COVERT GENERALIZATION

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In a context where allomorphs /A/ and /B/ merge to [A], what is the underlying representation of non-alternating [A]?[1]

[1] Underlying: /A/ /B/

Output: [A]

Analogical change shows that it is analyzed as /A/. The evidence is that when a neutralization process /B/ → [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).

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:

[2] 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 [2a], 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 [2b] is then only the tie-breaker.

This view is actually a consequence of Lexical Phonology and Morphology (LPM), and it is at least compatible with Natural Phonology. On the other hand, it seems irreconcilable with Vennemann's and Hooper's 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 [2a] cannot be distinct from case [2b].

I will present evidence which indicates that case [2a] is not reducible to case [2b], and supports a version of OT phonology where lexical and postlexical phonology constitute

[1] I would particularly like to acknowledge Wayne Redenbarger, who long ago suggested, as a corollary of his analysis of Latin morphology in Redenbarger 1974, that Nom.Sg. *honor* could be a case of intervocalic rhotacism. Thanks are also due to Edward Flemming, Andrew Garrett, Bruce Hayes, and Donca Steriade for critical discussion.

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.

[2a] 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.

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 [3a] and in presumed loanwords such as [3b].

[3] a. *miser* 'miserable'

b. *rosa* 'rose', *asinus* 'donkey'

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

[4] /haus+s+ī/ *hausī* 'I drained', /kad+t+us/ *cāsus* 'fallen', /vid+t+us/ *vīsus* 'seen'.

In LPM, these properties follow from the *cyclic* status of rhotacism.

Synchronically, rhotacism is *productive*. It functions as a rule of Latin morphophonology accounting for *s* ~ *-r* alternations at morpheme edges in both derivational and inflectional morphology:

[5] a. *fūnus, fūner+is* 'body', *fūnes+tu+s* 'funereal'
scelus, sceler+is 'crime', *sceles+tu+s* 'criminal'
mās, mar+is 'male' (N.), *mas+cul+u+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+u+m* 'little side'
lepus, lepor+is 'rabbit', *lepus+cul+u+m* 'bunny', *lepor+āri+a* 'rabbit meat'
glomus, glomer+is 'ball', *(con)+glomer+ō* 'to compact into a ball'
iūs 'justice', *iūs+tu+s* 'just', *in+iūr+ia* 'injustice', *iūr+ā+re* 'swear'
fās '(divine) justice', *ne+fār+iu+s*

b. *ger+ō* 'wear, carry', *ges+t+u+s* (pp.)
quaer+ō 'seek, interrogate', *quaes+tiō* 'search, interrogation'
haur+īre 'drain', *haus+t+u+s* '(pp.)'

c. *dis+put+ō, dis+curr+ō, dis+tine+ō* vs. *dir+im+ō, dir+ibe+ō.*

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 ([6a]), and new *-s*-stems resulting from reanalysis ([6b]):

[6] a. *tūs, tūr+is* 'incense' (borrowed from Greek *thūos*).

b. *glōs, glōr+is* 'sister-in-law' (*/glō+s/ reanalyzed as /glōs/)
femus, femor+is 'thigh', Late Latin for classical *femur, femor+is* (/femur/ reanalyzed as /femus/),
bover+um 'oxen's' (Gen.Pl., Varro), with a stem /bouis/ resulting from reanalysis of Nom. *bov+is* (itself from *bōs* /bou+s/, see below) as /bouis+s/.

In fact, once its character as a derived-environment process is understood, it can be seen that *rhotacism is virtually exceptionless.* The only exception in noun inflection that I am aware of is *vās, vāsis* 'vessel'.[2]

The stem-final *-s* ~ *-r* alternation resulting from rhotacism is leveled in some *s*-stem nouns by changing stem-final *-s* to *-r* in the nominative singular (Saussure 1916:230, Hoenigswald 1960:108-111, Kiparsky 1972, Hooper 1976:95, Kuryłowicz 1977:14, Hock 1979:179-180, Dresher and Lahiri 1983, Wetzels 1981, Ch. 4, Wetzels 1984, Kenstowicz 1996, Hale, Kissock, and Reiss 1998). The vowel in the innovating form is shortened in obedience to a constraint prohibiting polysyllabic words in *-V̄r, -V̄l.*

[7]

	Old Latin		Classical Latin	
Nom.	**honōs**	honōr+ēs	**honor**	honōr+ēs
Acc.	honōr+em	honōr+ēs	honōr+em	honōr+ēs
Gen.	honōr+is	honōr+um	honōr+is	honōr+um
Dat.	honōr+ī	honōr+ibus	honōr+ī	honōr+ibus
Abl.	honōr+e	honōr+ibus	honōr+e	honōr+ibus

In classical Latin, this analogical change affects primarily **masculine and feminine disyllabic and polysyllabic nouns**, including underived nouns, such as [8a], and derived nouns such as [8b], including about 60 nouns in *-or* from **-ōs*:

[8]

a.			b.		
arbōs > arbor	'tree'		**pallōs > pallor*	'pallor'
honōs > honor	'honor'		**albōs > albor*	'whiteness'
odōs > odor	'odor'		**vigōs > vigor*	'vigor'
vapōs > vapor	'vapor'		**rigōs > rigor*	'rigor'
colōs > color	'color'		**terrōs > terror*	'terror'
**augus > augur*	'omen'		*fulgus > fulgur*	'lightning'
vōmis > vōmer	'plowshare'			

[2]Even this may be only an apparent exception, if the word is really /uāss/, /uāss+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/.

Most **neuter nouns** retain *-s*:[3]

[9] *corpus, corpor+is* 'body' ↛ **corpor, genus, gener+is* 'kind' ↛ **gener, scelus* 'crime', *crūs* 'leg', *onus* 'burden', *fūnus* 'funeral', *vulnus* 'wound', *stercus* 'dung', *tempus* 'time', *sīdus* 'star', *pecus* '(head of) cattle', *pectus* 'chest', *tergus* 'rear', *glomus* 'ball', *nemus* 'woods', *latus* 'side'

Adjectives fall into two classes. Adjectives derived from noun compounds (the *bahuvrīhi* type) level the alternation in all three genders (see [10a]), while other adjectives retain *-s* in the neuter (see [10b]):

[10] a. **bicorpus* > *bicorpor* ' two-bodied' (m., f., and n.)
**dēgenus* > *dēgener* 'degenerate' (m., f., and n.)

b. *melius* (n.), *melior* (m., f.) 'better', *meliōr+is* (gen.sg)
plūs (n.) 'more' (no m.f. sg.), *plūr+is* (gen.sg.)

Monosyllables retain *-s*:[4]

[11] *flōs* (m.) 'flower', *mōs* (m.) 'custom', *mūs* (m.) 'mouse, rat', *rōs* (m.) 'dew', *vīs* (f.) 'power', *mās* (m.) 'male'

Since rhotacism continues to govern productive alternations in Latin (see [5]), the putative reanalysis /honōs/ > /honōr/ would not be a simplification of the grammar. Moreover, some words that level the nominative singular keep the *-s* ~ *-r* alternation in derivation:

[12] *arbor* > *arbus+tus* 'wooded', *arbus-cul-a* 'sapling'
honor > *hones+tu+s* 'honorable'
rōbur > *rōbus+tu+s* 'strong'
augur > *augus+tu+s* 'sacred, exalted'

These data somewhat undermine the credibility of an analysis according to which /-s/ stems are restructured as /-r/ stems, e.g. /honōs/ > /honōr/. 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 [12]. Sigmacism adds a further measure of complexity to the grammar because it must be prevented from applying when the base ends in a "real" /r/, e.g. /fur+tu+m/ 'theft' (↛ **fustum*), from *fūr* 'thief'. Thus a 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, Dresher & Lahiri 1983, Wetzels 1984 for discussion).

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

[13] a. Why does the analogy not apply in neuter nouns?

[3] *-r* is extended to neuters in a few words that have a masculine gender doublet: **rōbus, rōbor+is* (n.) 'oak heartwood, strength' → *rōbor*, cf. *rōbor* (m.); *fulgus, fulger+is* → *fulgur, fulguris* (n.) 'lightning', cf. *fulgor, fulgōr+is* (m.) 'id.'. But *decus, decor+is* (n.) versus *decor, decōr+is* (< **decōs*) (m.) 'dignity', *frīgus, frīgor+is* (n.) versus *frīgor, frīgor+is* (m.) 'cold' (Kieckers 1931:36).

[4] But *Lās* > *Lār* 'household god'; it mostly occurs in the plural *Larēs*, and has no derivatives with *-s*, so it may have been synchronically reanalyzed as /lar/.

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+tineō* '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*)?

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

[14]

	'circle'	'city'	'leader'	'mountain'	'enemy'	'sister'	'dog'
N.	orbis	urbs	dux	mōns	hostis	soror	canis
A.	orbem	urbem	ducem	montem	hostem	sorōrem	canem
G.	orbis	urbis	ducis	montis	hostis	sorōris	canis
D.	orbī	urbī	ducī	montī	hostī	sorōrī	canī
Ab.	orbe	urbe	duce	monte	hoste	sorōre	cane
N.	orbēs	urbēs	ducēs	montēs	hostēs	sorōrēs	canēs
A.	orbēs	urbēs	ducēs	montēs	hostēs	sorōrēs	canēs
G.	orbium	urbium	ducum	montium	hostium	sorōrum	canum
D.	orbibus	urbibus	ducibus	montibus	hostibus	sorōribus	canibus
Ab.	orbibus	urbibus	ducibus	montibus	hostibus	sorōribus	canibus

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. [15a] and [15b]:[5]

[15]

	Nom.Sg.		Gen.Pl.		
a.	/imbrek+s/	imbrex	/imbrik+um/	**imbricum**	'tile'
	/parent+s/	parēns	/parent+um/	**parentum**	'parent'
b.	/simpleki+s/	simplex	/simpleki+um/	**simplicium**	'simple'
	/ingenti+s/	ingēns	/ingenti+um/	**ingentium**	'huge'

The Nom.Sg. ending *-is* is reduced to *-s* in polysyllables, and, with some exceptions, after consonant clusters. This NOMINATIVE *i*-DELETION process applies to /-i+s/ and /-C+is/ but not to /-i+is/. The stems that undergo it will be referred to as LONG STEMS.

[16] a. /kom+potis/ *compos* 'in control' vs. /potis/ *potis* 'able'
/inter+kutis/ *intercus* 'subcutaneous' vs. /kutis/ *cutis* 'skin'

b. /nostrāti+s/ → *nostrās* 'native, domestic' (gen.pl. *nostrātium*, Old Latin *nostrātis*)

[5] Also in Acc.Pl. *-ēs* vs. *-īs*, in neuter Nom.Pl. *-a* vs. *-ia*, in Abl.Sg. *-e* vs. *-ī*, and sometimes in Acc.Sg. *-em* vs. *-im*. The analysis proposed here considerably regularizes the distribution of these endings.

c. /menti+s/ → *mēns* 'mind' (gen.pl. *mentium*)
/morti+s/ → *mors* 'death' (gen.pl. *mortium*)
/nokti+s/ → *nox* 'night' (gen.pl. *noctium*)
/imbri+s/ → *imber* 'shower' (gen.pl. *imbrium*)

Short -C stems, where deletion does not apply, show that there are two nominative singular allomorphs /-s/ and /-is/; contrast [17a] and [17b]:

[17]		Nom.Sg.		Gen.Pl.		
	a.	/op+s/	**ops**	/op+um/	opum	'help', pl. 'means'
	b.	/kan+is/	**canis**	/kan+um/	canum	'dog'

Long *-i* stems also provide evidence for the distinction between the allomorphs /-s/ and /-is/; contrast [18a] and [18b].

[18]		Nom.Sg.		Gen.Pl.		
	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.)
		/imbri+s/	**imber**	/imbri+um/	imbrium	'shower' (m.)
	b.	/uekti+is/	**vectis**	/uekti+um/	vectium	'lever' (m.)
		/orbi+is/	**orbis**	/orbi+um/	orbium	'circle' (m.)
		/sēmenti+is/	**sēmentis**	/sēmenti+um/	sēmentium	'planting' (f.)
		/febri+is/	**febris**	/febri+um/	febrium	'fever' (f.)

Similarly /sēcūri+is/ *sēcūris* 'axe' (f.) vs. /dispāri+s/ *dispār* 'unequal'. Generally, /-is/ is more frequent in feminines (as is the accusative ending /-im/, which I take as underlying /-i+im/, e.g. /febri+im/ *febrim* 'fever'). In feminine *-er* adjectives, /-is/ is regular:

[19] /ākeri+s/ → *ācer* (masc.), /ākeri+is/ → *ācris* (fem.) 'sharp'

In sum, there are three inflectional patterns in the long stems. The absence of the fourth possible pattern is explained by the proposed analysis, for two of the four potential inputs, [20c] and [20d], converge on the same output, and by the same token, no input yields a paradigm Nom.Sg. *-is*, Gen.Pl. *-um* for long stems:

[20]		Nom.Sg.	Gen.Pl.	Nom.Sg.	Gen.Pl.
	a.	/-i+is/	/-i+um/	*-is*	*-ium*
	b.	/-i+s/	/-i+um/	*-s*	*-ium*
	c.	/-is/	/-um/	*-s*	*-um*
	d.	/-s/	/-um/	*-s*	*-um*

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 IE terms, vocalic inflection replaces consonantal inflection, and in Romance terms, parisyllables replace imparisyllables. Thus Dat./Abl.Pl. /-bus/ > /-ibus (see [21a]) and 2.3.Sg. /-s, -t/ > /-is, -it/ ([21b]) are parallel to Nom.Sg. /-s/ > /-is/ (see [21c]):

[21] a. **rēg+bus* > *rēgibus* 'king' (Dat./Abl.Pl.)

b. *ēst* > *ēdit* (/ēd+t/ > /ēd+it/) 'eats'
fert > *ferit* 'carries' (postclass.)

c. **aus* > *auris* 'ear'
bōs > *bovis* 'bovine animal' (Varro)
mōns > *montis* 'mountain' (Ennius)
mēns > *mentis* 'mind' (Ennius)
grūs > *gruis* 'crane' (Phaidr.)
sors > *sortis* 'lot' (Plautus)
frōns > *frontis* 'forehead'
frōns > *frondis* 'frond'
glāns > *glandis* 'acorn'
mūgil > *mūgilis* 'mullet' (Juvenal)

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/:[6]

[22] a.

Input		Candidates	*CODA	ONSET
/sorōr+bus, -ibus/		sorōr+bus	*	
	☞	sorōr+ibus		
/rē+bus, -ibus/	☞	rē+bus		
		rē+ibus		*

b.

Input		Candidates	*CODA	ONSET
/sorōr+rum, -um/		sorōr+rum	*	
	☞	sorōr+um		
/rē+rum, -um/	☞	rē+rum		
		rē+um		*

As shown in [20], NOMINATIVE *i*-DELETION neutralizes the potential distinction betwen /-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 [1].

Theories which countenance constraints on lexical representations, such as LPM, make the following prediction here. The underlying representation of structurally ambiguous non-alternating outputs, *whatever their surface realization*, is the one that best conforms to lexical constraints (case [2a]). In particular, this means that the *CODA constraint in the lexical phonology will cause ambiguous non-alternating *-s* after long -C stems to be analyzed as underlying /-is/.

[23] Underlying: /-s/ /-is/
Output: -s

I will assume a lexical phonology with the constraints in [24] and [25]:[7]

[6]Stems in long *-ū* often pattern with -C stems, e.g. /fū+it/ *fuit* 'was' vs. /dă+t/ *dat* 'gives', /grū+is/ *gruis* 'crane'.

[7]Please note that these constraints represent a very preliminary analysis, and even so are grossly simplified

[24] Cyclic phonology:

a. *VsV (the constraint that drives rhotacism)

b. *CODA: A syllable must lack a coda.

c. ONSET: A syllable must have an onset.

[25] 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 moraic).

b. *VVR]$_\omega$: A word cannot end in a long vowel followed by *-l, -r*. (Dominated by STEM-FORM, hence no shortening in monosyllables).

c. *-RC]$_\sigma$: A syllable cannot end in a sonorant+obstruent cluster.[8]

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. *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.

Tables [26] and [27] show the analysis of Nom.Sg. *-s* as /-is/ in long stems. Syllable-driven allomorphy selection in the cyclic lexical system yields *sorōr+is, rē+s* (see [26]), and the word-level constraints reduce *sorōr+is* to *soror* (see [27]).

[26]

Cyclic		Candidates	*CODA	ONSET
/sorōr+s, -is/		sorōr+s	*	
	☞	sorōr+is		
/can+s, -is/		can+s	*	
	☞	can+is		
/rē+s, -is/	☞	rē+s		
		rē+is		*

to save space. In particular, for a phonological constraint not to figure in the cyclic or word level phonology really means that it is dominated at that level by an antagonistic Faithfulness constraint. In the actual constraint system, the cyclic and word level systems are not disjoint, but include essentially the same constraints, and differ rather in the ranking of Faithfulness constraints among them.

[8]Unless the obstruent is reduced from a two-consonant sequence, as in /monti+s/ → *mōns*, /parti+s/ → *pars*. Let us assume that such sequences are allowed to persist because of a Faithfulness constraint that dominates *-RC]$_\sigma$, which demands the retention of the segmental content of multiply linked phonemes (geminates and quasi-geminates). That constraint could also be responsible for the failure of rhotacism to apply to degeminated *-ss-*, e.g. /haus+s+ī/ → *hausī* (**haurī*), and for the retention of /-i+is/ as *-is* in the face of NOMINATIVE *i*-DELETION.

[27]

W.L.		Candidates	STEM-FORM	*VVR]$_\omega$	*-RC]$_\sigma$	*NOM-*i*
/sorōr+is/		sorōr+is				*
		sorōr+s			*	
		sorōr		*		
	☞	soror				
/kan+is/	☞	can+is				*
		can+s			*	
		can	*			

In the word-level phonology, *i* is deleted in *sorōris* in satisfaction of *NOM-*i*, but retained in short stems like *canis* because deletion would violate the STEM-FORM constraint.

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-/ runs entirely parallel parallel to the inflection of /sorōr-/, except that the cyclic *VsV constraint, which was vacuously satisfied in /sorōr-/, enforces rhotacism in Nom.Sg. /honōs+is/ → *honōris* (see [28]). The word-level constraint system takes *honōris* to *honor* (see [29]):

[28]

Cyclic		Candidates	*VsV	*CODA	ONSET
/honōs+bus, -ibus/		honōs+bus		*	
		honōs+ibus	*		
	☞	honōr+ibus			
/honōs+s, -is/		honōs+s		*	
		honōs+is	*		
	☞	honōr+is			

[29]

W.L.		Candidates	STEM-FORM	*VVR]$_\omega$	*RC]$_\sigma$	*NOM-*i*
/honōr+is/		honōr+is				*
		honōr+s			*	
		honōr		*		
	☞	honor				

We have seen that the Nom.Sg. allomorph /-is/ spreads through the third declension over a long period. On the surface, this spread results in diverse changes, or no change, according to what the regular phonology of Latin dictates:

[30]

Old system		New system		
Underlying	Surface	Underlying	Surface	overt change
/sorōr+s/	*soror*	/sorōr+is/	*soror*	none
/kan+s/	**can(s)*	/kan+is/	*canis*	ending
/honō+s/	*honōs*	/honōs+is/	*honor*	stem
/monti+s/	*mōns*	/monti+is/	*montis*	stem and ending

The questions we posed in [13]a-f can now be answered.

Re [13a]: the reason the analogy does not apply in **neuter nouns** is that neuters do not

have a Nom./Acc. Sg. ending, as shown by the absence of *-s* even in those stems where an underlying /-s/ would have to surface:

[31] *mare* 'sea' *(*maris), lac* 'milk' *(*lactis, *lax), caput* 'head' *(*capis).*

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

Re [13b]: neuter *s*-stem **adjectives** get analogical Nom.Sg. *-r* in those morphological classes which are inflected with an overt Nom.Sg. ending, and retain stem-final *-s* (as neuter nouns do) in those morphological classes which are inflected without an overt Nom.Sg. ending. In particular, neuter adjectives of the form X+Noun (compounds of the *bahuvrīhi* type) get Nom./Acc.Sg. *-s* (which is synchronically /-is/ by our hypothesis, see [32a]). Otherwise, neuter adjectives have no Nom./Acc.Sg. ending, like neuter nouns (see [32b]).

[32] a. *bidēns* /bi+dent+is/ 'two-toothed', *triceps* /tri+kapit+is/, 'three-headed', *quadrupēs* /k^{w}adru+ped+is/ 'four-footed', *duplex* 'double', *triplex* 'threefold' (Leumann 1963:265).

b. *brevis* (m.,f.), *breve* (n.) 'short' (cf. *mare* 'sea')

Therefore, those adjectives in /-s/ which are *bahuvrīhi* 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 *plūs* belong to this type.[9]

[33] a. /bi+korpus+is/ → *bicorpor* ' two-bodied' (m., f., and n.)
/dē+genus+is/ → *dēgener* 'degenerate' (m., f., and n.)

b. /citius+is/ *citior* (m.,f.), /citius/ *citius* (n.) 'faster'

Re [13c]: **monosyllables** 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, *glīs* does not become **glīr* the way *nonōs* becomes *honor*. The analogically reformed /glīs+is/ is a short stem, so its *-i-* is not subject to deletion, and the expected analogical output, instead, is *glīris*.

In fact, *glīs* > *glīris* is actually attested in late Latin *(Appendix Probi)*. Thus, the real counterpart to the analogical spread of rhotacism in the nominative singular long stems *(honōs* > *honor)* is the analogical spread of the *overt* ending *-is* in the nominative singular of short stems *(glīs* > *glīris*, analogous to cases like *mōns* > *montis* etc., see [21c] and [30]). 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).[10]

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:

[9] Adjectives that usually modify human beings, like *vetus* 'old', *pūbēs* 'having reached maturity', *dīves* '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.

[10] 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!).

[34] *cinis* > *ciner* 'cinder'
pulvis > *pulver* 'dust' (Gloss.)
cucumis > *cucumer* 'cucumber'
vetus > *veter* 'old' (Ennius)
pūbēs > *pūber* 'mature'

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

Re [13d]: unlike the innovation that actually happened, such innovations as **gesō, *gertus, *dis+imō*, or **dir+tineō* 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 [13e]: 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. *honōr-).* Both are the expected phonological consequences of a *morphological* change.

Re [13f]: the hypothetical analogies resulting in **sorōs* or **honōsem* would not simplify either the phonology or the morphology; the latter would in fact complicate it. The analogical change that actually happened removes a morphological exception, regularizing the distribution of the nominative singular endings.

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 that level. Analogical change can implement 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.*

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