Latin Theme Vowels and cophonologies

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ABSTRACT

Latin grammars traditionally divide verbs into four conjugations, identifiable (more or less readily) by their theme vowel. The identification of each theme vowel has been the object of several phonological analyses (Allen – Greenough 1903; Lieber 1981; Oniga 2014; Embick 2015; Halle 2019). This paper takes departure from Van der Spuy (2020), who has proposed that the theme vowels of Latin verbs can be analysed in terms of cophonologies. After elaborating on Van der Spuy's idea, this work concludes there is no need to postulate such cophonologies. Indeed, it is argued that the overall behaviour of Latin theme vowels is much less complicated: the deletion of the theme vowel in conjugations I and III can be explained through a single rule of Latin phonology, namely Back Vowel Deletion, by assuming, as in Halle (2019), that the theme vowel of the III conjugation is underlyingly /ɪ/. As for the mixed conjugation, although it can be argued that it represents a proper subset of the IV conjugation (Van Der Spuy 2020), it is shown here that postulating an underlying /iː/ for it is not beneficial to an analysis of Latin theme vowels in terms of cophonologies. While the section on Van Der Spuy's cophonologies relies on Optimality Theory, it is intended in the conclusion that the behaviour of Latin theme vowels can be better understood and formalized within the rule-based framework of Distributed Morphology.

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1. Introduction: Morphological and Phonological Aspects of Latin Theme Vowels[1]

Theme Vowels (TVs) have been a major topic in grammatical and linguistic descriptions of Latin. The reason for this interest lies in the fact that they represent, according to a tradition which goes back to the first centuries of the vulgar era, the main criterion to distinguish verbs belonging to the four conjugations attributed to Latin.

The majority of Latin verbs (at least in the present tenses) exhibit a root followed by a TV. The complex of the root followed by the TV is traditionally referred to as the *stem*. On the morphological side, the properties and functions of TVs have been widely indagated. Scholars across different theoretical approaches argue that Latin TVs do not contribute in any way to the syntactico-semantic representation of the lexical item. Hence, Latin TVs have been referred to as *empty morphs* (Aronoff 1994: 45ff.) and *ornamental morphemes* (Calabrese 2023: 402 ff.)[2]. If such an assumption is taken, then the question of what the function of Latin TVs is may arise. According to Carstairs – McCarthy (1994), TVs' main function is to distinguish each conjugation, thus facilitating language acquisition. A distinct problem is whether such TVs play any role in the morphological representation of the word. Here, different theoretical backgrounds imply very distant positions. If it is assumed that TVs are not grammatical entities, the main discussion focuses on the notion of stem and its role in the grammar. Notably, Distributed Morphology (DM) refuses the notion of stems, by considering only Roots and abstract morphemes as the primitives of morphology (Embick – Halle 2005: 17). As for lexeme-based theories of morphology (starting from Matthews 1972), the point is made clear by Aronoff

[1] I extend my gratitude to Renato Oniga, whose insightful methodological and bibliographical suggestions have been precious for this work. I am also thankful to the anonymous reviewers for their relevant observations and feedback.

[2] Some analyses, like those of De Vaan (2012), Bertocci (2017), and Bertocci – Pinzin (2021) argue that Latin TVs have at least a semantic function in terms of *Aktionsart*.

(1994), when he argues that the grammar must contain stems as a particular form of a Root (a *lexeme*, in his terminology). For reasons of length, a global discussion on theories with stem storage and how they apply to Latin conjugations is not possible here. The interested reader may refer to Anderson (1992), Aronoff (1994), Embick – Halle (2005) for such a discussion. It should be clarified, though, that neither of the main analyses considered here, i.e. Halle (2019) and Van der Spuy (2020), assume that stem storage is part of the morphology. Hence, when stems will be mentioned here, they will be intended just as sequences of Roots and TVs, with no further theoretical implication.

On the phonological side, previous analyses have especially focused on the identification of TVs and on formulating rules characterizing their behaviour. Consider some forms of the indicative present in (1).

(1)

	I	II	III	X	IV
	‘praise’	‘warn’	‘read’	‘take’	‘hear’
a. 1s	laud-oː	mon-e-oː	leg-oː	kap-i-oː	aud-i-oː
b. 1p	laud-aː-mus	mon-eː-mus	leg-i-mus	kap-i-mus	aud-iː-mus

The forms in (1a.) may (/mon-e-oː/, /kap-i-oː/, /aud-i-oː/) or may not (/laud-oː/, /leg-oː/) maintain the TV. As for what in (1) is referred to as the ‘conjugation x’ (the so-called *mixed conjugation*), the verbs’ behaviour oscillates between conjugations III (/i/ in 1p) and IV (surfacing of the TV in 1s). An adequate phonological analysis of the Latin verbal system requires each of the four conjugations to be assigned its underlying TV, as well as the rules by which these TVs may surface or not, and in what fashion. This paper discusses such an analysis, considering the proposal to explain the behaviour of the theme vowels of Latin verbs in terms of cophonologies. After presenting some uncontroversial assumptions on Latin phonology, two analyses on theme vowels are compared, namely Halle (2019) and Van der Spuy (2020). Van der Spuy’s idea to apply cophonologies to Latin theme vowels is further developed, according to the theoretical assumptions of cophonologies (Anttila –

Cho 1998; Anttila 2002, Inkelas – Zoll 2007) within the Optimal framework (Prince – Smolensky 1993). The discussion section presents some issues of Van der Spuy's cophonologies, and underlines that the peculiar behaviour of the TVs in conjugations I and III can be explained by a single phonological rule within the formalism of Distributed Morphology (DM, Halle – Marantz 1993).

Before proceeding with the analysis, it is essential to recall that phonemes are considered clusters of phonetic features. The specification of such features for Latin vowels are illustrated in (2)[3].

(2)

	a	e	i	o	u	ɪ
Back	+	-	-	+	+	+
Round	-	-	-	+	+	-
High	-	-	+	-	+	+

It should be noted that /ɪ/ is not generally included in the set of Latin phonemes[4]. It is postulated by Halle (2019) to explain Back Vowel Deletion in III conjugation (see below).

2. Theoretical Premises

2.1. Distributed Morphology

According to Embick – Halle (2005: 1) DM «is in its essence a syntactic theory of morphology, where the basic building blocks of both syntax

[3] For a wider discussion of Latin vowel system, cfr. Marotta (1981), Molina Yévenes (1992), Cser (2020).

[4] It is worth mentioning the fact that the existence of an additional vowel (called *sonus medius* by Quintilian), other than those generally ascribed to Latin, whether phonemic or not, has been long discussed (cf. Bolelli 1943; Marotta 1985: 93-96; 1999: 289-290). For a discussion of how /ɪ/ should be analysed in terms of diachronic development from Proto-Indo-European to Latin, cf. Calabrese (2023).

and morphology are the primitives», where the primitives are those elements of the grammar which underly word formation. More precisely, there are two primitives for word formation: abstract morphemes and Roots. The former consist of non-phonetic features like [past], [plural], D (for Determiner), and so on; the latter form the open-class vocabulary and include items like $\sqrt{aud}_{[iv]}$, $\sqrt{mon}_{[ii]}$, which are sequences of phonetic features equipped with both indices (to distinguish homophonous) and other diacritics like class features (verb, noun…). Among these diacritics, Latin Roots include a diacritic feature that encodes membership to a specific conjugation class. In the global picture of the syntactic theory as conceived in Minimalism (Chomsky 1995), morphological operations apply during the phonetic form (PF) derivation, hence they apply to the output of syntactic derivations. This means that morphological operations are concerned mainly with expressing the morphosyntactic features assigned to each syntactic unit and provide them with the phonological material. The process called *Vocabulary Insertion* linearizes the hierarchical structure generated by the syntax and add the phonological material. *Vocabulary Items* are pairs of morphosyntactic features and phonological exponent. Theme vowels are exponents inserted into Theme positions (TH) added to the syntactic structure at PF in particular structural configurations. TH nodes are added to *v*, and other functional heads. I give the general, and partial, morphological structure in (3), where '…' indicates the complex of additional functional heads like Asp, T, and so on.

(3) [[Root *v*] TH] …

The TH node acquire the Conjugation Class feature of the Root via the Concord process in (4).

(4) $TH \rightarrow TH[X]/\sqrt{Root}_{[X]}\_\_$
(Embick – Halle 2005: 12, 18a.)

Of course, the Vocabulary Items for TH according to each Conjugation Class feature needs to be specified. The last paragraph of this paper

includes the Vocabulary Items for each TV and the overall phonological derivation of the relevant forms in (1).

2.3. Optimality Theory and Cophonologies

Rule-based approaches to phonology, associated with the work by Chomsky – Halle (1968), use rules that change the phonological representation of the morpheme in particular phonological contexts. Such rules are widely adopted in the framework of DM, including the works of Halle (2019) and van Der Spuy (2020), as shown in section 3. Optimality Theory (OT, Prince – Smolensky 1993), on the other hand, is a constraint-based approach which posits that constraints are universal. The phonological variation among different languages is explained in terms of different rankings of the set of universal constraints. The phonological component consists of a mechanism which generates an illimited set of output forms. The evaluation process relates these outputs to the constraint hierarchy and eliminates the candidates which violate the 'fatal' constraints (i.e. those in higher positions in the hierarchy) and selects the optimal candidate, promoted as the surface form. There are two general forces which guide the evaluation of the optimal candidate: Faithfulness and Unmarkedness. The first impose the output form to be identical to the input form; the latter forces the output to be as unmarked as possible in terms of pronunciation, by minimizing less common and less complex way to pronounce items. The main universal constraints related to Faithfulness are three, according to McCarthy – Prince (1995), defined in (5).

(5) a. Max-IO: Deletion of segments is prohibited.
b. Dep-IO: Insertion of segments is prohibited.
c. Ident(F): A segment in the input is identical to the corresponding segment in the output.

Although Van der Spuy (2020) has expressed Latin cophonologies in terms of rules, the concept of Cophonologies has been mainly related

to OT, in terms of variation of the constraint hierarchy within a single language. This internal variation gives rise to what are called "cophonologies" or "phonological grammars". If a subset of the Latin TVs behaves differently with respect to the general phonological patterns of the language, one may justify these differences in terms of cophonologies. Just to give an example, conjugations I and III both exhibit the deletion of the TV in the first-person singular of the present tense. If such deletion process is not attributed to some shared property between the underlying TV in conjugations, specific cophonologies for them can be formulated. Given a general constraint ranking for the language (Master Ranking), cophonologies partially manipulate it by reordering the relevant constraints. In this way, the different behaviour of TVs can be explained without referring to TVs as grammatical entities, but only as ornamental morphemes handled by the phonological grammars involved. An example of how Cophonologies deal with phonological variation within a single language is that mentioned by Inkelas *et al.* (1996) regarding Turkish. Such phenomenon is known as "Sezer stress" (named after Engin Sezer, who first discovered this irregular pattern[5]). The regular stress pattern in this language is final, as in (6). Nevertheless, the pattern changes when place names or foreign names are involved: the stress moves to the antepenultimate syllable if it is heavy and the penultimate syllable is light (as in 7a.); it moves to the penultimate otherwise (as in 7b.).

(6) a. /aˈdam/ 'man.nom.sg'
b. /köyˈlɛr/ 'village.nom.pl'

(7) a. /ˈaŋkara/ 'Ankara'
b. /isˈtambul/ 'Istanbul'

[5] Sezer (1981).

3. The Debate on Latin TVs and Conjugations

3.1. Uncontroversial assumptions

The situation represented in (1) did not take any preliminary assumption on the TV assigned to each conjugation. Nevertheless, in light of the literature considered here, some assumptions can be made, as shown in (1bis), where TVs on which there is no agreement among the scholars are left unspecified.

(1bis)

	I	II	III	X	IV
	‘praise’	‘warn’	‘read’	‘take’	‘hear’
a. 1s	laud-oː	mon-e-oː	leg-oː	kap-i-oː	aud-i-oː
b. 1p	laud-aː-mus	mon-eː-mus	leg-i-mus	kap-i-mus	aud-iː-mus
	/aː/	/eː/	TV^{III}	TV^{x}	/iː/

3.1.1. Phonological rules

As a consequence of the virtually universal agreement on (1bis), some facts can be accounted for by using phonological rules like those formulated below. As for I conjugation, the rule describing the deletion of underlying /aː/ is (8)[6].

(8) Back Vowel Deletion: V[+back, (-round)] → Ø/ _V

a. /laud-aː-oː/ → /laud-oː/ ‘praise.1sg’
b. /port-aː-oː/ → /port-oː/ ‘bring.1sg’
c. /repar-aː-oː/ → /repar-oː/ ‘repair.1sg’

The surfacing of the theme vowels as short in conjugations II and IV is instead accounted for by a general rule of Latin by which long vowels are shortened before vowels, as stated in (9).

[6] [-round] feature is included by Halle (2019) but not in Van der Spuy (2020).

(9) Prevocalic Shortening: [+long] → [-long]/ V[__]V
a. /mon-eː-oː/ → /mon-e-oː/ ‘warn.1sg’
b. /aud-iː-oː/ → /aud-i-oː/ ‘hear.1sg’

4. Focus on the Controversy

As for the III conjugation and the mixed conjugation, scholars have suggested various proposals. Previous analyses having been discussed in Van der Spuy (2020), to whom the reader may refer, the focus here is on the comparison between two more recent ones: Halle (2019) and Van der Spuy (2020).

Preliminarily, though, a third way to characterize the third conjugation deserves a separate discussion. Some Latin grammars, including Maidhoff (2009), refer to the III conjugation as the ‘consonantal conjugation’. This means the III conjugation lacks an underlying TV, which is inserted according to the nature of the adjacent morpheme: it is /e/ in subjunctive past tense (/legerem, legereːs, legeret legereːmus, legereːtis, legerent/), infinitive (/legere/), and singular present imperative (/lege/); it is /i/ otherwise. This approach to the III conjugation is incompatible with both the distributed and optimal approaches considered here since the TV is assigned in function of some morphological property of the word. In other words, the way it surfaces is not determined by the phonological context (cf. Van der Spuy 2020: 8 for a wider discussion).

4.1. Halle’s Analysis: TV^{III}=/ɪ/ and TV^{x}=/i/

The main advantage of Halle’s work is that it minimizes the overall number of features necessary to explain TV deletion in the forms which have been mentioned. Indeed, by assuming that the TV of III conjugation is underlyingly /ɪ/, and given that this vowel is [+back, -round], the single rule of deletion in (8) holds for both the I and the III conjugation, as shown below in (10).

(10) Back Vowel Deletion: V[+back, -round] → Ø/ _V

a.	/leg-ɪ-oː/	→ /leg-oː/	‘read.1sg’
b.	/duk-ɪ-oː/	→ /duk-oː/	‘lead.1sg’
c.	/tang-ɪ-oː/	→ /tang-oː/	‘touch.1sg’

On the other hand, the identification of the TV of the III conjugation with /ɪ/ requires an additional rule which converts [+back] in [-back] in the forms where the TV surfaces as /i/. Halle’s fronting rule is formalized in (11).

(11) ɪ-Fronting: [+back] → [-back] / V[__, -round, +high]

a.	/leg-ɪ-mus/	→ /leg-i-mus/	‘read.1pl’
b.	/duk-ɪ-mus/	→ /duk-i-mus/	‘lead.1pl’
c.	/tang-ɪ-mus/	→ /tang-i-mus/	‘touch.1pl’

Crucially, rule (11) must apply after rule (10), so that the TV in singular 1S can be deleted. Otherwise, incorrect forms are produced, as shown in (12).

(12)

Underlying	duk-ɪ-oː
Rule (11)	duk-i-oː
Rule (10)	n.a.
Surface	*duk-i-oː

As for the mixed conjugation, Halle assigns to it the TV /i/. Halle’s analysis is adequate for the forms which he considers, as well as for those presented here. The introduction of a never-surfacing phoneme may seem speculative[7]. Nevertheless, an evaluation of the economy of other alternatives reveals that Halle’s solution is quite advantageous in many respects. If two widely unrelated underlying TVs – in terms of phonetic features – are posited for conjugation I and III, the degree of complexity of the phonological explanation grows critically. Such an explanation would require two distinct rules for the deletion of /a/ and

[7] This also reflects the view of Lieber on his own proposal, not taken into account here, that TV^{III}=/j/ (1981: 76).

/i/, involving all the relevant features [back], [round], [high]. Halle's solution provides a way to conflate the two processes into a single rule which mentions only two features. Finally, if the III conjugation is considered consonantal in nature, various problems arise with respect both to morphological theory and the overall economy of the explanation of the phonological processes involving TVs. As said in the introductory part of this section, morphologically conditioned assignment of the TVs is not contemplated in the phonological approaches considered here; in addition, such assignment criteria would be necessary only for this specific conjugation, making the explanation quite a*d hoc*.

4.2. Van der Spuy's Analysis: TV^{III}=/i/ and x ⊂ IV

Van der Spuy's work exploits the traditional set of Latin phonemes and assigns to the III conjugation the TV /i/. This analysis can be maintained only if a different TV than /i/ is assigned to the mixed conjugation, as he does. Under these assumptions, the deletion of the TV in the III conjugation is explained through the rule (13).

(13) Short Vowel Deletion: V[-long] → Ø/_V

a.	/leg-i-o:/	→ /leg-o:/	'read.1s'
b.	/duk-i-o:/	→ /duk-o:/	'lead.1s'
c.	/tang-i-o:/	→ /tang-o:/	'touch.1s'

As Van der Spuy points out, rule (13) must apply before rule (9). If not, incorrect forms are produced, as shown in (14).

(14)

Underlying	aud-i:-o:
Rule (9)	aud-i-o:
Rule (13)	aud-Ø-o:
Surface	*aud-o:

As for the mixed conjugation, he considers it a proper subset of the IV conjugation, hence assuming that these verbs have underlyingly /i:/:

«This conjugation is traditionally regarded as a subset of the third conjugation [(Allen – Greenough 1903; Oniga 2014)]. However, in the majority of forms, these verbs have more in common with the fourth conjugation». Indeed, according to Van der Spuy's calculations, out of the overall 60 forms, only 18 resemble the III conjugation, «not counting participles, gerunds, supines and the periphrastic passives, which are composed of [pass ptcp] + some form of the verb *esse* 'to be'». He also observes that «membership of the mixed conjugation can generally be predicted from the phonological shape of the roots of the verbs» (Van der Spuy 2020: 9-10), reflecting a consideration largely noted in previous literature, at least from Sommer (1948). Such shape is that in (15),

(15) #C(C)V[-long]C[-cont]

with only few exceptions (e.g. /parere/ 'bring forth') The explanation of non-surfacing /iː/ in the forms of the mixed conjugations relies on a rule which is sensitive to the shape (15). Such a rule is that in (16).

(16) Root-conditioned Shortening:
[+long] → [-long]/#C(C)V[__, +high, -back]C[-continuant]__{C, #}

a. /kap-iː-s/	→	/kap-i-s/	'take.2sg'
b. /fak-iː-mus/	→	/fak-i-mus/	'make.1pl'
c. /rap-iː-tis/	→	/rap-i-tis/	'take away.2pl'

According to Van der Spuy, the behaviour of Latin TVs can be analysed in terms of Cophonologies. The idea behind Cophonologies is that morphological constructions or lexical classes can be captured with different phonological grammars. He claims that, once excluded Latin global phonological rules like Prevocalic Shortening, only three rules are suitable as candidates for cophonologies, namely Back Vowel Deletion, Short Vowel Deletion, and Root-conditioned Shortening. The representation in (17) reflects Van der Spuy's assumptions on the TV to be assigned to each conjugation.

(17)

	I	II	III	X	IV
	‘praise’	‘warn’	‘read’	‘take’	‘hear’
a. 1s	laud-oː	mon-e-oː	leg-oː	kap-i-oː	aud-i-oː
b. 1p	laud-aː-mus	mon-eː-mus	leg-i-mus	kap-i-mus	aud-iː-mus
	/aː/	/eː/	/i/	/iː/	/iː/

He formulates such cophonologies in terms of rules. Nevertheless, he notes that cophonologies are generally included in constraint-based approaches to phonology like OT (Inkelas et al. 1996: 1). In the conclusion of his work, Van der Spuy briefly explores the idea to analyse Latin cophonologies in terms of OT by converting the relevant three rules into the corresponding constraints. The overall Van der Spuy’s representation of such cophonologies is that reproduced in (18).

(18)

Cophonology	Conj.	Constraint
A	I	*V[+back, -round]V
B	III	*V[-long]V
C	x	*V[-long]C[-cont]V[+hi, +lo, -str]

Cophonology A explains the deletion of the TV of 1sg of the I conjugation as in /laud-oː/; Cophonology B explains the deletion of the TV of the III conjugation as in /leg-oː/; Cophonology C explains the forms of the mixed conjugation, where the non-stressed underlying long vowel is shortened when following a root of the shape (15), thus differing from the way the TV in ‘standard’ forms of the IV conjugation surfaces (e.g. /kapis, kapitis, kapimus/ vs. /audiːs, audiːmus, audiːtis/).

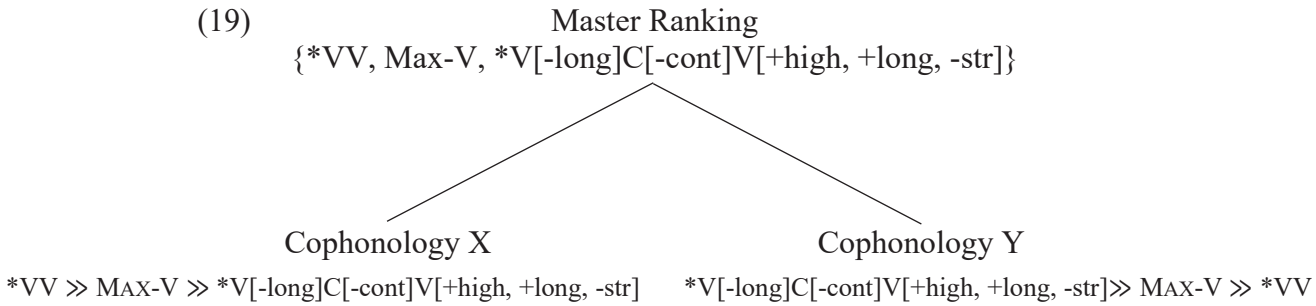
5. Discussion

5.1. Van der Spuy’s cophonologies in the OT framework

In Inkelas – Zoll (2007: 137) cophonologies of a language are conceived as «related in a grammar lattice whose superordinate node con-

tains what we term the ‘Master Ranking’, a partial ranking of constraints to which all individual cophonologies in the language must conform». A rather notable oddity in (18) is that it is difficult to derive all the three constraints from a general “Master Ranking”, since Cophonologies A and B lead to vowel deletion in VV contexts while Cophonology C leads to vowel shortening in roots of the shape (15). In addition, Cophonologies A and B are supposed to affect 1sg forms, while Cophonology C affects singular and plural forms. This means that any Master Ranking including all the relevant constraints (ban on vowel hiatus, segment deletion, and *Sommer roots*, in addition to the Faithfulness conditions) would necessarily comprehend at least one constraint which is completely irrelevant to one or more cophonologies. Let us suppose that both constraints of Cophonologies A and B are derivable from a more general ban of vowel hiatus. The resulting Master Ranking would be as in (19), where it is implicitly assumed a third Cophonology R (for “regular”) which, by Max-V, preserves the TV and manipulates it only when required by global rules like (9), as in conjugations II and IV.

(19)



If a candidate form like /laud-aː-oː/ is introduced in the phonological computation, it is correctly handled by Cophonology X where it is judged ungrammatical, violating the *VV constraint, and *V[-long]C[-cont]V[+high, +long, -str] constraint is totally irrelevant. By analogy, a form like /kapiːs/ is handled by Cophonology Y, being judged ungrammatical by virtue of violating of the *V[-long]C[-cont]V[+high, +long,

-str] constraint, while the *VV constraint plays no role in the computation.

A way to avoid the computational inefficiency shown above is to assign the TV /i/ to the conjugation x. If so, no distinct cophonology is required for this conjugation, which simply relies on global phonological rules of Latin verbs. A distinct cophonology would be still required to explain the behaviour of the TVs of conjugations I and III. Such cophonology would include a re-ranking by which forms with a vowel hiatus are banned by the *VV constraint. The resulting cophonology for these conjugations would be one where the constraint ranking is *VV ≫ Max-V ≫ Ident(F), with the other Cophonology R ranking *VV constraint lower in the hierarchy. These cophonologies would correctly predict the different behaviour of the TV in conjugations I and III with respect to the others. Yet, this would raise the legitimate question why the TVs /aː/ and /i/, which do not share any feature other than being both [+vocalic, -round], delete; also, why /i/ deletes in /leg-oː/ but not in /kap-i-oː/. These problems challenge the idea that there is nothing in common between the TVs in conjugations I and III other than being handled by the same cophonology. On the contrary, it would be reasonable to assume that these TVs do not surface in the given contexts because they share some interesting abstract feature. This idea is further developed in the following paragraphs.

5.2. Vowel reduction processes in Latin and a general morphophonological rule

Let us consider, again, the ban of vowel hiatus as a result of the application of the *VV constraint to Latin. This process extensively characterizes nominal morphology (cfr. Oniga 1997; 2014), as shown in (20).

(20)	a.	/ros-a-iːs/	→	/ros-iːs/	‘rose.pl.dat/abl’
	b.	/lup-o-iːs/	→	/lup-iːs/	‘wolf.pl.dat/abl’

In the mentioned examples, which reflect a general tendency of Latin first two declensions, the deleted vowel is always [+back]. One can then argue that the relevant constraint is more specific than *VV, being better conceived as *V[+back]V (with the exception of /u/, see below). This would mean that Back Vowel Deletion is not specific of the I conjugation, but rather reflects a general tendency of this language to avoid such sequences by deleting the back vowel across morphological boundaries, as represented in the following general rule (21).

(21) Back Vowel Deletion (between morphological boundaries):
V[+back] → Ø/_ + V

Cser proposes a similar rule where the deleted vowel is [+back, -high], which excludes /u/ from the deletion process. Indeed, the vowel /u/ does not generally delete when it precedes a vowel (Cser 2020: 113, 70). Crucially for our considerations, Cser's rule also excludes /ɪ/ (which he does not mention in his inventory of Latin vowels). One may argue that /uV/-sequences respond to a distinct phonological grammar, thus reworking Van der Spuy's idea in terms of the following cophonologies: one which undergoes the general tendency to ban V[-back]V sequences, the other which re-rank this constraint below Max-V constraint when /u/ precedes a vowel. Yet, such a formalization would require an additional constraint to manage the non-surfacing vowel /ɪ/ like *V[+back, -round, +high]C. This constraint would operate only on the III conjugation, suffering thus from an *ad hoc* characterization. More in general, the reformulation of a rule like /ɪ/-Fronting as a constraint within the Optimal framework is somewhat problematic, as Optimal models are generally intended as surface-based and non-derivational. An alternative which is more coherent with the solution proposed here is to consider the forms where /u/ does not delete (nouns like *tribuum*

'tribe.gen.pl', or adjectives like *exiguus* 'small.nom.sg') bearing un underlying /uw/-stem, to which rule (21) cannot apply. This hypothesis is workable (cf. Cser 2015: 6, n. 7))[8] and it is left for further research.

5.3. No cophonologies required for Latin TVs

If we postulate the general rule (21), the overall schema in (18) can be largely exemplified by making the following assumption: the TV of the III conjugation is underlyingly /ɪ/, which is [+back]; since such vowel never surfaces, the additional rule (11) is required. This totally reflects Halle's analysis.

If such an assumption, which relies on a general tendency of both verbal and nominal morphology involving Latin back vowels (except /u/), is accepted, there is no need to postulate cophonologies as in (18). As for the mixed conjugation, Van der Spuy convincingly shows that it should be considered a proper subset of the IV conjugation. Since the necessity of cophonologies for Latin TV has been excluded in general in this work, because of the difficulty to reduce them to the general principles of cophonologies, there is no point in postulating a single cophonology for the mixed conjugation. In addition, /iː/ never surfaces in the forms of the mixed conjugation and there are no other processes of root-conditioned shortenings in Latin to my knowledge. Van der Spuy (2020: 5) mentions an analogous, though not symmetrical, phenomenon characterizing the diachronic development of Estonian, but further investigations are required as far as Latin is concerned. To sum up, Van der Spuy's hypothesis that the mixed conjugation has underlyingly /iː/ cannot be excluded here.

The morpho-phonological derivation of the relevant forms in (1) can be thus described according to the formalism of DM and the phonological rules mentioned earlier. Such a derivation proceeds as follows. First, the TV is inserted in the TH position following the Root, by the

[8] For the analysis of /u/ and its relationship with the semivowel /w/, cf. also Hoenigswald (1949), Marotta (1981; 1999), and Nishimura (2011).

Concord process repeated in (22) and the Vocabulary Items listed in (23a.); the additional Vocabularies Items in (23b.) add the relevant agreement morphemes; then, the phonological rules apply as in (24):

(22) Concord process: TH → TH[X]/√Root[X]__

(23) a. Vocabulary Items: TH nodes
TH[I] ↔ -aː-
TH[II] ↔ -eː-
TH[III] ↔ -ɪ-
TH[IVi] ↔ -i-
TH[IV] ↔ -iː-

b. Vocabulary Items: Agreement morphemes
Pres.1sg ↔ -oː
Pres.1pl ↔ -mus

(24) a. Back Vowel Deletion
α) /laud-aː-oː/ → /laud-oː/
β) /leg-ɪ-oː/ → /leg-oː/

b. ɪ-Fronting
α) /leg-ɪ-mus/ → /leg-i-mus/
β) /duk-ɪ-mus/ → /duk-i-mus/

c. Prevocalic Shortening
α) /mon-eː-oː/ → /mon-e-oː/
β) /aud-iː-oː/ → /aud-i-oː/

6. Conclusion

The present work has discussed Van der Spuy's proposal to analyse the behaviour of TVs in Latin verbs as cophonologies. Such a proposal has been considered and explored under the lens of OT, as it has been considered better suited for the concept of cophonologies. The adaptation of such hypothesized cophonologies to the principles of cophonologies

within the Optimal framework has shown serious limitations. These limitations manifest in the fact that the contexts by which Van der Spuy explains the behaviour of Latin TVs are too heterogeneous to be captured by cophonologies, which, by definition, must conform to the Master Ranking of the language considered. If Van der Spuy's constraints are postulated, there is no satisfactory way to adapt such constraints to cophonologies as are generally intended.

The approach presented here has the advantage to reduce the overall phonological complexity of TV deletion in conjugations I and III, by assuming, as Halle does, that the TV of the III conjugation is /ɪ/, and that it undergoes Back Vowel Deletion as formulated in (21). As for the mixed conjugation, no definitive statement is made here whether its TV is long or short, although it should be noted that postulating /iː/ for it has no particular advantage for the present analysis. In general, it would reinforce the idea, which is motivated but should be investigated further, that the mixed conjugation represents a proper subset of the IV conjugation.

Given that the behaviour of Latin TV can be explained by recurring to a description in a rule-based fashion, DM should be considered better suited for a morphophonological analysis of Latin TVs.

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