. These etymologies come in two categories: examples where OstL applies, and apparent counterexamples that make OstL

historically ‘opaque’ in a counterfeeding sense. The data themselves come from Lewis and Short’s (1879) dictionary, online via the Perseus Digital Library; and from the Thesaurus Linguae Latinae (TLL), online via de Gruyter. Vowel length isn’t often marked in written classical Latin, and potential OstL environments scan heavy in verse, whether or not the vowel is long, due to the coda resonant. Much of our evidence depends on the reliability of transcriptions using either a double vowel ⟨*vv*⟩ or an apex ⟨*Ṽ*⟩ (or, in the case of *i*, the ‘*i longa*’ ⟨*I*⟩). As discussed by Flobert (1990), in the imperial period, the apex and *i longa* came to be adopted for spelling features other than vowel length: the apex for heavy or accented syllables and for word boundaries, and the *i longa* for /i/ in initial position. The fact that not all long vowels are marked as long, and that not all apparent length marking reflects long vowels, means that we can’t be fully confident about the synchronic length of a vowel. The evidence for OstL, of course, depends on how accurate our guesses about length are; unless otherwise stated, vowel lengths are taken from TLL.

I’ll also use later sound changes, in particular Romance reflexes, as evidence for length. In the development of the vowel system into Vulgar Latin (Alkire and Rosen 2010), the language loses vowel length, but indirectly distinguishes original long vowels from short vowels by vowel quality:

- long *ī, ū* stay as *i, u*;
- short *ī, ū* merge with long *ē, ō* as high-mid *e, o*;
- short *ē, ō* become low-mid *ɛ, ɔ*;
- short and long *ā* and *ā* merge as *a*.

In particular, we can distinguish short high and mid vowels from their long counterparts by the height of the Romance reflex.

2.1 *Potential sources of long vowels*

To treat an etymology as an example of OstL, we need evidence that the form contained a long vowel at some earlier stage; so one issue to be dealt with before discussing particular etymologies is the question of where a long vowel before a consonant cluster could in general come from. As we’ll see, there are a range of possible sources. An inherited long vowel could be an original lengthened-grade (as in **ōrbis*). In new inflectional or derivational forms, OstL contexts appear productively when a stem-final long vowel is followed by an affix beginning with a cluster, creating a sequence **V:RC* (as in **amā-nt* next to *amā-re*); or when a stem ending in a long vowel and a final resonant is followed by a consonant-initial affix, giving us **V:R-C* (as in **līn-teum* next to *līnum*). Within a form, the context for OstL could be produced from original **V:RVC*

by syncope (as in **sēnciput* < **sēmi-kaput*), or by monophthongization from **V₁V₂RC* (as in **ūncia* < **oin-kia*). These examples will be covered in more detail in section 2.2.

But a problematic category of etymologies consists of those where the (potential) long vowel comes from a laryngeal, in a context like **eHRC* or **_RHRC*.¹ In other environments, we'd expect an inherited sequence **eH* or **_RH* to give a long vowel **V:* (depending on the laryngeal) and **Rā* respectively (Weiss 2009: 97, 100). Naïvely, we might expect **V:RC* and **RāRC* in earlier Latin. The problem is that according to the standard picture of PIE syllabification (Schindler 1977), these forms should syllabify as **eH_RC* and **_RH_RC* in the parent language. When the intervocalic laryngeal deletes without lengthening, given that only coda laryngeals cause compensatory lengthening, we should ask what we'd expect to happen to the new sequences **e_RC* and **_R_RC*.

We can consider what the learner perceives at the time that laryngeals were deleted. In the case of an adult sequence [eH_RC], the new generation of learners lacking laryngeals is faced with what they perceive as a phonetic sequence [e_RC]—the question is how a learner analyses this [e_RC], which presumably is impossible according to the phonotactics of early Latin. One possibility is that the learner interprets the sequence as /eRC/, so the end result is a sound change **eHRC* > *eRC* with no intermediate **ē* stage; if this is true, etymologies that show short vowels from original **eHRC* aren't examples of OstL. This is the development described by Ringe (2008: 77) for *ventus*, ultimately following Kuryłowicz (1935). Alternatively, the learner might preserve the weight and phonetic duration of [e_RC], and interpret it as /ēRC/; if this is true, **eHRC* gives **ēRC* as we'd naïvely expect, and so these etymologies *do* involve OstL. I don't know of any way to distinguish between these options.²

From **_RHRC*, our task is easier. The vocalism in Latin *planta* < **plh₂-nt-* shows that **_h₂* must have given its usual long-vowel reflex as *lā*; otherwise, a short syllabic **_l* would give ***ol*, and a short syllabic **_n* would give ***en*. Suppose that **_RH* becomes **Rā* via an intermediate stage of a long syllabic resonant **_R:* (Sihler 1995: 101); *planta* is evidence that **_R_RC* is somehow analysed as **_R:RC*. The fact that learners seem here to be preserving the duration or weight of the syllable as a whole, rather than the length of the vowel, should count at least as weak evidence for the same treatment of **e_RC*; so tentatively, I will treat these

1 Thanks to an anonymous reviewer for raising this issue.

2 As Gene Buckley points out, another alternative is that the loss of laryngeals happens within a speaker's lifetime. The child acquires a sequence /eHRC/ that is synchronically syllabified as [eH_RC], but then gains an optional laryngeal deletion rule, which acts on /eHRC/ with compensatory lengthening to give [e:RC].

as examples of OstL. This won't affect the conclusion of the paper or the relative chronology I give in section 3.

2.2 Examples of OstL with etymologies

Here, I list candidate examples of OstL, together with discussion of possible alternative (non-OstL) explanations for the relevant data when appropriate. I start with examples from inflectional paradigms, where the phonological environment for OstL appears consistently in particular morphological categories, and then move on to examples from the etymologies of individual words.

2.2.1 Examples from morphology

The clearest examples from inflectional morphology are in the verbal system, and they mostly come from instances where an affix beginning with a cluster *RC* is added to a stem ending with a long vowel. Some of these are from the theme vowels defining the stem of each conjugation (Morwood 1999): the first conjugation *ā* (*amāre*) and the second conjugation *ē* (*docēre*). (The fourth conjugation theme vowel *ī*, as in *audīre*, is never immediately followed by a cluster.) We also have the long theme vowels of the present subjunctive—*ē* for the first conjugation and *ā* for the second, third, and fourth conjugations—the long *ā* of the imperfect subjunctive in *-bā-*, and the long *ī* of the perfect subjunctive in *-erī-* (from the PIE optative; Weiss 2009: 420).

There are three types of affix that create the environment for OstL to shorten stem-final long vowels:

- 3rd person plurals in *-nt(ur)*: *amant* 'they love', *docent* 'they teach', *amantur* 'they are loved', *ament* 'that they love', *amābant* 'they were loving', *amāverint* 'that they have loved'.
- Participles in *-nt-*: *amantis* 'of one who loves', *docentis* 'of one who teaches'.
- Gerunds and gerundives in *-nd-*: *amandus* 'needing to be loved', *docendus* 'needing to be taught', *amandō* 'by loving', *docendō* 'by teaching'.

Per OstL, we see shortening, so *amant* < **amānt* (next to *amāre*).³

3 An anonymous reviewer raises the question of how we know these vowels are short, given that, because long vowels aren't often marked, the absence of long vowel marking doesn't mean a vowel wasn't long. In this case, I've found *no* cases of long vowel marking in these environments in any verbal form, and these vowels are marked as short in all the traditional grammars, so it's unlikely they were long. For instances of 'short *a*' in particular lexical items, the lack of long vowel marking in our records is more plausibly down to coincidence, so those cases are less secure.

Sihler (1995: 77) points out that some of these environments were created within the history of Latin, given that the vowels are contractions of earlier **VjV* sequences: **laudājonti* 'they praise' > **laudānt* > *laudant*. Other first conjugation verbs—e.g. *novāre* < **new-eh₂*- (Weiss 2009: 400)—are from original athematic formations, which would have produced long vowels early on.

Aside from these three environments in which the theme vowel is shortened, one other context of inflectional morphology is claimed to undergo OstL: the dative plural in *-īs*, supposedly from **-ōis*, in both the first and second declensions (Sihler 1995: 263; Weiss 2009: 207, 236). For the *o*-stems, Sanskrit and Avestan instrumental plurals in *-āis* and *-āiš* respectively attest **-ōis* with a long vowel (Simkin 2004: 35); and the fact that Greek has a dative plural *-ois* < **-ōis* was Osthoff's original motivation for proposing OstL in Greek. But in both Old Latin and Oscan (Sihler 1995: 263), we see inscriptions with dative plurals in *-ois*, which in Latin regularly became *-īs*; for the change **oi* > *ī* in final syllables, cf. the nominative plural **-oi* > *-ī*. If this Italic **-ois* is from **-ōis*, we have an instance of OstL parallel to the one in Greek. Although it's possible that ⟨*ois*⟩ is spelling *-ōis* in Latin, it seems unlikely that there was a direct sound change **ōi* > *ī*; the dative singular *-ō* has to come from **-ōi* (cf. the Greek dative singular in *-ōi*), as still survives in the Duenos inscription (Weiss 2009: 222). The Oscan spelling ⟨*ois*⟩ has to reflect **-ois*, given that **ō* > *u* is spelt ⟨*u*⟩.⁴ The traditional explanation for this difference between the reflexes of **-ōi* and **-ōis* is that the latter was shortened by OstL.

In the first declension—*a*-stems—Weiss (2009: 236) argues we have a similar development. The dative plural **-īs* is attested as *-eis* in Plautus and appears as *-ais* in Oscan, so Weiss proposes an innovated Italic form **-āis* by analogy with **-ōis*, which then shortens to **-ais* by OstL and then undergoes weakening to **-eis* > *-īs* within Latin. Weiss also mentions the dedication DEVAS CORNISCAS SACRUM (ILLRP 69), with apparent dative plurals in *-ās*, as evidence that **-āis* sporadically became **-ās* rather than undergoing OstL.

2.2.2 Examples from individual etymologies

- *ventus* 'wind' < **wēntos* < **h₂wéh₁ntos*. This is a *Paradebeispiel* of OstL in Latin. The evidence for the laryngeal is from Sanskrit *vátas* 'wind', scanning trisyllabically in Vedic as **vaHatas* < **weh₁ntos*. In Tocharian, **wēntos* > PToch. **w^yente*, preserving the original vowel length (Ringe 2006: 77); but in Italic and Germanic (feeding raising to *wind*), the vowel shortens

4 Thanks to an anonymous reviewer for pointing this out.

before *nt* (Meiser 1998: 75). As discussed in section 2.1, the outcome of **eh₁n̥* is debatable; based on the argument given there, I tentatively class this as a real example of OstL.

- *-bundus* (cf. *moribundus* ‘dying’, *cantābundus* ‘singing’, *furibundus* ‘raging’) < **b^huH-ont-(i)nos*. The origins of the *-ndus* element are disputed: Jasanoff (2006) argues that this adjectival suffix has the same origin as the gerundive in *-nd-*, which he takes to be a complex of the participial **-ont-*, a formative **-i-*, and a **-no-* suffix. Sihler (1995) proposes a metathesis from **-tn-* + **-o-* to **-ndo-*, while Meiser (1995) proposes metathesis from a form **-dn-o-*, a thematized zero-grade of the **-den-/don-* suffix. Wherever the *-nd-* cluster comes from, it seems clear that the first element is the root **b^huH-* ‘be’. An anonymous reviewer points out two options for the etymology of this form: one is **b^huH-ont-nos* > **-buwontinos* (with epenthesis of a glide after the loss of the laryngeal) > **-buwondus* > **-buwundus* > **-būndus* > **-bundus* by OstL. The second is that the laryngeal was lost early on by the *neognós* rule, deleting a laryngeal in between a sonorant and a vowel in complex words (Weiss 2009: 113): this would give us **b^huH-ont-nos* > **bwondus* > *bundus* directly, in which case this form isn’t evidence for OstL.⁵
- *linteum* ‘piece of linen’. cf. *līnum* ‘linen’. This etymology is problematic for two reasons: one is that we’d expect *linteus* to have come from a noun stem **lint-*, cf. *aureus* ‘golden’, *aurum* ‘gold’. The other issue is that, as de Vaan (2008: 344) comments, ‘linen’ has the reflex of a short vowel in some branches—Greek *línōn* ‘linen’, Slavic *lǐnŭ* ‘flax’, Lithuanian *línas* ‘id.’—but a long one in others—Irish *lín*, Gothic *lein* (Schrijver 1991: 243). This is probably a non-IE loan with variable treatments of the vowel length. Assuming the **lint-* stem was formed within Italic from the ‘western’ variant **līn-*, I take this shortening to be an example of OstL.
- *planta* ‘sole of foot’ < **plāntā*. De Vaan (2008: 470) derives this from **-nt-* attached to a root which, because it ends up with the vowel *a*, must have contained a laryngeal; but the outcome of a **-RH-* sequence should be **-Rā-*, as discussed in section 2.1, hence the need for OstL. He suggests the root is **plh₂-* ‘approach’, so the sole of the foot is an agent noun, the ‘approacher’.
- *clangō* ‘cry’ < **clāngō* < **klh₂ng-*. As Schrijver (1991: 223) comments, comparing Greek *klázō* ‘shout’ < **klh₂g-jō* gives a root **klh₂ng-*, which would

5 Alternatively, if we have **b^huHnt-*, the form is parallel to *ventus*, and so might not involve OstL as described above.

- regularly give **klāng-* as above. The same will go for *plangō* < **pleh₂k-* and *lambō* < **leh₂b-*.
- *ientō* ‘have breakfast’ < **iēntō*. This has a variant *iantō*, and a related adjective *ieiūnus*, *iāiūnus* ‘hungry’ (Schrijver 1991: 107). The form with *a/ā* appears earlier in old manuscripts from Plautus (Skutsch 1892), and de Vaan (2008: 297) assumes a root **Hjeh₂ǵ-ju-*, cf. Greek *hágios*, *hazomai* (LIV 224); the *e* variant must then be from some fronting of *a* to *e* conditioned by the surrounding palatal glides. Forssmann (1993) proposes a Proto-Italic **jagj-*, which attaches to a sequence of affixes **-je/o-nt-* to give **jagjent-* > **jajjent-*. Meiser (1998: 85) explains the long vowel in the adjective *ieiūnus*, *iāiūnus* as lengthening alongside an apparently irregular degemination of medial **-jj-*. If this **jajjent-* underwent the same change to **jājent-*, then the eventual form **jānto* > *iantō* must be by OstL. But there are two problems with this account: one is that this degemination of **-jj-* is unexpected, given the sequence survives in *maior* ‘bigger’ < **magjōs-* (Allen 1965: 39, Weiss 2009: 355), and any contraction over **-jj-* to give **jajjent-* > **jānt-* directly would be similarly unexpected for the same reason. A second problem is that the forms *ieient-* and *iaient-* are still around in Plautus (Meiser 1998: 80), dangerously close to my proposed dating of OstL after the 2nd century BCE (see section 3.2.1). An alternative account not involving OstL would be that *ieient-* and *iaient-* haplologized directly to *ient-* and *iant-*, as assumed by Weiss (2009: 141), meaning there was never a long vowel in the *-nt-* forms.⁶
 - *sinciput* ‘half a head’ < **sēmi-kaput-*. Along with *simbella* ‘half a libella’ < **sēmi-libella*, this gives us two etymologies where the long vowel of *sēmi-* ends up in a closed syllable by the round of syncope described by Sen (2012) as ‘archaic parsing syncope’. This syncope then feeds OstL, which in turn feeds the regular raising to *i* before [ŋ] and *mb*. We have **sēmi-kaput* > **sēn-kaput* > **sen-kaput* > *sinciput*; in the case of *simbella*, some more complicated syncope or haplology is needed to delete two syllables. Simkin (2004: 49), with the view that there was no OstL in Latin, suggests that **sēmi-libella* > *simbella* just comes from irregular “syncope/haplology” rather than a sequence of syncope and haplology and then regular OstL and raising.
 - *-unculus* < **-ōnculus*, in pairs like *carbō* ‘charcoal’, diminutive *carbunculus* ‘carbuncle’. As Leumann (1977: 107) points out, this is the usual change of *o* > *u* before the velar nasal, as in *hunc* ‘this’ < **hom-ke* and *uncus* ‘hook’

⁶ Thanks to an anonymous reviewer for discussion of this.

- < **onkos* (Weiss 2009: 139). It's also possible that the diminutive is built directly from the earlier non-nominative suffix in *-*on-* (Weiss 2009: 310), which we see in gen.sg. *hominis* < **homones* next to *homō* 'man' < **homōn*, in which case this suffix doesn't show OstL.⁷
- *iuncus* 'rush, reed'. Walde and Hoffmann (1930; cited in de Vaan 2008: 313) link *iuncus* to Irish *aín* 'reeds' and Swedish *en* 'juniper' as a reflex of a stem **joi-ni* attached to a *-*ko-* suffix in Latin: **oi* > *ū* as usual, which then shortens by OstL. As de Vaan comments, the syncope in **joinikos* > **joinkos* > **jūnkos* > *iuncus* is unexpected (and the expected Exon syncope fails to happen in *iūniperus* 'juniper').
 - *nuncupō* 'call by name' < **nōmi-capāre* by Sen's (2012) 'alignment syncope'. De Vaan (2008: 412) assumes this is a denominative verb from an original noun **nōmi-caps* 'one taking a name', ultimately with a long vowel from *nōmen*: the syncope of *i* feeds OstL. An anonymous reviewer points out that the paradigm of 'name' could originally have had **nom-*; Stüber (1998: 53–56), for example, reconstructs a paradigm **h₁nom-ŋ*, **h₁nem-ŋ*-. We could then have **nomi-caps* from the root **h₁nom-*, apparently without its -*ŋ-* suffix. If the long vowel in *nōmen* is based on a different stem, or introduced later by analogy with *gnōsco*, this collocation may not involve OstL.
 - *uncia* 'one-twelfth' < **ūn-cia* < **oin-cia*, cf. *ūnus* 'one'. This turns up as the second element of compounds like *quincunx* 'five-twelfths of a pound', *deunx* 'eleven-twelfths of a pound', which also have short vowels.
 - *membrum* 'limb' < **mēmsrum* < **mēms-ro-*. Old Irish *mír* 'portion' and Lithuanian *mėsá* 'meat' are evidence for an original long vowel (Meiser 1998: 119, de Vaan 2008: 370), which shortens by OstL in Latin after the change of medial *-*sr-* > -*br-* (Weiss 2009: 163). The same feeding of OstL by *-*sr-* > -*br-* happens in the names of months with the unrelated root **mēns-* 'month', as in *september*, -*bris* 'seventh month' < **septemo-membris* < **mēns-ris*.
 - *glāns*, *glandis* 'acorn' < **glāndis*. Schrijver (1991: 223) assumes a root **g^wh₂-n-d-* (cf. Greek *bálanos*), with the regular change **h₂* > *lā*, followed by OstL in the oblique cases. The length in the nominative *glāns* < **glānds* could be original; or if OstL preceded the loss of *d* by the *-*RCs-* > *-*Rs-* rule (Weiss 2009: 182), **glans* would lengthen to **glāns* anyway by the regular lengthening before *ns* (see section 3.1.2.1 for discussion of nasal + fricative lengthening).

7 Thanks to an anonymous reviewer for pointing this out.

- *pinguis* ‘fat, greasy’ < **pīnguis* < **piH-n-*. Sanskrit *pīvan-* ‘fat’ (adj.) < **piH-wen-* and Lithuanian *píenas* attest a laryngeal in the root **piH-* (de Vaan 2008: 466), so the vowel looks to have been shortened by OstL. The origin of the *-n-* or the *-gui-* elements aren’t clear, but Walde and Hoffmann (1930) suggest analogy with unattested **finguis* < **bʰŋgʰ-u-i-* (which ought to mean ‘thick’); the case for OstL in this word would be weakened if this analogy is right, but there’s no other evidence for that suggestion.
- *Herculēs* < Greek *Hēraklēs*. This word shows an irregular syncope of *a*, which perhaps feeds OstL in shortening the vowel, but we would regularly expect ***Hēreclēs* (Weiss 2009: 3). Given Etruscan *Hercle* (Rix 2004), the actual Latin word is probably a borrowing, in which case the short vowel could equally be an Etruscan development rather than a Latin one.
- *surculus* ‘twig’. This has a short vowel, and is a diminutive from *surus* ‘post’, which has a vowel of unclear length (de Vaan 2008: 602). As de Vaan comments, if this is connected to *sūra* ‘calf of the leg’, then there should be a long vowel in *sūrus*, and so *surculus* would involve OstL—but this etymology is only speculation.
- *perna* ‘thigh, upper leg’ < **pērsna-* (Meiser 1998: 75). This must be connected to Sanskrit *pārṣṇi-* and Gothic *fairzna* (acc.sg.), both ‘heel’ (de Vaan 2008: 461); the loss of *s* in **-RsN-* is probably regular, as in **alsnos* > *alnus* ‘alder’ (Weiss 2009: 179).
- *ulna* ‘forearm’. Based on Greek *ōlénē*, Parker (1986: 64) proposes a preform **ōlenā* > **ōlna* > **olna* > *ulna*, with syncope feeding OstL, which then feeds *o* > *u* before /C. De Vaan (2008: 638) suggests instead that a form **ōlēna* > **olēna* early on by Dybo’s shortening, which has been claimed to shorten a pretonic long vowel before a resonant (see discussion in Zair 2012). An anonymous reviewer points out that cognates including Old Irish *uilen* and Old High German *elina* (both ‘elbow’; de Vaan 2008: 638) must reflect a short vowel.
- *verculum* ‘little spring’ and *vernus* ‘in spring’ cf. *vēr*, *vēris* ‘spring’. In the whole paradigm of *vēr*, the vowel is long, but explanations of this vary. Schrijver (1991: 128) reconstructs nom.sg. **wēs*r, though Greek *héar* ‘spring’ nom.sg., Sanskrit *vásri* and Avestan *vaŋri* ‘in spring’ need a short **wesr-*, so he reconstructs Narten ablaut with *ē:e* (later levelled). De Vaan (2008: 663) proposes nom.sg. **wesr* > **weror*, gen.sg. **wesnos* > **wēnos*, analogically replaced by **wēros* which in turn creates a new nom.sg. **wēr*. If *verculum* and *vernus* were formed before this levelling from **wesi-tlom* and **wesi-nos*, then we’d expect the short vowel; if they’re more recent **wēr-tlom* and **wēr-nos*, then the shortening is by OstL.

- *orbis* ‘disc’. Tocharian *yerpe* has the reflex of a long vowel **ē*, so Driessen (2001: 53) proposes **h₁ēr̥bis* / **h₁ōrbis*, meaning the vowel in Latin must be a shortening by OstL. De Vaan (2008: 433) suggests the Tocharian long vowel is secondary, in which case the Latin vowel was originally short with no need for any OstL. Latin and Tocharian could also have used different grades of the root; Weiss (2006) has a detailed discussion of the cognates of *orbis*.
- *princeps* ‘leader’ < **prismo-kaps* (lit. ‘who takes first’; Weiss 2009: 238) by Sen’s (2012) archaic parsing syncope. Although this word is traditionally given (e.g. by Weiss) with a long vowel as *prīnceps*, Sihler (1995: 78) points out that Roman grammarians give the vowel as short, and that archaic Italian has a form *prence* explicitly reflecting a short vowel. To account for the spelling ⟨PRĪNCIPĪ⟩ in Latin using the apex in CIL 13.1644, I follow Allen’s (1965: 73) suggestion that this letter before a velar nasal is meant to reflect quality, not length (see section 2.2.1). The usual Romance form with a vowel *i*, as in *prince*, is a learned borrowing directly from Latin that takes on the original vowel quality.

2.3 ‘Counterexamples’ to OstL, and etymologies

In this section, I list some apparent ‘counterexamples’ to OstL: if a classical Latin word contains a long vowel followed by a resonant-consonant cluster, it looks superficially as if OstL hasn’t applied. The explanation in all these cases is either that the word was only formed after OstL applied, or that the word is old but its long vowel was only formed after OstL applied. Two broad classes of exceptions relating to later vowel lengthening rules will be dealt with in section 3.

I’m only considering words that are judged to be native Latin vocabulary. There are examples of loans containing long vowels before *RC*—e.g. *hūrmōs* ‘first troparion of a canon’ < Greek *heirmós*, or place names like *Crēmna*—but in the absence of knowledge about when these were borrowed, I take it these aren’t probative.

2.3.1 Synchronic long vowels before OstL clusters

- *vīndēmīa* ‘grape harvest’ < *vīnum* ‘wine’ + *demō* ‘take away’ (Meiser 1998: 76). This has both short and long reflexes in Romance—e.g. Italian *vendemmia* versus Portuguese *vindimia*—so the *ī*, if it existed in late Latin, must be by analogy with the unshortened form *vīnum*.
- *vēndō* ‘sell’ < *vēnum dō* lit. ‘give a sale’ (de Vaan 2008: 663, LIV 693). If this vowel was long, it must have been created after OstL: but in this

case, we can't describe it as a later univerbation. As I'll argue in section 3, the weakening of *a* to *e* in medial syllables preceded OstL, and this weakening explains the third-conjugation theme vowel of *vēndere* given original *dare*. This means the collocation of *vēnum dare* as a single word has to precede *a*-weakening—so it also preceded OstL, which means OstL should have applied to this form to give **vēndere*. But from the same root, we have a family of words like *vēnum* 'sale', *vēneō* 'be sold', and *vēnālis* 'for sale', all of which weren't compounded with *dare* and so didn't undergo OstL. I take it that the vowel in *vēndere* is just analogy with all the other forms of this family.

- *fūrtum* 'theft', *fūrtim* 'secretly' (i.e. 'like a thief'), and other members of this derivational family. The agent noun *fūr* < **b^hōr* (cf. Greek *phōr*) has an inherited long vowel, and this vowel spread analogically into the rest of the family.
- *ūndecim* < **oino-dekem* (Meiser 1998: 172). The evidence about the length of this vowel is inconsistent: on the one hand, grammarians explicitly give the vowel as being long (Sihler 1995: 78), and some Romance reflexes like Italian *undici* reflect a long vowel. But most Romance languages show a short vowel *o* < **ū*: French *onze*, Spanish *once*, Portuguese *onze*. Given **oi* regularly produces Latin *ū*, the only explanation for the short vowel is OstL; we can sensibly explain the long vowel as an analogy with *ūnus* 'one', which OstL doesn't touch.
- *nūndinae* 'market day' < **noweno-dinai*. This literally means 'on the ninth day' (Meiser 1998: 172, de Vaan 2008: 415), where **e* syncopates giving **ou* > *ū*, and then the syncope of **o* leaves this long vowel in an OstL environment. The vowel here is marked as long (Allen 1965: 75), so these instances of syncope must be later than OstL. This means that, contra Sen (2012), this syncope isn't an example of the archaic alignment syncope that feeds OstL.
- *nōngentī* 'nine hundred' < **novem-centī*. This *ō* is from contracted **owe-* (Meiser 1998: 174, de Vaan 2008: 415).
- *nūntius* 'messenger' < **nowentius*. Weiss (2009: 268) treats this as from **new-* 'shout', cf. Sanskrit *návate*, where the outcome of syncope must have been **owe-* > **ou-* > **ū-* (Parker 1986: 160), cf. the doublet *providentia* and *prudentia*. This problematic syncope is apparently not one of the regular syncopes identified in Sen (2012), as an anonymous reviewer points out, but it counterfeeds OstL. Parker follows Sommer and Pfister (1977: 102) in giving French *annoncer* 'announce' < **annuntiāre* as evidence that there was a late round of OstL shortening the vowel of *nūnt-*; but there are easier interpretations than a new sound change.

French *nonce* has the specialized meaning of ‘nuncio’, the ecclesiastical title, where Italian has *nuncio* < **nūntius* with the expected reflex of a long vowel. The vowel *o* is an outcome of the borrowing of *nuncio* into early French, rather than a direct outcome of Latin *ū*; from *nonce*, French analogically modified the verbs *annuncer*, *pronuncer*, etc. into *annoncer*, *prononcer*, hence their current vowels. Daniel Ezra Johnson (p.c.) suggests that being a back vowel, *on* [ɔ̃] was a better perceptual match within French to the Italian vowel in *nuncio* than *un* [œ], which had fronted and lowered.

- *quārtus* ‘fourth’. We have length marked with an apex in CIL 3.4959. Schrijver (1991: 492) assumes an original **k^wadw̄rtos* > **k^wadwortos* > **k^wawortos* > **k^wārtos*. For the *d*, cf. the voicing in the form *quadru-*, which he takes to be a regular voicing of *t* in a ‘heavy consonant cluster’; then **-dw-* > *-w-*, as in *suāvis* ‘sweet’ < **swādwis*. Meiser (1998: 174) assumes direct loss of the **t* from **k^watw̄rtos* by dissimilation, without an intermediate **d* stage.
- *hōrnus* ‘grown this year’. Szemerényi (1960) offers Greek *hōrimos* ‘ripe’, or an unattested **hōrinós*; de Vaan (2008: 289) gives the traditional etymology as a derivative **ho-jōr-ino-* from **joHr-* ‘year’, but points out that we’d expect a long vowel ***hōrīnus*, rather than the apparent actual development **hōrīnus* > *hōrnus*. In both accounts, the environment *rn* comes from a syncope of short *i* that it’s possible to assume is later than OstL.
- *dēnde* ‘then’. TLL gives this as a variant of *deinde*. This monophthongization must be later than the usual **ei* > **ē* > *ī* (Weiss 2009: 101), given *deinde* is the usual form in the classical language.
- *prōrsus* ‘forwards’ < **pro-worsos* (Meiser 1998: 87). TLL gives this vowel as long.
- *Mārs* ‘Mars’ < *Māvors* (Meiser 1998: 127, de Vaan 2008: 366). We have inscriptional evidence for the length of the vowel in both the nominative form *Mārs* and in the stem *Mārt-* (CIL 10.809), as well as Greek spellings *Maarkos* for the derivative name *Mārcus* (Allen 1965: 74).
- *cōls* ‘penis’ < *cōlis*, *caulis*. De Vaan (2008: 100) treats *cōlis* as a borrowing from a dialect with *au* > *ō*, as eventually happens in Romance; TLL gives the variant *cōls*.
- *cōrs* ‘cohort’ < *cohors*; TLL also gives a variant *chōrs*, and another variant that apparently raises to *cūrs*.
- *nōndum* ‘not yet’ < *nōn* + *dum* (CIL 10.4041).
- *pūrgō* ‘cleanse’ < *pūrus* + *agō* (de Vaan 2008: 31), with Sen’s (2012) ‘classical parsing syncope’.
- *iūrgō* ‘quarrel’ < archaic *iūrigō* < **iūs* + *ago*.

- *cōngustus* 'narrow' < *coangustus*.
- *prēndō* 'seize' < *prehendō*.
- *cōntiō* 'meeting' < *conventiō*.
- *ārdeō* 'burn' < **ārideō* by classical parsing syncope, cf. *āridus* 'dry'; but this could have been short *ardeō*, as the only reason for assuming synchronic length (e.g. in Allen 1965: 74) is its etymological length.

2.3.2 Vowels before *gn*

In classical Latin, the sequence spelt ⟨*gn*⟩ (and historically from **gn*) was pronounced [ɲn] (Allen 1965: 24). In principle, this new *RC* cluster fits the conditioning environment for OstL, but there are some inherited long vowels that stay long in this environment in Latin: *rēgnum* 'kingdom' < **rēg-nom* (cf. *rēx*), *sēgnis* 'slow' < **sēg-nis* (cf. Greek *hēka* 'slowly'), and *abiēgnus* 'made of fir' from *abiēs* 'silver fir'. We also have *stāgnum* 'pool'; although there are no cognates with long vowels directly, de Vaan (2008: 585) takes this to be a full grade of **steh₂g-* cognate with zero-grades in Old Breton *staer* < **stagrā* and Greek *stagón* 'drop'. Eichner (1992: 66) gives the vowel in *sēgnis* as short, as evidence for shortening by OstL, but Allen (1965: 72) gives inscriptional evidence for both *sēgnis* and *rēgnum*. As I'll argue in section 3, the fact that *sēgnis* doesn't raise to ***signis* is also evidence that the vowel was long, because (pace Eichner) OstL happens earlier than the raising of *ě* > *ĩ* before *NC* clusters; this raising otherwise happens before *gn*, as in *dignus* 'fitting' < **dek-nos* or *lignum* 'firewood' < **leg-nom*.

One possibility is that there was a lengthening before *gn*, and indeed there are some inscriptional cases of inherited short vowels before *gn* being spelt as long (Sommer and Pfister 1977: 121; Meiser 1998: 79): we have spellings ⟨*SEIGNVM*⟩ (CIL 1².42) and ⟨*SIGNVM*⟩ (CIL 6.10234) with the *i longa* ⟨I⟩ for *signum*, ⟨*DIGNI*⟩ (CIL 10.5676) for *digne*, ⟨*IGNIS*⟩ (CIL 11.826) for *ignis*, and ⟨*PRIVIGNO*⟩ (CIL 6.3451) for *prīvignō*. But Diomedes describes *dignitās* as an anapaest,⁸ meaning the first vowel was short. The Romance evidence also implies short vowels for words of this form: from *signum*, Italian has *segno*, and French has a doublet *seing* (with an inherited short *ĩ*) and *signe* (a *cultismo* with *ĩ* borrowed as Proto-Romance *i*); and from *dignus*, Italian has *degno*. Allen (1965: 73) suggests the *i longa* is being used here to spell a short vowel with the quality of a long /i:/, assuming short *i* became allophonically tenser before

8 Carl Darling Buck, reported in Bennett (1907: 41), interprets this as a claim about the length of the vowels rather than syllable weight; the first syllable is metrically heavy.

[ŋ] without actually lengthening. The spelling ⟨EI⟩ is also sensibly treated as a spelling of a tense vowel distinct from /i:/; cf. the high vowel inscriptionally spelt ⟨EI⟩ from the original **ei* that eventually raises to merge with *ī* (Weiss 2009: 101). If neither ⟨I⟩ nor ⟨EI⟩ reliably spells length, then these aren't clear examples of long vowels, as is backed up by the Romance reflexes with short vowels. If there was no lengthening before *gn*, then the long vowels of *rēgnum* and *sēgnis* can't be the result of a post-OstL lengthening—so OstL didn't apply before *gn*. I take it that *gn* was still pronounced [gn] at the point OstL applied, and the change to [ŋn] happened later.

3 Analysis

3.1 Other rules affecting vowel length

In the previous section, I gave the etymologies of Latin words involving OstL, and the etymologies of some synchronic 'counterexamples'. In this section, I discuss two broad classes of more exceptions to OstL in particular phonological environments, and the sound changes (ordered later than OstL) that create them.

3.1.1 Lengthening before *r*

In this category, I list instances of long vowels in the environment *_rC* not explained by any sound changes covered so far.

- *ōrdō* 'row, line'. De Vaan (2008: 434) treats this as an *o*-grade of **h₂er-*, also seen in *artus* 'limb', on (unstated) semantic grounds; there's no etymological reason for the long *ō*. The vowel is marked with the apex in CIL 9.5177.
- *ōrdior* 'weave'. De Vaan (2008: 434) gives this the same etymology as *ōrdō*; we can also compare *ōrnō* 'furnish' < **ōrd-nō*, as a long vowel from the same source (Meiser 1998: 122).
- *fōrtuna* 'fortune' < *fors*, *fortis* 'chance'. This vowel is marked with the apex in CIL 6.7527.
- *fōrma* 'appearance, beauty'. This vowel is marked with the apex (Ernout and Meillet 1959: 239), and we have a Greek spelling *phōrmē* (Allen 1965: 74); as an etymology, de Vaan (2008: 234) suggests **morma*, on the grounds of a dissimilation **m...m* > **f...m* also seen in *formīca* 'ant' (cf. Greek *múr-mēx*) and *formīdō* 'fear' (cf. Greek *mormē*). The almost identical *formus* 'warm' < **g^{wh}ormos* has a short vowel.
- *libertus* 'freedman'. the dative plural *libērtīs* is explicitly marked with the apex (CIL 10.3523; Leumann 1977: 114). Assuming the endingless nomina-

tive singular *liber* < **libēr* < **liber-s* is the base form for 'freedman', this could have had a long vowel originally before it shortened in the -r# shortening.

- *fīrmus* 'firm' < **d^her-*. De Vaan (2008: 223) suggests Proto-Italic **fermo* < **d^her-mo-* 'holding', with the raising to *i* being part of a (supposed) general raising after a labial (Watkins 1973). We have use of *i longa* in CIL 4.175, but the Romance evidence (French *ferme*, Italian *fermo*) points to a short vowel in *fīrmus* (Ernout and Meillet 1959: 422, Allen 1965: 74; Meiser 1998: 79).
- *vīrtūs* 'manly qualities'. The vowel is marked with *i longa* in CIL 6.449. This abstract noun is from *vir* 'man' < **wiH-rō-*, where the short vowel is due to Dybo's law (de Vaan 2008: 681). We also have *i longa* used for *vīrgō* in CIL 6.2150, which Ledo-Lemos (2002) etymologizes as a derivative of *vir*.
- *lārgus* 'large'. We see use of the apex in CIL 6.32521. De Vaan (2008: 327) explains the length of the vowel as a secondary lengthening, rather than following the Walde and Hoffmann (1930) etymology as ultimately from a stem **laj-es-* 'fat' as in *lāridum* 'bacon'.
- *ārma* 'arms'. Grammarians describe the long-vowel form *ārma* as a 'barbarism' (Allen 1965: 73), which tells us that both *ārma* and *arma* must have existed (the former being stigmatized). Allen also points out that the weakening in *inermis* 'unarmed' means that the vowel must have been short at some point, given that only short vowels undergo weakening. De Vaan (2008: 54) treats the word as from **h₂er-* 'join', so a short vowel is etymologically expected.
- *ārca* 'chest'. The vowel is marked with the apex in one inscription from Lyon (Boissieu 1846), but as Allen (1965: 73) points out, the fact we have weakening in compounds (*exerceō*, *coerceō*, etc.) of the corresponding verb *arceō* means the vowel must have once been short.
- *hōrtus* 'garden'. We have use of the apex in CIL 6.9493, but no obvious etymological reason for a long vowel (de Vaan 2008: 290).

In sum, the evidence seems to suggest that some words underwent a lengthening before *rC* sequences. Obviously, this means that some of the examples of later formations in section 2.2 above—*quārtus*, *hōrnus*, etc.—could in fact have been shortened by OstL and then lengthened again by this pre-*rC* lengthening, which would undermine the explanations in that section. I haven't been able to find an interpretation of the etymologies under which this lengthening was completely regular in any environment, with plenty of short vowels in *_rC* position still surviving in Latin as well as near-minimal pairs like *fōrma* 'form' but *fōrmus* 'warm', so I take it this rule only applied sporadically.

3.1.2 Lengthening before *NCT* clusters

3.1.2.1 *nct* and *nx*

In this category, we have more surface exceptions to OstL not explained by any of the above rules; these are instances of long vowels before *nct*, *nx*, or *mpt* clusters. The solution is a lengthening before *nct* and *nx* (Weiss 2009: 130), but a morphological explanation for the examples with *mpt*. In most of these cases, the vowel length is disputed by different sources, which suggests this lengthening was sporadic or dialectal.

Most of the examples with *nct* and *nx* are from paradigms, either in past participles or perfects:

- *cingō* ‘ring’, *cingere*, *cīnxī*, *cīnctus*. Meiser (1986) and De Angelis (2016) give this vowel as long, following CIL 10.4104.
- *extinguō* ‘quench’, *extinguere*, *extīnxī*, *extīnctus* (CIL 6.25617).
- *fungor* ‘perform’, *fungī*, *fūnctus sum* (CIL 5.1326).
- *iungō* ‘join’, *iungere*, *iūnxī*, *iūnctus* (CIL 10.1888). We also see length explicitly marked in derivatives like *coniūnx* (Allen 1965: 67, Sommer and Pfister 1977: 120).
- *plangō* ‘strike’, *plangere*, *plānxī*, *plānctus*. The vowel in the root here was originally long: **pleh₂-n-k-* > **plāng-* > *plang-* by OstL (see the discussion of *clangō* in section 2.1).
- *pollingō* ‘wash a corpse’, *pollingere*, *pollīnxī*, *pollictus*. We also have a derived noun *pollīnctor* ‘undertaker’ (de Vaan 2008: 478). TLL cites this vowel as short.
- *pungō* ‘prick’, *pungere*, *pupungī*, *pūnctus*.
- *sancio* ‘consecrate’, *sancire*, *sānxī*, *sānctus* (spelt with an apex in CIL 5.2681).
- *stringō* ‘press’, *stringere*, *strīnxī*, *strictus*.
- *tingō* ‘dye’, *tingere*, *tīnxī*, *tīnctus*.
- *vincio* ‘bind’, *vincere*, *vīnxī*, *vīnctus*. De Angelis (2016) cites the past participle *vīnctus* with a long vowel, but de Vaan (2008: 679) cites it with a short one; and where de Vaan cites the perfect *vīnxī* with a long vowel, Priscian says explicitly that the vowel is short (Weiss 2009: 130).⁹

Some are derived from past participle forms of verbs which themselves have short vowels:

9 Both Allen (1965: 67) and Weiss (2009: 130) decide not to believe this statement from Priscian, on the grounds that his claims about length in perfects are unreliable in other examples.

- *līnctiō* 'licking', *līnctū* 'by licking' next to *līngō* 'lick'.
- *mīnctiō* 'urination' next to *mīngō* 'urinate'.

In one form, we have a verbal noun with no form in the corresponding paradigm to compare it to:

- *pānctiō* 'fastening' next to *pangō*; the verb has *pepigī*, *pāctus* for the perfect and past participle respectively, so there's no trace of the nasal other than in the present stem forms. The long vowel in *pāctus* < **ph₂ǵ-to-s* (de Vaan 2008: 443) is expected from Lachmann's Law after devoicing of an original voiced stop, and not necessarily from an original nasal.

One verb possibly has length before *nct* in the present tense:

- *cūnctor* 'delay'. Marx and Perthes (1901), De Vaan (2008: 153), and De Angelis (2016) give this vowel as long. Leumann (1977: 217) and LIV 325 etymologize this as from an earlier frequentative **cuncitāre*, with alignment syncope.

In the one word *quīnque* 'five' and its derivatives, we see a long *ī*:

- *quīnque* 'five', *quīndecim* 'fifteen', *quīnquāgintā* 'fifty', *quīntus* 'fifth' < **k^wénk^we* < **pénk^we*. Traditionally (e.g. de Vaan 2008: 509, Sihler 1995: 413) it's assumed that the length started in the ordinal *quīntus* < **quīnctus* < **k^wenk^w-tos*, and then was analogically introduced into all the other forms. This makes it part of the set of words with *nct* originally, with loss of **k* in between a resonant and a stop (Weiss 2009: 180).

And finally, one adjective is reliably marked with length before *nct* (e.g. in CIL 9.60):

- *cūnctus* 'all'. One Roman folk etymology (Maltby 1991) was that this is a contraction of *coniūnctus* 'joined together' from *iūngō*, which would mean the length comes from the length of *iūnctus*; de Vaan (2008: 154) cites the traditional scholarly etymology as from **kon-kitos*, the past participle of *conciēre* 'called together'.

For all of these forms, the Romance reflexes have inconsistent vowel length. As Allen (1965: 67) and Sommer and Pfister (1977: 121) point out, French has short reflexes *point*, *joint*, and *teint*, which would need Latin forms *pūnctus*,

iunctus, and *tinctus*; Weiss (2009: 130) also points out the discrepancy between Italian *giunto*, implying a long vowel, and French *joint*, implying a short one. Allen assumes analogy with the presents *pŭngō*, *iŭngō*, and *tŭngō*; Parker (1986: 160) assumes a sporadic late round of OstL in Romance. The latter is possible — if ‘long-vowel’ forms like Italian *giunto* are actually learned borrowings from ‘short-vowel’ forms like *iunctus*, the data are all consistent with a shortening in early Romance. Given lengthening was sporadic before *nct* and *nx*, it could alternatively be that these just carry on the unlengthened variants.

From these examples, it’s sensible to conclude there was a lengthening before *nct* and *nx*. Given **quinctus* > *quintus* and the Greek loan *sphinktér* > *spinter* ‘bangle’, Weiss (2009: 180) analyses the regular outcome of the sequence **nkt* as deletion of the *k*. This would follow a general **RCt* > *Rt* rule, as in **forktis* > *fortis* ‘strong’, as well as being backed up by spellings ⟨*defuntus*⟩ for *defunctus* and ⟨*santus*⟩ for *sānctus* (Sihler 1995: 221), and late-attested hypercorrections ⟨*Crysantus*⟩ and ⟨*Sanctipe*⟩ for Greek *chrúsanthos* and *xanthíppē* respectively (De Angelis 2016). Weiss takes it that all instances of *nct* and *nx* in past participles are newly created, with a new devoiced *c* by analogy with the *g* in the present tense. One problem is that *cunctus* and *cūnctor* don’t have any obvious models for analogy: Sihler assumes that the **nkt* > *nt* change doesn’t apply before back vowels, while Leumann (1977) and de Vaan (2008) analyse these *nct* clusters as having been created later by alignment syncope, as in the two etymologies above.

If it’s true that **nkt* > *nt* is counterfered by alignment syncope in forms that then undergo lengthening, as in *cunctus* and *cūnctor*, then this can’t just be analysed as compensatory lengthening after the loss of the stop. It’s standardly assumed (Allen 1965: 66, Parker 1986: 113, Meiser 2003: 30) that these *nct* and *nx* lengthenings are just a special case of the sound change lengthening vowels before *nf* and *ns*, or *n* + fricative clusters. In Oscan and Umbrian (Parker 1986: 113), there’s a regular spirantization *k* > *χ* before *t* and *s*, followed by loss of nasals before fricatives with compensatory lengthening of the preceding vowels. This means there are Sabellic parallels to the Latin *nct* and *nx* lengthening cases: Latin *sānctum* next to Oscan *saahtum*, and Latin *cūnctum* next to Umbrian *šihitum*¹⁰ Meiser (1986: 55). The assumption is that Latin also had *k* > *χ* in these environments, followed by the normal lengthening before *n* + fricative clusters.

This isn’t convincing: for one thing, the Latin lengthening has to be a separate development from the Sabellic lengthening in *saahtum* and *šihitum*. Although Meiser (1986: 55) argues the latter lengthening has to be ordered earlier than

10 The ⟨*h*⟩ doesn’t represent [h]; it’s part of the spelling of an Umbrian long vowel.

Proto-Sabellic, such that we see Umbrian *i* and not *e* as would be expected by the ‘ursabellische Vokalverschiebung’, Weiss (2009: 130, 177) points out that the Latin lengthening must have happened within Latin: lengthening before *n* + fricative clusters is fed by *a*-weakening, a change specific to Latin, in **an-an-slō* > **an-en-slō* > *anēlō* ‘pant’. If lengthening were in Proto-Italic, these clusters would also be affected by OstL, and this rule is meant to explain the exceptions to OstL by being ordered after it. Clackson (2015) points out that South Picene has unspirantized forms of *k* in *deiktam* ‘shown’ (< **deik-*) and *molk[t]ah* ‘many’ (< **molkt-*, cf. Latin *multus*), meaning the spirantization in Oscan and Umbrian is also a later development than Proto-Italic.

The rule would have to have a different conditioning environment in the two branches, in any case. The Sabellic spirantization rule also seems to apply to **pt* as well as *kt*—cf. Umbrian *screhto* ‘written’, with no change in Latin *scriptus* (Clackson 2015). A second reason is that the change *kt, ks* > *χt, χs* is unconditioned in Sabellic, while in Latin it would have to be limited specifically to the environment *n_t*. Parker (1985: 111) prefers this to a general Latin *kt, ks* > *χt, χs*, which would then require a ‘*Rückverwandlung*’ where all instances of *χt, χs* later revert to *kt, ks* after the lengthening. Even in the restricted form of the rule, we’d need a later reversal of unattested *χ* to *k*.

A final argument against analysing *nct* and *nx* lengthening as *n* + fricative lengthening is that the two have different mechanisms. Allen (1965) gives inscriptional evidence that *n* was actually deleted before fricatives, as in <COSUL> (CIL 1².8) for *cōnsul*, <CESOR> (CIL 1².8) for *cēnsor*, <MESES> (CIL 9.714) for *mēnses*, <COFECI> (CIL 1.560) for *cōnfecī*, meaning we can analyse the lengthening of the vowel as compensatory lengthening. The *n* was then restored analogically, except when there was no base for analogy, cf. Spanish *mesa*, French *moise* from *mēsa* < *mēnsa* ‘table’.¹¹ In *nct*, it’s the stop that deletes, so *quīntus* rather than ***quīctus*; all the cases I’ve found of long vowels before *ct* come from Lachmann’s Law, rather than from any process of nasal deletion.

3.1.2.2 mpt

Although superficially similar in containing a cluster *NCt*, I’m not proposing that the instances of length before *mpt* in verbal paradigms are down to a regular lengthening before *mpt*. The reason is that the examples are actually all derivatives from a single verb, *emō*:

11 Even in these cases, there were later spelling pronunciations with [n] (Allen 1965: 29).

- *ēemptus* next to *emō* ‘buy’.
- *dēemptus* next to *dēmō* ‘remove’ < *de-* + *emō*.
- *sūmptus* next to *sūmō* ‘take up’ < *sub-* + *emō*.
- *prōmptus* next to *prōmō* ‘produce’ < *prō-* + *emō*. TLL also gives a variant *prūm(p)tus*.
- *cōmptus* next to *cōmō* ‘arrange’ < *co-* + *emō*.

This isn’t strong enough evidence for a general *mpt* lengthening; these long vowels are all from coalescence of a suffix vowel with the *e* of the root, or (in the case of other more transparent compounds from *emō*) analogies with *ēemptus* itself. Given the long vowel in the perfect *ēmī*, as expected from a lengthened grade, the vowel in *ēemptus* is probably analogy. The main reason that it’s difficult to rule out a regular lengthening before *mpt* is that we should predict **mpt* > **mt* > *nt* by the general cluster simplification rules given above, so there are no native *mpt* sequences. In the verbs above, I take it *mpt* is by analogy with the *m* of the present and perfect paradigms; the other two instances I’ve been able to find are *cōmptō* ‘reckon’ < *computō* (cf. French *compter*) by a late syncope and *cāmpster* ‘angle’ < Greek *kamptēr*. In the absence of any better evidence for a regular lengthening, the morphological explanation for the *emō* forms is preferable.

3.2 *Relative chronology of OstL*

In this section, I discuss the chronology of OstL relative to other Latin sound changes. First, I list sound changes that need to i) precede and ii) follow OstL, based on the etymologies in section 2. Next, I discuss the case for an early OstL shortening before glides, and judge that none of the arguments in favour are conclusive. Finally, I respond to some potential objections and problematic etymologies.

Leaving aside the shortening of long vowels before glides, which I discuss in section 3.2.2, the evidence for OstL in early Italic isn’t very strong. Parker (1986: 149) comments in passing that the short *í* in the nominative singular of Oscan *n*-stems like *statíf* < **stat-íns* (Buck 1904: 130) is down to an instance of OstL in Sabellic, but this wouldn’t be a convincing case that there was another OstL in any ancestor (as opposed to cousin) of Latin. As an alternative, *statíf* could from **stat-ēns* with no OstL. There’s even some evidence that length before *nt* was maintained from Proto-Italic at least into early Sabellic, as in the Oscan third person plural *stahúnt*, which has to reflect **sta-ēnt*.¹² Without evidence

¹² Thanks to James Clackson for this example; as above, the ⟨*h*⟩ represents vowel hiatus

for a round of OstL specifically shared between Sabellic and Latin, I conclude there was no early round of OstL.

3.2.1 The chronology

From the etymologies in section 2, we can read off which sound changes preceded OstL and which followed it. I've summarized these in the lists below.

Rules that take place before OstL:

- Laryngeal loss (*ventus, planta*)
- $*_{\text{RH}} > R\bar{a}$ (*clangō, glandis*)
- Metathesis of $*-Dn-$ > $-nd-$ (*-bundus*)
- $*o > u$ in a medial closed syllable (*-bundus*)
- $*-sr-$ > $-br-$ (*membrum, -ember*)
- Contractions of $*VjV$ sequences in verbs (*laudant*)
- Parsing syncope (*sinciput, princeps*)
- Alignment syncope (*nuncupō*)
- Irregular syncope (*iuncus*)
- Monophthongization of $*oi > \bar{u}$ (*iuncus, uncia, undecim*)
- Weakening of *a* (according to me)

Rules that take place after OstL:

- Lengthening before *nct*, sporadically (*cīnctus, iūnctus*, etc.)
- $*-nct-$ > $-nt-$ (*quintus, defūntus, santus*)
- Lengthening before *rC*, sporadically (*ōrdō, fōrma*, etc.)
- Raising $*e, o > i, u$ before *NC* (*nuncupō, sinciput, simbella*)
- Late syncope (*prēndō, cōntiō, nūndina, nōngentina, nūntiō, prōrsus*)
- $*-owe-$ > $-ō-$ (*nōngenti*)
- $*gn > [ɣn]$ (*sēgnis, dignus, rēgnum*)
- Some vowel coalescence (*cōngustus*)
- Late *ei > ē* (*dēnde*)
- Weakening of *a* (according to Weiss; *parentes, calendae*)

For discussion of Weiss' (2009) chronology and the question of whether *a*-weakening precedes or follows OstL, see section 3.2.3.

rather than a consonant. Don Ringe (p.c.) points out that this suffix vowel could be by analogy with the *í* in the rest of the paradigm.

In terms of absolute dates, the key constraint is that OstL needs to follow **oi* > *ū*. The absolute chronology in Weiss (2009: 192) dates **oi* > *ū* as happening in the early 2nd century BCE. Although I haven't found any examples of the parallel change **ei* > *ī* feeding OstL, we have early records of a spelling ⟨*e*⟩ probably reflecting some intermediate *ē* (Allen 1965: 53); if the two monophthongizations can be thought of as part of the same change, it was already underway in the 3rd century. I place OstL in the 2nd century or later, after monophthongization was complete.

3.2.2 OstL before glides

In Weiss' (2009: 104, 125) discussion of OstL, he proposes that the sound change applies at three separate points in the history of Latin. His first round, Round A, applies early on—before monophthongization and *a*-weakening—and part of the evidence for this is in the few examples of OstL before glides. In other words, these are cases where long diphthongs **Vj*, **Vw* shorten to *Vj*, *Vw*, the Greek equivalents of which were Osthoff's (1879) original reason for proposing OstL. I've been able to find four arguments in the literature for a specifically 'Osthoff' shortening of long diphthongs.

The first is from the merger of reflexes of **ēi* and **ei* as *ī* in medial position, as in *dīxī* 'I said' < **dēixī* with a lengthened grade, cf. Old Avestan *dāiš* (Weiss 2009: 104). I agree with Simkin's (2004: 185) comment that this is only probative if we have a good case that unshortened **ēi* would have changed into something other than **ī*; the fact that **ēi* > *ī* in itself doesn't imply that it went through a stage of **ei*.

The second argument is from the dative plurals in *-īs* (Sihler 1995: 263, Weiss 2009: 207; see section 2.1.1). The argument is that the second declension *-īs* reflects **ois* < **ōis*, where the normal reflex of **oi* would be *ō*, as seen in the dative singular *-ō* < **ōi*; and that the first declension *-īs* reflects **ais* < **āis*. Sihler (1995: 253) suggests that the first of these dative plurals is actually from the locative **oisu*, as in Sanskrit *-eṣu*, which has a short vowel; the Latin ending would then reflect an apocope **oisu* > **ois* > *-īs*, with no OstL. Michael Weiss (p.c.) has suggested that **oisu* would regularly give **ēse*, given that final short **u* is preserved as *-e* (Weiss 2015). This may be true, but as James Clackson (p.c.) points out, the Greek variant *-oisi* is plausibly relevant; if early Latin shared the same irregular development to **oisi*, then the loss of final *-i* would be expected, as happens in the present tense verbal endings *-s*, *-t*, *-nt* < **si*, **ti*, **nti*. As described in section 1, when we have alternative etymologies, Ockham's razor would have us choose the one that doesn't involve proposing a new sound change; and so we should prefer the **oisu* etymology to **ōis*.

In the case of the first declension *-īs*, Weiss' (2009: 236) proposed origin of **-āis* is by analogy with a masculine **-ōis*. If Italic speakers innovated **-ais* straight away by analogy with **-ois* < **-oisi* < **-oisu* (as is more plausible under my account than a form **-āis*), there was no OstL involved; and even if we take the variant form *-ās* as evidence for **-āis*, a shortened form **-ais* by analogy with **-ois* would be a sensible analogy anyway, so again there need not have been any round of OstL involved.¹³

For a third argument, Parker (1986: 181ff.) points out an unexplained difference between the vowels of *nōn* and *nūllus*. He takes it that these come from **ne oinom* and **ne oinelos* respectively, where the vowels are in some way the outcome of a contraction **eoi*. Comparing the dative singular **-e-oi* > **-ōi* > **-ō*, we might expect that **ne oinom* > **neoin* > **nōin* > **nōn* is the right development, which raises the question of why we don't have ***nōllus*. Parker rejects an account based on some ad hoc raising of *oi* > *ō* in an unstressed syllable, which would be consistent with the data (and the rest of the evidence from Latin) but not independently confirmed by any other facts. The explanation from Juret (1938: 64) is that *nūllus* underwent OstL: **ne oinelos* > **neoillos* > **nōillos* > **noillus* > *nūllus*, with the *ū* coming regularly from monophthongization of *oi*. But as Parker points out, there's no explanation given as to why **nōillos* should be an OstL environment if **nōin* isn't. I propose *nūllus* is more sensibly treated as analogy with *ūllus* < **oinelos*, with no long **ōi*, meaning this isn't an Osthoff form.

A fourth argument is pointed out by Sommer and Pfister (1977: 124). Next to *gaudeō* 'rejoice', we have a past participle *gāvisus* with a long *ā*; de Vaan (2008: 255) compares Greek *gēthēō* 'rejoice' < **geh₂-d^h-* with a different root extension, as evidence the vowel should be etymologically long in Latin. Sommer and Pfister's explanation is that the original present **gāvideō* < **geh₂-wid-* irregularly syncopated to **gāudeō*, where **āu* > *au* by OstL. It's possible that a sound change creating a new phoneme *āu* would have been automatically analysed as *au* without involving OstL, given we have no evidence that Latin allows long diphthongs, and a change to a single word wouldn't be powerful enough to alter the phonology of the language. Even if it is an example of OstL, this OstL is late—fed by syncope within Latin—and so not evidence for an early round of OstL shortening long diphthongs.

13 An anonymous reviewer argues that speakers could have analogized an ending **-āis* based on other forms of the *a*-stem paradigm with a long vowel in the suffix, like the locative plural **-āsu*. This is possible, but even then wouldn't be evidence that the shortening to **-ais* is sound change rather than analogy.

3.2.3 Weiss' chronology

In Weiss' (2009: 125) short discussion of OstL, he argues that OstL happened not once, but three times independently in the history of Latin. Round A, which he argues takes place in *parentēs* 'parents' and *calendae* 'calends', feeds the weakening of **a* to *e* in medial unstressed syllables. Round B is fed by both archaic parsing syncope and alignment syncope, and feeds raising of **e*, *o* to *i*, *u* before the velar nasal as in *nuncupāre* and *sinciput* (see above). Round C applies late, after monophthongization, as in *undecim*. My proposal that there was a single OstL will have to explain these apparent ordering facts. Given the sound changes he cites, there's actually nothing distinguishing Round A from Round B: there's no argument that the sporadic instances of syncope feeding Round B have to be later than weakening. Round C really is separate, though, importantly because it's fed by monophthongization.

The crucial fact from absolute chronology distinguishing Round C from Rounds A and B is that weakening precedes monophthongization: while weakening was prehistoric, **oi* > *ū* only took place at the start of the 2nd century BCE (Weiss 2009: 192). If the other monophthongization from **ei* > *ī* was part of the same sound change as **oi* > *ū*, then we have internal evidence for this relative chronology as well: weakening **a* > *e* feeds **ei* > *ī*, as in **ok-kaidō* > **occeidō* > *occidō* 'kill' (cf. *caedō* 'cut' for the base form). Based on examples like *iuncus*, *uncia*, and *undecim* above, I've argued that monophthongization feeds OstL—and Weiss' case for distinguishing Round A from later rounds is that there are examples of OstL feeding weakening.

Because only short *ă* undergoes weakening to *e*, if any instances of **āRC* undergo OstL to **āRC* and then weaken to **eRC*, we'd have a case of a pre-weakening OstL (cf. *talentum* 'talent' < Greek *tálanton* for weakening in this environment (Sihler 1995: 61)). And because monophthongization follows weakening and some OstL follows monophthongization, we'd need multiple rounds, as Weiss proposes. To argue against OstL preceding weakening, it'd suffice to give an example of a long vowel **ā* shortened by OstL but not later affected by weakening.

The theme vowels from section 2.1.1 show exactly this development, where OstL counterfeeds weakening, rather than weakening feeding OstL. Next to *amāre*, we have the 3pl. *amant*, not **amānt* > **amant* > ***ament*; the gen.sg. participle *amantis*, not ***amentis*; and the gerundive *amandus*, not ***amendus*. Weiss' response to this (2009: 126) is that the vowel quality was restored analogically to *amant* after OstL; the *ē:e* correspondence in *docēre:docent* caused by OstL isn't obscured by weakening rules, so in principle could be the basis for a four-part analogy *ē:e* :: *ā:X*. Sihler (1995: 78) is skeptical, pointing out that the only other vowel in the paradigm of *amāre* after OstL-then-weakening would

be *ā*, so *amāns*:**ament* could be analogized as *amāns*:***amānt* just as plausibly as introducing an innovated short vowel *amāns*:*amant*.

An analogy *ē:e* :: *ā:X* would also need to have happened consistently to all instances of *a* in each paradigm: the present 3pl. active (*amant*) and passive (*amantur*), the imperfect 3pl. active (*amabant*) and passive (*amabantur*), the pluperfect 3pl. (*amaverant*), the participle (*amantis*), and the gerundive (*amandus*), as well as the present subjunctive 3pl. of the second, third, and fourth conjugation verbs (*docant*, *trahant*, *audiant*), both active and passive. Rather than a proportional analogy applying to every verb in at least four separate suffixes (the first conjugation stem vowel, the cross-conjugation imperfect stem vowel, the cross-conjugation pluperfect stem vowel, and the second/third/fourth-conjugation present subjunctive stem vowel), I take it that weakening just didn't apply to these forms in the first place—because weakening preceded OstL.

Weiss' two examples of OstL feeding weakening (p. 125)—in other words, of Round A shortening, in his scheme—are *parentēs* 'parents' and *calendae* 'calends': in his view, the former being a fossilized participle **parāntēs* > **parantēs* > *parentēs* from *parāre* 'beget', and the latter being a fossilized deverbal noun **kalāndai* > **kalandai* > *calendae* from *calāre* 'call', attested in derivatives like *calātiō* 'calling' and *calātor* 'caller'. The reasoning is that in both cases, the forms were divorced from their original paradigms, so the vowels weren't analogized to *a* like in the forms above. The first of these isn't a problem if we follow Meiser (1998: 183) and LIV 474 in taking *parentēs* to be an aorist participle of *parere* 'beget', not *parāre*, given that the aorist participle involves a bare root **par-* rather than the stem **par-i-*. This would mean an original **parēntēs* undergoes OstL to *parentēs* with no weakening involved.

In the case of *calendae*, although there was a Sabellic cognate **kalē-* (de Vaan 2008: 85) and a Greek *kalēō*, it won't work to assume an original **calēndae*. The first reason is that we have an early form *kalo* (Leumann 1997: 107, Weiss 2009: 125) in the old formula *die x te kalo Iuno Covella* ('I call you on the xth day, Juno Covella', used to announce which day of the month the Nones were on), so even if there was an original **caleō*, it must have moved to the first conjugation early on. The second reason is that we have a Greek form *Kalāndai* (Graf 2015: 219), which has no explanation if there was never an *a* in the Latin form. Meiser (1998: 109) and LIV 361 etymologize *calāre* as from **kala-je/o-*, from which we would expect a long theme vowel. But if *calāre* is from **kelh₁-*/**klh₁-* with no suffix, then the theme vowel from **-h₁-* > *-ā-* would originally have been short, so the oldest derivative in *-nd-* would be just **calandae* (Schrijver 1991: 206). Schrijver explains the vowel in the first syllable either by a change **e* > *a* after a plain velar or as a reflex of **klh₁-* before a vowel. The vowel in the second

syllable underwent weakening as expected, having not been produced by OstL. By the *alacer* rule (Weiss 2009: 118), this syllable is blocked from weakening to *e* by undergoing harmony with the first syllable, giving forms like **calatiō* and **calator*; I take it these were then remodelled with the first conjugation theme vowel and become *calātiō* and *calātor*. Weiss' two problematic etymologies, then, needn't be convincing.

One case not mentioned by Weiss as an argument for a round of OstL preceding weakening is *vēndō* 'sell'. As commented earlier, this superficially gives us a chronology problem: *vēndere* < *vēnum* + *dāre* shows weakening of the theme vowel *a* to *e*, but if weakening precedes OstL, any forms created early enough to undergo weakening should also undergo OstL. As above, we can quite reasonably invoke analogy with the rest of the derivational family: *vēnum* 'sale', *vēneō* 'be sold', and *vēnālis* 'for sale', all of which are outside the environment for OstL and so keep their long vowels.

In short, then, I think the evidence for a round of OstL before *a*-weakening isn't conclusive—meaning the parsimonious solution, by Ockham's razor, is that there was only a single round of OstL.

4 Conclusion

I've discussed the evidence for Osthoff's Law—the shortening of long vowels before sequences of a resonant followed by a consonant, originally proposed for Greek—in the history of Latin. I've surveyed every word in the recorded Latin lexicon that contains the environment for OstL, and discussed the evidence for the etymology of each word that has been (or could be) claimed to involve OstL shortening. For each of the synchronic 'counterexamples', I've given an explanation in terms of later sound changes, especially the sporadic lengthenings before *rC* and *nct/nx*. In terms of the chronology of OstL, I've shown that (contra Weiss' 2009 account), there was only one application of OstL in the history of Latin; and that it happened some time in or after the 2nd century BCE, following the monophthongization **oi* > *ū*.

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