a long time. The other, Kashaya metrical structure, is a challenge for practically all theories of phonology.

6.4 Covert generalization in Latin

6.4.1 The leveling of rhotacism

6.4.1.1 Rhotacism

Not very long before the oldest written records of Latin, a sound change known as Rhotacism had taken place, by which intervocalic /s/ — probably voiced at that time — changed to /r/. Quite likely rhotacism was part of a more general fortition process which happened around the same time, by which the fricatives /f/ and /θ/ in those environments where they had been voiced, turned into the corresponding stops /b/ and /d/. As a result of this sound change, Latin was left with a synchronic -s ~ -r alternation — also called rhotacism — throughout its inflection and derivation. During the Old Latin period, the rhotacism alternation was partly leveled. At the end of a class of s-stem nouns, the rhotacism alternation is systematically leveled by changing stem-final -s to -r in the nominative singular.

<table>
<thead>
<tr>
<th></th>
<th>Old Latin</th>
<th>Classical Latin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nom.</td>
<td>honōs</td>
<td>honōr-ēs</td>
</tr>
<tr>
<td>Acc.</td>
<td>honōr-em</td>
<td>honōr-ēs</td>
</tr>
<tr>
<td>Gen.</td>
<td>honōr-is</td>
<td>honōr-um</td>
</tr>
<tr>
<td>Dat.</td>
<td>honōr-ī</td>
<td>honōr-ibus</td>
</tr>
<tr>
<td>Abl.</td>
<td>honōr-e</td>
<td>honōr-ibus</td>
</tr>
</tbody>
</table>

Elsewhere the morphophonological rhotacism alternation is retained.


One question that has preoccupied writers on analogical change is why the leveling took place only in masculine and feminine polysyllabic noun stems. A related question raised by generative phonologists is in what sense the change could be characterized as a simplification. Given that rhotacism continues to function even after the leveling in many synchronic -s ~ -r alternations, and that rule reversal is implausible in view of

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334 An earlier version of this section appeared as Kiparsky 1998b. I would particularly like to acknowledge Wayne Redenbarger, who long ago, suggested, as a corollary of his analysis of Latin morphology (Redenbarger 1974), that Nom.Sg. honor could be a case of intervocalic rhotacism. Thanks are also due to Edward Flemming, Andrew Garrett, Bruce Hayes, Charles Reiss, and Donca Steriade for critical discussion.

335 The identical development /z β ð ɣ/ > /r b d g/ took place in Germanic.
derivatives like *honestus*, one might ask whether the change has not merely created a new morphological environment in which the $s \rightarrow r$ process applies. if so, the motivation for the change would be mysterious.

A related puzzle is in what sense the change of *honōs* to *honor* is a leveling. The vowel in the innovating form *honor* is shortened in obedience to a constraint prohibiting words from ending in -$\hat{V}r$, -$\hat{V}l$. It would seem, then, that the change from merely exchanges an $s \sim r$ alternation for an $\tilde{o} \sim o$ alternation. Where is the leveling, then? The Stratal OT analysis presented below will provide a solution to this problem.

A third aspect of this change has been of concern especially to linguists concerned with sharpening the theory of analogical change. Kuryłowicz proposes that analogical change proceeds from basic forms (*formes de fondation*) to derived or marked forms (*formes fondées*). Along similar lines, Dresher & Lahiri argue that leveling is based on certain “important forms” in a paradigm. The Latin case is a potential problem for them, because the basic form of the paradigm, the nominative singular, is seemingly influenced by the oblique inflected forms in the rest of the paradigm. If one wished to capture the leveling synchronically, it would be a problem for standard O/O-Identity constraints, which do not allow bases to be influenced by derived forms. To theorists like Kenstowicz, this has suggested an argument for Paradigm Uniformity constraints. But it would have to be a different kind of Paradigm Uniformity constraint from the Polish one briefly discussed in 6.3.3, where the nominative in fact seems to be the important form.

I propose to show that the change is a special case of a larger change in the Latin inflectional system, by which consonant stems were replaced by vowel stems in the interests of simpler syllable structure. This will add a new type of evidence to that given in Ch. 2 for the existence of stem-level constraints and their effect on the structure of underlying forms.

### 6.4.1.2 Leveling as the result of covert generalization

In a context where allomorphs /A/ and /B/ merge to [A], what is the underlying representation of non-alternating [A]?

$$
\begin{align*}
\text{(918) Underlying:} & \quad /A/ \quad /B/ \\
\text{Output:} & \quad [A]
\end{align*}
$$

Analogical change shows that it is analyzed as /A/. The evidence is that when a neutralization process /B/ $\rightarrow$ [A] is lost, non-alternating outputs of the form [A] remain unchanged (Kiparsky 1968, 1973). This preference for “face value” analyses is predicted by several theories, including Natural Phonology (Stampe 1972/1980), Natural Generative Grammar (Vennemann 1973, Hooper 1976), Lexical Phonology and Morphology (Kiparsky 1982), and Optimality Theory (Prince & Smolensky 1993).

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336 Dominated in monosyllabic words by a minimum size requirement which forces lengthening in them.
But analogical change also provides evidence that this is not the whole story. The face-value analysis can be overridden by positive evidence for a deeper underlying form. I shall argue that the correct generalization is as follows:

(919)  a. Non-alternating forms are assigned the optimal lexical representation.
   b. Of several equally optimal lexical representations, the one closest to the output is preferred.

By (919a), non-alternating /A/ is analyzed as underlying /B/ rather than as /A/ when /B/ conforms better to constraints on lexical representations, such as those relating to the phonological inventory, phonotactics, or the structure of particular classes of morphemes. Case (919b) is the tie-breaker.

This view is actually a consequence of Lexical Phonology and Morphology (Stratal OT), which claims that the structure of morphemes is governed by level 1 (cyclic) phonology, and it is at least compatible with Natural Phonology. On the other hand, it seems irreconcilable with NGG. And if Prince and Smolensky are right that the form of lexical representations is derivative of constraints on the output (Richness of the Base, Lexicon Optimization), then lexical constraints could never choose /B/ as the preferred underlying form of an output that is always overtly realized as [A]. In that version of OT, case (919a) cannot be distinct from case (919b).

I will present evidence which indicates that case (919a) is not reducible to case (919b), and supports a version of OT phonology where lexical and postlexical phonology constitute separate, serially related constraint systems. Such a theory allows properties of lexical representations to be determined by phonological and morphological constraints at the lexical level, not just derivatively by constraints on output forms.

(919a) implies that lexical constraints can induce covert reanalysis of surface [A] as /B/, which may be overtly manifested in analogical change. Latin morphology provides a case in point. The constraint at stake is a preference for vocalic endings over consonantal endings, which drives a series of analogical suffix replacements, of which some are overt, others covert. In the covert cases, the replacement of the original consonantal ending by a vocalic ending at the underlying level is manifested indirectly through its contextual effects, which include the famous generalization of -r in from the oblique stem to the nominative singular in certain nouns and adjectives, e.g. honōs > honor.

Such covert generalizations are of theoretical interest in another respect as well. They are incomprehensible in terms of proportional analogy, output-output constraints, or other surface-oriented approaches to lexical relationship. Viewed in terms of the pre-reanalysis underlying form /A/, the overt consequences of the reanalysis to /B/ can appear as complications of the grammar (exceptions, morphological conditions), or as “paradigm uniformity” effects seemingly restricted to arbitrary contexts. At least in the present case, as well as in the analogous Gothic case presented in Kiparsky (in press), there is no complication of the grammar, nor even any change in the constraint system. What happens rather is that an exceptional morpheme is brought into line with the constraints that organize the language’s morphology.
6.4.1.3 The basic facts

In Latin, intervocalic s becomes r, a process known as Rhotacism (for the sound change, see e.g. Leumann 1963:140). Synchronically, rhotacism applies only in derived environments. Morpheme-internal invariant /s/ occurs both in native words such as (920a) and in presumed loanwords such as (920b).

(920)  
a. miser ‘miserable’, caesariēs ‘hair’, aser ‘ritual ’mixture of blood and wine’  

In rule-based LPM, blocking in nonderived environments was originally attributed to the Strict Cycle Condition, and later to the application of feature-filling rules to specified representations. In Stratal OT, it can be attributed to a constraint that requires faithfulness to a lexical entry.

Rhotacism does not apply to intervocalic s from -ss-, -dt-, -tt- by degemination after a long vowel, a word-level constraint:


This is straightforwardly attributable to the stem-level status of rhotacism, with opacity the result of masking by word-level processes.

Synchronically, rhotacism is productive in Latin morphophonology. It is responsible for s ~ -r alternations at morpheme edges in both derivational and inflectional morphology:

(922) Nouns:

  tellūs, tellūr-is ‘earth’
  mās, mar-is ‘male’ (N.), mas-culu-s ‘male’ (A.)
  corpus, corpor-is ‘body’, corpus-culum ‘little body’, in-corpor-ō ‘incorporate’,
  corpor-āl-is ‘bodily’
  latus, later-is ‘side’, later-āl-is ‘lateral’, latus-cul-um ‘little side’
  lepus, lepor-is ‘rabbit’, lepus-culu-m ‘bunny’, lepor-āri-a ‘rabbit meat’
  glomus, glomer-is ‘ball’, (con)-glomer-ō ‘to compact into a ball’
  in, iūr-is ‘law’, iūs-tu-s ‘just’, in-iūr-ia ‘injustice’, iūr-ā-re ‘swear’
  iūs, iūr-is ‘sauce, gravy’, iūs-culu-m, iūs-cellu-m (dim.), iūr-ulentu-s ‘juicy’
  rūs, rūr-is ‘countryside’, rūs-tiu-s ‘rustic’, rūr-āl-is ‘rural’, rūr-ō ‘live in the country’
  crūs, crūr-is ‘leg’, crūs-culu-m (dim.), crūr-āl-i-s (adj.)
  pus, pūr-is ‘pus’, pūr-ulenti-a ‘purulence’, sup-pūr-ō ‘suppurate’
  flōs, flōr-is ‘flower’, flōr-eu-s ‘flowerly’, flōr-āl-is ‘floral’, flōs-culu-m, flōs-cellu-s

One might consider decomposing words like rosa and pisum into the stems /rosa/, /pis/ and the Nominative Singular endings /-a/, /-um/ (Barr 1994: 522). But as far as I can see this ‘school grammar’ analysis is not supported either by derivational morphology, or by inflection, and I prefer the to take the stems as /rosa/, /pis/.
Paradigms and opacy

flōri-legu-s ‘flower-gatherer, anthologist’
öš, ör-is ‘mouth’, öš-culu-m (dim.), ör-ea-e ‘bit, bridle’, in-ör-i-s, in-ör-u-s ‘mouthless’, ör-i-fici-u-m ‘orifice’
mōš, mōr-is ‘customary behavior’, mōr-ālī-s ‘customary, ethical’
ros, rōr-is ‘dew’, rōs-cūdus ‘dewy’, rōr-a-t ‘is dewy, becomes dewy, bedews’, rōr-i-fēr ‘dew-bringing’
mūs, mōr-is ‘mouse, rat’, mūs-culu-s ‘little mouse, muscle’, mūs-cell-us ‘little mouse’
mūr-i-mu-s ‘relating to mice or rats’, mūs-er-ī-di ‘rat feces’, mūs-cip-ulu-m ‘mousetrap’
fās, fār-is ‘(divine) justice’, ne-fār-i-tu-s
viš, Pl. viř-ē-s ‘strength’, viř-tō-su-s ‘violent’, viř-ićula-e ‘
glīš, glīr-is ‘dormouse’ glīr-āriu-m ‘place for raising dormice’
cucumis, cucumer-is ‘cucumber’
cinis, ciner-is ‘ash, cinders’, ciner-culu-s (dim.), ciner-āriu-s, ciner-eu-s (adj.), ciner-ēs-o ‘burn to ashes’, ciner-iciu-s
culvis, pulver-is ‘dust’, pulvis-culu-s
vōnis, vōmer-is ‘plowshare’
Venus, Vener-is ‘love, Venus’, venus-tu-s ‘charming’, vener-eu-s ‘pertaining to love’
mīnu-s, mūn-er-is ‘payment, gladiator show’ (n.), manus-culu-m (dim.), (re)mūner-ō ‘pay, reward’, mūner-āriu-s ‘promoter of gladiator shows’
fīnus, fēner-is ‘funeral’ (n.), fēnes-tu-s ‘funereal’
sckēl, scel-e-is ‘crime’ (n.), scēles-tu-s ‘criminal’
tempus, tempor-is ‘time’ (n.), tempor-ālī-s ‘temporal’, tempes-tu-s, tempes-tiivu-s ‘timely’, tempes-tā-s ‘time’
fēnu-s, fēner-i-is ‘interest’ (n.), fēner-ārī-s ‘relating to interest’
genus, gener-is ‘kind’ (n.), gener-ō ‘generate’, congener ‘cognate’

(923) Adjectives:
pūbēs, pūber-tā-s ‘mature’, pūber-tā-s ‘puberty’
plūs, plīr-is ‘more’, plūs-culu-m ‘a bit more’, com-plūs-culu-i (pl.) ‘a small majority’, plīr-īes ‘more often’, plīr-ālī-s ‘plural’

(924) Verbs:
ger-ō ‘wear, carry’, ger-e-re (inf.), ges-s-i (perf.), ges-tu-s (pp.)
ūr-ō ‘burn’, ūr-e-re (inf.), ūs-s-i (perf.), ūs-tu-s (pp.)
quae-ō ‘seek, interrogate’, /quae-ś-s-i/ quaesi (perf.), quaes-tu-m or /quae-ś-s-i-tu-
m/quae-stiium (supine), quaesi-tō ‘search, interrogation’, quaesi-tor ‘interrogator, prosecutor’
maer-e-ō ‘be depressed’, maer-ē-re (inf.), /maer-u-i/ (perf.), maer-or, maes-tiis ‘depression’
haur-i-ō ‘drain’, haur-i-re (inf.), /haus-s-i/ hausì (perf.), haus-tu-s (pp.), haus-
Paradigm Uniformity constraints / 549

tru-m 'pump', haus-tor 'drainer'
es-se 'be' (inf.), es-t 'is', er-am 'was', es-c-o (inch.)

(925) Prefixes and suffixes:
dis-pu-t-o, dis-cu-r-r-o, dis-ti-ne-o vs. dir-im-o, dir-ibe-o
es-se 'be' (inf.), ger-e-re 'wear' (inf.), haur-i-re (inf.) 'drain', laud-a-re (inf.) 'praise'

Conclusive evidence of the synchronic productivity of rhotacism is the fact that it applies in words newly introduced into Latin after the historical change had already taken place. These include loanwords ((926a)), and new -s-stems resulting from reanalysis ((926b)):

(926) a. tüs, tü-r-is 'incense' (borrowed from Greek thüös).
   b. glös, glör-is 'sister-in-law' (*/glö-s/ reanalyzed as /glös/)
   c. femus, femor-is 'thigh', Late Latin for classical femur, femor-is (/femur/ reanalyzed as /femus/)
   d. bover-am 'oxen's' (Gen.Pl., Varro), with a stem /bouis/ resulting from reanalysis of Nom. bou-is (itself from bös /bou-s/, see below) as /bouis-s/

Also, new words formed in Latin by productive word formation processes respect the distribution of \( r \sim s \). The listing in (922) includes both early and late Latin words. Late Latin retains the phonological pattern even in morphologically unusual formations where there is no straightforward analogy. For example, from mös 'custom, behavior' there is built in Late Latin the compound adjective benemörius 'well-behaved'.

In fact, once its character as a derived-environment process is understood, it can be seen that \textit{rhotacism is virtually exceptionless}. The only apparent exception in noun inflection that I am aware of is vás, vásis 'vessel'.

In classical Latin, this analogical change affects primarily \textbf{masculine and feminine disyllabic and polysyllabic nouns}, including underived nouns, such as (927a), and derived nouns such as (927b), including about 60 nouns in -or from *-ös:

(927) a. arbös > arbor 'tree'
   honös > honor 'honor'
   odös > odor 'odor'
   vapös > vapor 'vapor'
   colös > color 'color'
   *augus > augur 'omen'
   *vōnis > vōmer 'plowshare'

   b. *pallös > pallor 'pallor'
   *albös > albor 'whiteness'
   *vigös > vigor 'vigor'
   *rigös > rigor 'rigor'
   *fulgös > fulgor 'lightning'

\textsuperscript{338}Even this may be only an apparent exception, if the word is really /vāss/, /vāss-is/, with regular degemination after long vowels. At least some Latin speakers seem to have analyzed it that way, for the Nom.PL is spelled vassa, with -ss, in the Milan MS of Plautus. There is independent evidence that final geminates “count” in Latin: words such as /uad-(i)s/ → vass → vās ‘guarantor’ and /farr-(i)s/ fār ‘spelt’, seem to satisfy prosodic minimality only in virtue of their underlying /-CC/; i.e. there are no words like *fār, fāris in Latin.
Most **neuter nouns** retain -s:\(^339\)


**Adjectives** fall into two classes. Adjectives derived by compounding (the bahuvrīhi or “redcoat” type) level the alternation in all three genders (see (929a)), while other adjectives retain -s in the neuter (see (929b)):

(929) a. \*bicorpus > *bicorpor’ two-bodied’ (m., f., and n.)
    \*degenus > *degenere degenerate’ (m., f., and n.)
    \*congenus > *congener’ cognate’ (m., f., and n.)

b. *melius* (n.), *melior* (m., f.) ‘better’, *meli-ır-is* (gen.sg)
    *plüs* (n.) ‘more’ (no m.f. sg.), *pler-ır-is* (gen.sg.)

**Monosyllables** retain -s:\(^340\)

(930) *glis, glir-is* ‘dormouse’, *flös* (m.) ‘flower’, *mös* (m.) ‘mouse, rat’, *rös* (m.) ‘dew’, *väs* (f.) ‘power’, *mäs* (m.) ‘male’

### 6.4.1.4 The problem

Since rhotacism continues to govern productive alternations in Latin (see (922)), the putative reanalysis \(/honös/ \not\sim /honör/\) would not be a simplification of the grammar. Moreover, some words that level the nominative singular show an -s \(\sim\) -r alternation also in derivation, which remains unchanged.

(931) *arbor* \(\sim\) *arbutus* ‘wooded’, *arbus-cul-a* ‘sapling’
    *honor* \(\sim\) *hones-tu-s* ‘honorable’
    *rōbur* \(\sim\) *rōbus-tu-s* ‘strong’
    *augur* > *augus-tu-s* ‘sacred, exalted’

These data somewhat undermine the credibility of an analysis according to which \(-s/-r\) stems are restructured as \(-r/-s\) stems, e.g. \(/honös/ > /honör/\). Such a restructuring would entail complementing rhotacism with a backwards rhotacism (“sigmacism”) process of the form \(r \rightarrow s / \_ \_ C\), or with the equivalent constraint or constraints barring \(r\) before consonants, in order to account for the alternations in (931). Sigmacism would add a further measure of complexity to the grammar because it would have to be prevented from applying when the base ends in a “real” /\(r/\), e.g. /fur-tu-m/ ‘theft’ \(\sim\) \*fustum\), from \(fūr\ ‘thief’, and \(ver-culu-m\ ‘little spring’ \(\sim\) \*vesculum\), from \(vēr\ ‘spring’. Thus a

\(^{339}\) -r is extended to neuters in a few words that have a masculine gender doublet: \*rōbus, *rōbor-is* (n.) ‘oak heartwood, strength’ \(\rightarrow\) *rōbor, cf. rōbor* (m.); *fulgus, fulger-is* \(\rightarrow\) *fulgur, fulgiris* (n.) ‘lightning’, cf. *fulgor, fulgor-ıs* (m.) ‘id.’. But *decus, decor-ııs* (n.) versus *decor, decö-ır-is* (< *decös* (m.) ‘dignity’, *frıgs, frıgor-ııs* (n.) versus *frıgor, frıgor-ııs* (m.) ‘cold’ (Kieckers 1931:36).

\(^{340}\) But \(Lās > Lār\ ‘household god’; it mostly occurs in the plural Lārés, and has no derivatives with -s, so it may have been synchronically reanalyzed as /lār/.
putative reanalysis of /-s/ stems to /-r/ stems would not be an optimization. Some other motivation for the directionality of the change would be required, perhaps having to do with the special status of the nominative singular in the case paradigm (see Hooper 1976, Drescher & Lahiri 1983, Wetzel 1984 for discussion).

An adequate historical account of the Latin change should not only address this point, but also the following questions:

(932)  
(a) Why does the analogy not apply in neuter nouns?  
(b) Why does the analogy apply in some neuter adjectives but not in others?  
(c) Why does the analogy not apply in monosyllabic nouns (Kuryłowicz 1977:14)?  
(d) Why does the analogy not apply in verbs and prefixes? For example, why not *gertus for gestus, or for that matter *gesō for gerō? Why not *dir-tineō for dis-tinēō ‘separate’, on the analogy of dir-imō ‘separate’, or *dis-imō by the converse analogy?  
(e) honōs > honor eliminates the -s ~ -r alternation but in turn introduces an -ō- ~ -o- alternation into the paradigm (Kiparsky 1972, Hale, Kissock, and Reiss 1998). Then in what sense can it be characterized as a leveling?  
(f) Why not instead honōrem : honōs = sorōrem = X (X = *sorōs) (Kuryłowicz 1977:14), or indeed soror : sorōrem = honōs : X (X = *honōsem)?

6.4.1.5 A solution

For an answer, let us take a closer look at the third declension, to which the s-stems belong.

(933)  
<table>
<thead>
<tr>
<th></th>
<th>‘circle’</th>
<th>‘city’</th>
<th>‘leader’</th>
<th>‘mountain’</th>
<th>‘enemy’</th>
<th>‘sister’</th>
<th>‘dog’</th>
</tr>
</thead>
<tbody>
<tr>
<td>N.</td>
<td>orbis</td>
<td>urbs</td>
<td>dux</td>
<td>mōns</td>
<td>hostis</td>
<td>soror</td>
<td>canis</td>
</tr>
<tr>
<td>A.</td>
<td>orbem</td>
<td>urbem</td>
<td>ducem</td>
<td>montem</td>
<td>hostem</td>
<td>sorōrem</td>
<td>canem</td>
</tr>
<tr>
<td>G.</td>
<td>orbis</td>
<td>urbis</td>
<td>ducis</td>
<td>montis</td>
<td>hostis</td>
<td>sorōris</td>
<td>canis</td>
</tr>
<tr>
<td>D.</td>
<td>orbi</td>
<td>urbi</td>
<td>ducī</td>
<td>montī</td>
<td>hostī</td>
<td>sorōri</td>
<td>canī</td>
</tr>
<tr>
<td>Ab.</td>
<td>orbe</td>
<td>urbe</td>
<td>duce</td>
<td>monte</td>
<td>hoste</td>
<td>sorōre</td>
<td>cane</td>
</tr>
<tr>
<td>N.</td>
<td>orbēs</td>
<td>urbēs</td>
<td>ducēs</td>
<td>montēs</td>
<td>hostēs</td>
<td>sorōrēs</td>
<td>canēs</td>
</tr>
<tr>
<td>A.</td>
<td>orbēs</td>
<td>urbēs</td>
<td>ducēs</td>
<td>montēs</td>
<td>hostēs</td>
<td>sorōrēs</td>
<td>canēs</td>
</tr>
<tr>
<td>G.</td>
<td>orbīum</td>
<td>urbium</td>
<td>ducium</td>
<td>montium</td>
<td>hostium</td>
<td>sorōrum</td>
<td>canum</td>
</tr>
<tr>
<td>D.</td>
<td>orbibus</td>
<td>urbibus</td>
<td>ducibus</td>
<td>montibus</td>
<td>hostibus</td>
<td>sorōribus</td>
<td>canibus</td>
</tr>
<tr>
<td>Ab.</td>
<td>orbibus</td>
<td>urbibus</td>
<td>ducibus</td>
<td>montibus</td>
<td>hostibus</td>
<td>sorōribus</td>
<td>canibus</td>
</tr>
</tbody>
</table>

From a historical point of view, the third declension includes several classes of stems which were morphologically distinct in Indo-European, including -i-stems and -C-stems, which contrast in genitive plurals, cf. (934a) and (934b):\(^\text{341}\)

\(^{341}\) Also in Acc. Pl. -ēs vs. -ēs, in neuter Nom. Pl. -a vs. -ia, in Abl. Sg. -e vs. -i, and sometimes in Acc. Sg. -em vs. -im. The analysis proposed here considerably regularizes the distribution of these endings.
The Nom.Sg. ending -is is reduced to -s in polysyllables, and, with some exceptions, after certain consonant clusters. The stems that undergo this NOMINATIVE i-deletion process will be referred to as LONG STEMS. NOMINATIVE i-deletion applies to /-i-s/ and /-C-is/ but not to /-i-is/.

Short -C stems, where NOMINATIVE i-deletion does not apply, show that there are two nominative singular allomorphs /-s/ and /-is/. The distribution of the two allomorphs is morphologically and lexically determined. For example, the monosyllabic noun stems op- and can- take Nom. Sg. -s and -is, respectively:


a. /op-s/ op /op-um/ opum ‘help’, pl. ‘means’
b. /kan-is/ canis /kan-um/ canum ‘dog’

Long -i stems provide independent evidence for the distinction between the allomorphs /-s/ and /-is/. The generalization is that /-i-is/ → -is, and otherwise /-is/ → -s; contrast (937a) and (937b).


a. /nokti-s/ nox /nokti-um/ noctium ‘night’ (f.)
   /urbi-s/ urbs /urbi-um/ urbium ‘city’ (f.)
   /sekstanti-s/ sextāns /sekstanti-um/ sextantium ‘one sixth As’ (m.)
   /imбри-s/ imber /imбри-um/ imbrium ‘shower’ (m.)
b. /uekti-is/ vectis /uekti-um/ vectium ‘lever’ (m.)
   /orbi-is/ orb is /orbi-um/ orbium ‘circle’ (m.)
   /sémenti-is/ sémentis /sémenti-um/ sémentium ‘planting’ (f.)
   /febri-is/ febris /febri-um/ febrium ‘fever’ (f.)
Similarly /secūri-is/ secūris ‘axe’ (f.) vs. /dis)parsi-s/ (dis)pār ‘unequal’. Generally, /-is/ is more frequent in feminines. In feminine -er adjectives, /-is/ is in fact the regular ending:

(938) /ākeri-s/ → ācer (masc.), /ākeri-is/ → ācris (fem.) ‘sharp’

In sum, there are three inflectional patterns in the long third declension stems, -is ~ -ium, -s ~ -um, and -s ~ -um. The absence of the fourth logically possible pattern -is ~ -um is explained by the proposed analysis, for two of the four potential inputs, (939c) and (939d), converge on the same output, and by the same token, no input yields a paradigm Nom.Sg. -is, Gen.Pl. -um for long stems:

(939)  
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. /-i-is/</td>
<td>/-i-um/</td>
<td>-is</td>
<td>-ium</td>
</tr>
<tr>
<td>b. /-i-s/</td>
<td>/-i-um/</td>
<td>-s</td>
<td>-ium</td>
</tr>
<tr>
<td>c. /-is/</td>
<td>/-um/</td>
<td>-s</td>
<td>-um</td>
</tr>
<tr>
<td>d. /-s/</td>
<td>/-um/</td>
<td>-s</td>
<td>-um</td>
</tr>
</tbody>
</table>

More marginally, there is parallel evidence for an Accusative Singular allomorph /-im/. While the overt third declension Accusative Singular ending is normally -em, a minority of third declension nouns show Acc.Sg. -im. Significantly, they are all -i stems, i.e. stems with Gen.Pl. -ium. Therefore, the ending -im is derivable from /-i-im/, like overt Nominative Singular -is is derivable from /-i-is/.

(940)  
a. /febri-im/ febrim ‘fever’ (f.)  
b. /urbi-m/ urbem ‘city’ (f.)

6.4.2 Syllabically determined suffix allomorphy

The Nom.Sg. /-is/ ~ /-s/ variation is part of a larger pattern of allomorphy. Other inflectional endings that begin with consonants have developed an allomorph in /-i/, which is favored after -C stems, where it eventually replaces the consonantal allomorph completely. In Indo-European terms, vocalic inflection replaces consonantal inflection (‘thematization’ being a special case of this drift), and in Romance terms, parisisyllables replace imparisyllables. Thus Dat./Abl.Pl. /-bus/ > /-ibus (see (941a)) and 2.3.Sg. /-s, -t/ > /-is, -it/ ((941b)) are parallel to Nom.Sg. /-s/ > /-is/ (see (941c)):

(941)  
a. *rēg-bus > rēgibus ‘king’ (Dat./Abl.Pl.)  
b. ēst > ēdit (jēd-t/ > jēd-it/) ‘eats’  
fert > ferit ‘carries’ (postclass.)  
c. *aus > auris ‘ear’ (cf. auscultāre ‘listen’)  
bōs > bovis ‘bovine animal’  
glāns > glandis ‘acorn’  
mōns > montis ‘mountain’ (Ennius)  
mēns > mentis ‘mind’ (Ennius)  
sors > sortis ‘lot’ (Plautus)  
mūgil > mūgilis ‘mullet’ (Juvenal)  
grūs > gruis ‘crane’ (Phaedrus)  
frōns > frontis ‘forehead’ (late Latin)
frōns > frondis ‘frond’ (late Latin)

By late Latin, this analogical process goes to completion in all morphological categories.\textsuperscript{343}

The selection of vocalic and consonantal allomorphs is done by the syllable structure constraints *CODA and ONSET: -C stems get the vocalic Dat./Abl.Pl. allomorph /-ibus/, while -V stems get the consonantal allomorph /-bus/. Similarly, -C stems get Gen.Pl. /-um/, while -V stems get /-rum/:\textsuperscript{344}

\begin{center}
\begin{tabular}{|c|c|c|c|}
\hline
Input & Candidates & *CODA & ONSET \\
\hline
/sorōr-bus, -ibus/ & sorōr-bus & * & \\
\hline
\textbullet & sorōr-ibus & & \\
\hline
/rē-bus, -ibus/ & rē-bus & & * \\
\hline
\textbullet & rē-ibus & & \\
\hline
\end{tabular}
\end{center}

\begin{center}
\begin{tabular}{|c|c|c|c|}
\hline
Input & Candidates & *CODA & ONSET \\
\hline
/sorōr-rum, -um/ & sorōr-rum & * & \\
\hline
\textbullet & sorōr-um & & \\
\hline
/rē-rum, -um/ & rē-rum & & \\
\hline
\textbullet & rē-um & & \\
\hline
\end{tabular}
\end{center}

6.4.3 The Nominative Singular

As we saw in (939), NOMINATIVE i-DELETION neutralizes the potential distinction between /-s/ and /-is/ in long -C stems. A word like Nom.Sg. parēns could be underlying /parent-s/ or /parent-is/, and sorōr ‘sister’ could be underlying /sorōr-s/ or /sorōr-is/. This is a concrete instance of the neutralization schema in (918).

Theories which countenance a stem level subject to its own constraint system, such as Stratal OT, make the following prediction here. The stem-level representation of structurally ambiguous non-alternating outputs, \textit{whatever their surface realization by the word-level or postlexical constraint systems}, is the one that best conforms to the stem-level constraints (case (919a)). In particular, this means that the *CODA constraint in the stem-level phonology will cause ambiguous non-alternating -s after long -C stems to be analyzed as underlying /-is/.

\begin{center}
\begin{tabular}{|c|c|c|}
\hline
(943) Stem level: /-s/ & \text{vs.} & /-is/ \\
\hline
Word level: & -s \\
\hline
\end{tabular}
\end{center}

\textsuperscript{343}The late grammarian Consentius cites the nominatives fontis, dentis as “solecisms” (Niedermann 1937:18,26).

\textsuperscript{344}Stems in long -ū often pattern with -C stems, e.g. /fū-it/ fuit ‘was’ vs. /dā-t/ dat ‘gives’, /grū-is/ gruis ‘crane’ vs. /rē-s/ rés ‘matter’.
I will assume a lexical phonology with the constraints in [944] and [945]:

(944) Stem-level phonology:
   a. *VsV (the constraint that drives rhotacism)
   b. *CODA: A syllable must lack a coda.
   c. ONSET: A syllable must have an onset.

(945) Word-level phonology:
   a. STEM-FORM: A stem must contain at least a two-mora foot (not counting a stem-final -C, which is not mornaic).
   b. *VVR]: A word cannot end in a long vowel followed by -l, -r. (Dominated by STEM-FORM, hence no shortening in monosyllables).
   c. *-RC]: A syllable cannot end in a sonorant-obstruent cluster.
   d. *Nom-*i: -i- is deleted in the final syllable of nominative singular forms. (Probably not a single constraint but a complex of constraints. Synchronically, it has to be restricted to nominatives because of endings like gen.sg. -is, historically *-es.)

As mentioned, the rhotacism constraint *VsV is virtually exceptionless, once we factor in the constraint that restricts it to derived environments. *CODA and ONSET, of course, are less often seen in action in Latin because they are dominated by Faithfulness constraints. Their role in allomorphy selection is thus a case of the emergence of the unmarked in the sense of McCarthy and Prince.

The constraint (945c) *-RC], which prohibits syllables ending in sonorant-obstruent cluster, is violated by obstruents reduced from two-consonant sequences, as in /monti-s/ → mòns, /pari-s/ → pars. I assume that such sequences persist in virtue of of a Faithfulness constraint that dominates *-RC], which demands the retention of the segmental content of multiply linked phonemes (geminates and quasi-geminates). Note that the same constraint could also be responsible for the failure of rhotacism to apply to degeminated -ss-, e.g. /haus-s-í/ → hausí (*haurí), for the retention of /i-is/ as -is in the face of NOMINATIVE i-DELETION, and for the retention of /-i-im/ as -im in the face of -i-LOWERING.

At the word level, rhotacism is dominated by Faithfulness, and hence does not apply to intervocalic VVs sequences enforced by word-level constraints, such as the prohibition of geminates after long vowels. The derivation of hausí from /haus-s-í/ illustrates this. The lexical constraints ((946)) maintain the geminate ss, while the word-level constraints ((947)) eliminate it, but in turn do not reduce the resulting intervocalic s to r:

---

These constraints represent a preliminary analysis, with some simplifications. In particular, for a phonological constraint not to figure in the stem-level or word-level phonology really means that it is dominated at that level by an antagonistic Faithfulness constraint. In the actual constraint system, the stem level and word level systems are not disjoint, but include the same constraints, and differ rather in the ranking of Faithfulness constraints among them.
Here the constraint *-VVC,C_i is a conjunction of the constraint prohibiting three-mora syllables (*_mm_0) and the constraint prohibiting geminates (*C_i C_i).

Tables (948) and (949) show the analysis of Nom.Sg. -s as /-is/ in long stems. Syllable-driven allomorphy selection in the stem-level system yields sorörr-is, rë-s (see (948)), and the word-level constraints reduce sorörr-is to soror (see (949)).

Table (949) shows how *Nom-i forces deletion of i in the word-level phonology in soröris, and how i is retained in short stems like canis because deletion would violate the dominant Stem-Form constraint.
6.4.4 Rhotacism as a consequence of suffix allomorphy

It can now be seen that the leveling of -s ~ -r is a consequence of the (covert) spread of the Nom.Sg. allomorph /-is/. The regularized inflection of /honōs-/, which runs entirely parallel to the inflection of /sorōr-/, except that the stem-level *VsV constraint, which was vacuously satisfied in /sorōr-/, enforces rhotacism in Nom.Sg. /honōs-is/ → honoris (see (950)). The word-level constraint system then takes the stem-level output Nom.Sg. /honōr-is/ to honor, just as it takes Nom.Sg. /sorōr-is/ to soror (see (951)):

(950)  
<table>
<thead>
<tr>
<th>Stem level</th>
<th>Candidates</th>
<th>*VsV</th>
<th>*CODA</th>
<th>Onset</th>
</tr>
</thead>
<tbody>
<tr>
<td>/honōs-bus, -ibus/</td>
<td>honōs-bus</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>honōs-ibus</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*</td>
<td>honōr-ibus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>/honōs-s, -is/</td>
<td>honōs-s</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>honōs-is</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*</td>
<td>honōr-is</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(951)  
<table>
<thead>
<tr>
<th>Word level</th>
<th>Candidates</th>
<th>STEM-FORM</th>
<th>*VVR</th>
<th>*RC</th>
<th>*Nom-i</th>
</tr>
</thead>
<tbody>
<tr>
<td>/honōr-is/</td>
<td>honōr-is</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>honōr-s</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>honōr</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*</td>
<td>honor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Nom.Sg. allomorph /-is/ spreads through the third declension over a long period. On the surface, this spread of /-is/ results in diverse changes, or no change, according to what the regular phonology of Latin dictates. The range of its overt effects are illustrated in (952):

(952)  
<table>
<thead>
<tr>
<th>Old system</th>
<th>New system</th>
<th>overt change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underlying</td>
<td>Surface</td>
<td>Underlying</td>
</tr>
<tr>
<td>/sorōr-/</td>
<td>soror</td>
<td>/sorōr-is/</td>
</tr>
<tr>
<td>/kan-/</td>
<td>*can(s)</td>
<td>/kan-is/</td>
</tr>
<tr>
<td>/honōs-</td>
<td>honōs</td>
<td>/honōs-is/</td>
</tr>
<tr>
<td>/monti-/</td>
<td>mōns</td>
<td>/monti-is/</td>
</tr>
</tbody>
</table>

6.4.4.1 Explaining the properties of the change

The questions we posed in (932a-f) can now be answered.

Re [932a]: Why does the analogy not apply in neuter nouns? The reason is that neuters do not have a Nom./Acc. Sg. ending. We know that because no Nom.Sg. -s ever appears in neuters, even in those stems where the phonological conditions would force such an /-s/ to surface:

Because neuters have no Nom.Sg. /-s/, there is no occasion to regularize /-s/ to /-is/, and hence no rhotacism.

Re [932b]: Why does the analogy apply in some neuter adjectives but not in others? Neuter s-stem adjectives level /s/ to /r/ just in case they have an overt Nominative Singular ending. In particular, neuter adjectives of the form X-Noun (compounds of the bahuvrihi type) get Nom./Acc.Sg. -s (which is synchronically /-is/ by our hypothesis, see (954a)). Otherwise, neuter adjectives have no Nom./Acc.Sg. ending, like neuter nouns (see (954b)).

   b. brevis (m.,f.), breve (n.) ‘short’ (cf. mare ‘sea’)

Therefore, those adjectives in /-s/ which are bahuvrihi compounds level out rhotacism in all three genders, whereas those adjectives in /-s/ which do not belong to this class adopt the majority pattern. Adjectives formed with the comparative suffix -ior ~ -ius and glis belong to this type.346

(955)  a. /bi-korpus-is/ → bicorpor ‘two-bodied’ (m., f., and n.)
   /dē-genus-is/ → dēgener ‘degenerate’ (m., f., and n.)
   b. /kitius-is/ citior (m.,f.), /kitius/ citius (n.) ‘faster’

The fact that those morphological classes which are inflected with an overt Nom.Sg. ending undergo leveling of rhotacism, and those morphological classes which are inflected without an overt Nom.Sg. ending do not, follows directly from the present analysis.

Re [932c]: Why does the analogy not apply in monosyllables? Monosyllabic nouns retain Nom.Sg. -s because a covert generalization of the vocalic ending /-is/ is ruled out, for i-deletion doesn’t apply in short stems. Consequently, glis does not become *glir the way honēs becomes honor. The analogically reformed /glis-is/ is a short stem, so its -i- is not subject to deletion. The expected analogical output, instead, is gliris.

In fact, glis > gliris is actually attested in late Latin (Appendix Probi). Thus, the real counterpart to the analogical spread of rhotacism in the nominative singular long stems (honēs > honor) is the analogical spread of the overt ending -is in the nominative singular of short stems (glos > gliris, analogous to cases like mōns > montis etc., see (941c) and (952)). But the overt generalization of /-is/ has a more drastic effect on the output form than its covert counterpart, for it not only replaces the stem-final consonant but also adds a syllable. Because the short stems provide the learner with clearer overt evidence than the long stems, they change more slowly, with the time lag characteristic for the salient cases of an innovation (Naro 1981).347

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346 Adjectives that usually modify human beings, like vetus ‘old’, pūbēs ‘having reached maturity’, dives ‘rich’, caelebs ‘unmarried’, naturally rare in the neuter, seem to have -s throughout the nominative of all three genders in the classical language, as far as it is possible to tell.

347 In canis ‘dog’ /-is/ was introduced early, because the inherited *can(s) violates foot minimality; also interestingly enough in iuvenis ‘youth’ (an exception to NOMINATIVE i-DELETION!).
In postclassical Latin, as the declensional classes tended to merge, many stems that retained the -s ~ -r alternation in the classical language leveled it out:

(956) cinis > ciner ‘cinder’
pulvis > pulver ‘dust’ (Gloss.)
cucumis > cucumer ‘cucumber’
vetus > veter ‘old’ (Ennius)
pubes > puber ‘mature’

In the Romance languages, the allomorphy is quite obliterated: Italian fiore, monte (but corpo, tempo, petto etc.), French fleur, mont.

Re (932d): Why does the analogy not apply in verbs and prefixes? Unlike the innovation that actually happened, such innovations as *gesô,*gertus, *dis-imô, or *dir-timeô would complicate the system: ges- ∼ ger- and dis- ∼ dir- are phonologically regular reflexes of underlying forms /ges/ and /dis/, so changing the output forms would not reduce allomorphy, but simply introduce gratuitous exceptions to the otherwise well-behaved rhotacism process.

Re (932e): Why does the “leveling” introduce a length alternation? The -s > -r replacement is a side effect of the generalization of the vocalic allomorph /-is/, which is itself driven by the optimization of syllable structure in lexical representations. The same generalization has another side effect of the opposite kind, a differentiation of the vowel length between the Nom.Sg. and oblique stem (honor vs. honôr-). Both are the expected phonological consequences of a morphological change.

Re (932f): Why this change, rather than other hypothetical analogies, such as honôrem : honôs = sorôrem = X (X = *sorôs), or soror : sorôrem = honôs : X (X = *honôsem)? These other analogies would not be motivated either by the phonology or the morphology; the latter change would in fact complicate the system. The analogical change that actually happened removes a morphological exception, regularizing the distribution of the nominative singular endings.

6.4.5 Conclusion

We may conclude that there is evidence for optimization of lexical representations, which implies that there is a system of constraints that characterizes regularities at the stem level. Analogical processes can affect this constraint system, causing lexical representations to conform to the canonical distribution of allomorphs and segments of the language. The case examined here is not an instance of surface analogy. It involves the elimination of unmotivated language-specific restrictions on the *CODA constraint in allomorphy, independently manifested in other morphological alternations of the language. Thus it is consistent with the view that analogical change is grammar optimization.