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Latin Verbal Morphology
A Distributed Morphology Analysis

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Latin four conjugations

Latin is traditionally described as having four conjugations characterized by different thematic vowels.

The thematic vowel may be absent in specific morphological categories such as irregular perfects or Past participles as well as in specific verbs (e.g., *su-mus/es-se*):

(1)

Traditional Label	Theme Vowel	Example 1st Pl	Infinitive
Conj. I	*-ā-*	*laud-ā-mus*	*laud-ā-re*
Conj. II	*-ē-*	*mon-ē-mus*	*mon-ē-re*
Conj. III	*-I-*	*dūc-i-mus*	*duc-e-re*
Conj. IlI(i)	*-ĭ-*	*cap-ĭ-mus*	*cap-e-re*
Conj. IV -	*-ī-*	*aud-ī-mus*	*aud-ī-re*

With /-I-/, I will be referring to the short thematic vowel of the III conjugation.

I follow Embick and Halle (2004:18) in treating capiō verbs as belonging to a fifth conjugation with respect to the traditional four ones, which they refer to as III(i). The short /-ĭ-/ of this conjugation derives from an /-ī-/ which was shortened after roots with a certain prosodic shape, an issue that will not be addressed here.

The short thematic vowel of the III conjugation

/-I-/ identifies the short thematic vowel of the III conjugation.

Here I assume Halle's (2018) synchronic analysis of this vowel, according to which it is an underlying [+high, +back, -round] vowel .

This vowel, like /- ā-/, is deleted by (2) below, before vowel-initial suffixes (*am-ā-ō*➔*amō*, cf. *dūc-I-ō* ➔*ducō*, vs. *mon-ē-ō*➔*moneō*, *aud-ī-ō* ➔*audiō*, *cap-i-ō* ➔*capiō*).

(2) [-cons, +back]➔ Ø / [__]$_{TV}$ -V (i.e., *I, ā* ➔ Ø/[__]$_{TV}$ -V)

When this vowel appears before a consonant, and therefore is not deleted, it is fronted by the rule in (3) (cf. *dūcimus, dūcite*; otherwise, the /*e*/ in *dūceremus, dūcere* is accounted for by an independently needed rule lowering short [ĭ] before rhotics (*cap-ĭ-mus* vs. *cap-e-re*) (see (4) below) :

(3) [-round]➔[-back] / [__, -low] (i.e., *I* ➔ *i*)

(4) [-back]➔[-high] / ___ X / [+cons, +son, -nas, -lat] (i.e., *i* ➔ *e* / __ r)

Basic analytical steps

After collecting and examining the verbal forms of the language, the semantic features that determine their uses must be established.

Assuming a universal set of semantic features, the features that are contrastive in the morpho-syntax of the language are established, where a feature X is contrastive in a language L if there is at least a form in L whose distribution is determined by the features [aX].

We can say that this contrastive feature is morphologically realized in the language.

In the case of verbs, the set of the morphological realizations of the verbal semantic contrastive features of L define a paradigm for a given verb.

The Latin verbal system

The Latin verbal system is characterized by a basic aspectual opposition between imperfective and perfective forms (*Īnfectum* vs. *Perfectum*).

Tense distinctions are found in each of these aspectual categories, although no Future forms are present in the Subjunctive.

(5)

	Īnfectum			*vs.* *Perfectum*			
	[-Perfect]			[+Perfect]			
	[-Past]	[+Past]	[+Future]	[-Past]	[+Past]	[+Future]	
	Present	Imperfect	Future	Perfect	Pluperfect	Future Perfect	
Ind.	*laudāmus*	*laudābāmus*	*laudābĭmus*	*laudāvĭmus*	*laudāverāmus*	*laudāverĭmus*	[-Irrealis]
Subj.	*laudēmus*	*laudārēmus*	—	*laudāverĭmus*	*laudāvissēmus*	—	[+Irrealis]

Comparison and segmentation of pieces

By the standard strategy of form comparison and subsequent extraction of the recurring parts with similar featural distribution (Nida 1970), a basic segmentation of forms can be achieved.

A first possible segmentation of Latin verbal forms using these criteria is given below.

Some of the functional nodes are treated as having a null exponent. As discussed later in more detail, once it is determined what features, or feature combinations receive overt exponents, all other features are automatically assigned zeros.

In particular, some zeros will be inserted in positions that have overt counterparts. For example, an overt exponent for [+Past]T0 motivates a Ø for [-Past]T0 if there is no overtly marked exponence for this configuration.[1]

It follows that zeros are automatically assigned to otherwise non-overt nodes containing contrastive morphological features, therefore, to features that are morphologically active in a language. The issue of representational zeros is dealt with more in depth later

A basic segmentation of Latin verbal forms

Some of the functional nodes are treated as having a null exponent. The issue of representational zeros is dealt with later. The analysis assumes that the vocalic pieces found after the root and inflectional elements are ornamental thematic vowels. Inflectional elements below include consonants and Øs.

(6)

	Root-		Asp^0		T^0		$Mood^0$		AGR_{1pl}		
a.	*laud - ā*	+	*v-i*	+	*r -ā*	+	*Ø*	+	*mus*	Indicative	Pluperfect
b.	*laud - ā*	+	*v-i*	+	*r -I*	+	*Ø*	+	*mus*		Future Perf.
c.	*laud - ā*	+	*v-i*	+	*Ø*	+	*Ø*	+	*mus*		Perfect
d.	*laud - ā*	+	*Ø*	+	*b -I*	+	*Ø*	+	*mus*		Future
e.	*laud - ā*	+	*Ø*	+	*b -ā*	+	*Ø*	+	*mus*		Imperfect
f.	*laud - ā*	+	*Ø*	+	*Ø*	+	*Ø*	+	*mus*		Present

	Root-		Asp^0		T^0		$Mood^0$		AGR_{1pl}		
a.	*laud - ā*	+	*v-I*	+	*s -Ø*	+	*s-ē*	+	*mus*	Subjunctive	Pluperfect
b.	*laud - ā*	+	*v-I*	+	*Ø*	+	*r-ĭ*	+	*mus*		Perfect
c.	*laud - ā*	+	*Ø*	+	*Ø*	+	*r-ē*	+	*mus*		Imperfect
d.	*laud -*	+	*Ø*	+	*Ø*	+	*Ø -ē*	+	*mus*		Present

Consonantal [v] and vocalic [u] alternate depending of syllable structure: it is [u] after consonants, otherwise [v], as in these cases.

Rhotacism

Given the segmentations above, a synchronic simplification of the exponence of the Latin verbal inflectional elements is possible if one assumes that there is a correlation between the intervocalic [r]s found in the case of the $[+\text{Past}]_{T^0}$ and $[+\text{Irrealis}]_{\text{Mood}^0}$ in lines a-b) and b-c), respectively, and [s]'s found for the same nodes in Subjunctive Pluperfect in line a).

Alternations between [s] and intervocalic [r], in fact, are a characteristic feature of Latin morpho-phonology and are due to the independently motivated so-called rhotacism process, given below:

(7) [+cons, +cont, -nas, -lat] ➔ [+son]/ V ___ V (i.e., *s* ➔ *r* / V__V)

Underlying representations for Latin verbal exponents

If one assumes the ordered rules in ( ), one can postulate the following underlying representations:

(8) a. The rotacism rule (7)
b. Rule (3) (*i* ➔ *e* / __ r)
c. Rule (2) (*I, ā* ➔ Ø/[__]$_{TV}$ –V)

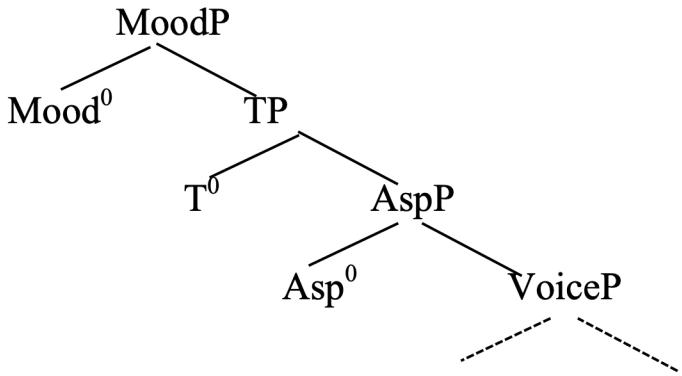
(9)

	Root-		Asp^0		T^0		Mood^0		AGR$_{1pl}$		
a.	*laud* - *ā*	+	*v* -*i*	+	*s* -*ā*	+	Ø	+	*mus*	Indicative	Pluperfect
b.	*laud* - *ā*	+	*v* -*i*	+	*s* -*ĭ*	+	Ø	+	*mus*		Future Perf.
c.	*laud* - *ā*	+	*v* -*i*	+	Ø	+	Ø	+	*mus*		Perfect
d.	*laud* - *ā*	+	Ø	+	*b* -*ĭ*	+	Ø	+	*mus*		Future
e.	*laud* - *ā*	+	Ø	+	*b* -*ā*	+	Ø	+	*mus*		Imperfect
f.	*laud* - *ā*	+	Ø	+	Ø	+	Ø	+	*mus*		Present
a.	*laud* - *ā*	+	*v* -*i*	+	*s* -Ø	+	*s* -*ē*	+	*mus*	Subjunctive	Pluperfect
b.	*laud* - *ā*	+	*v* -*i*	+	Ø	+	*s* -*ĭ*	+	*mus*		Perfect
c.	*laud* - *ā*	+	Ø	+	Ø	+	*s* -*ē*	+	*mus*		Imperfect
d.	*laud* - *ā*	+	Ø	+	Ø	+	Ø-*ē*	+	*mus*		Present

The verbal functional structure

The morpho-syntactic structure of the verbal systems of the languages considered in the paper is derived by assuming, along the lines of Wurmbrand (2015; but see also Cinque 1999), the verbal functional structure in (10) which expresses the basic core temporal, aspectual, and modal structure of eventualities.

(10)

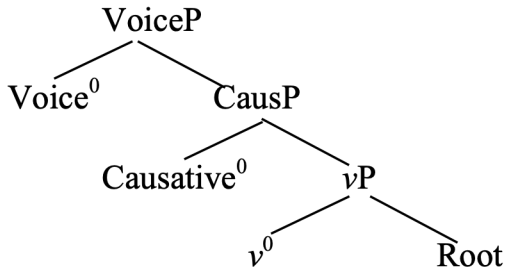


Along the lines of Wurmbrand (2015), additional functional heads may be provided by bleached lexical roots (that is, restructuring verbs). These functional heads express additional "nuances" of eventualities (see also Calabrese (Forthcoming a) for discussion). The matter is not of relevance here and will not be pursued further.

The VP-shell

As standard in DM, the split-verb phrase hypothesis (Larson 1988, Hale and Keyser 1993, Kratzer 1994, 1996; Chomsky 1995, Marantz 1997, Borer 1994, 2005; Travis 2000, Pylkkänen 2008; Harley 2017), is also adopted and with it a complex structural organization of the VP-shell. It includes (i) *v*P, which assigns verbal category to the category-unspecified root head of its complement and that may mediate between the inner syntactico-semantic properties of the root and the higher functional projection; it also has the function of verbalizing nominal and adjectival constituents in its complement—namely, it can be a denominative/deadjectival verbalizer; (ii) CausP, which introduces Causative syntax and semantics; and (iii) VoiceP, which controls the presence/absence of the external argument (and consequently assignment of accusative case, given Marantz (1991)). The VP-shell structure is given (11) t(he structure reported in (3) is simplified with respect to the one proposed by Harley (2017) in not having the inner Appl(icative)P and the outer CausP, which are not relevant in our analysis here.)

(11)

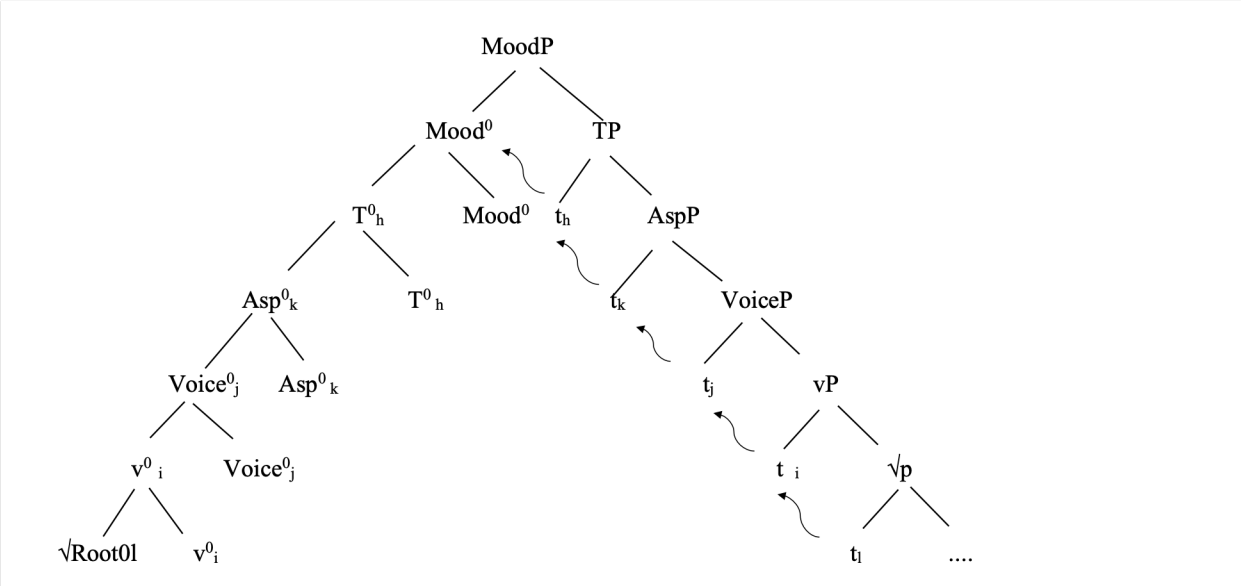


I will refer to the head nodes in (11) and to their exponents, as the VP-shell functional nodes and the VP-shell exponents, respectively.

Word-Forming Head Movement

The universal hierarchical structure formed by the combination of (10) and (11) is then mapped onto surface morphological units (i.e., X^0-complexes; Embick and Noyer 2001) via cyclic, iterated head-rollup movement of Root through *v*, Asp, T, M. Such a procedure will create the structure in (12) (For graphic simplicity, I will omit the CausP until it is relevant for the analysis further below):

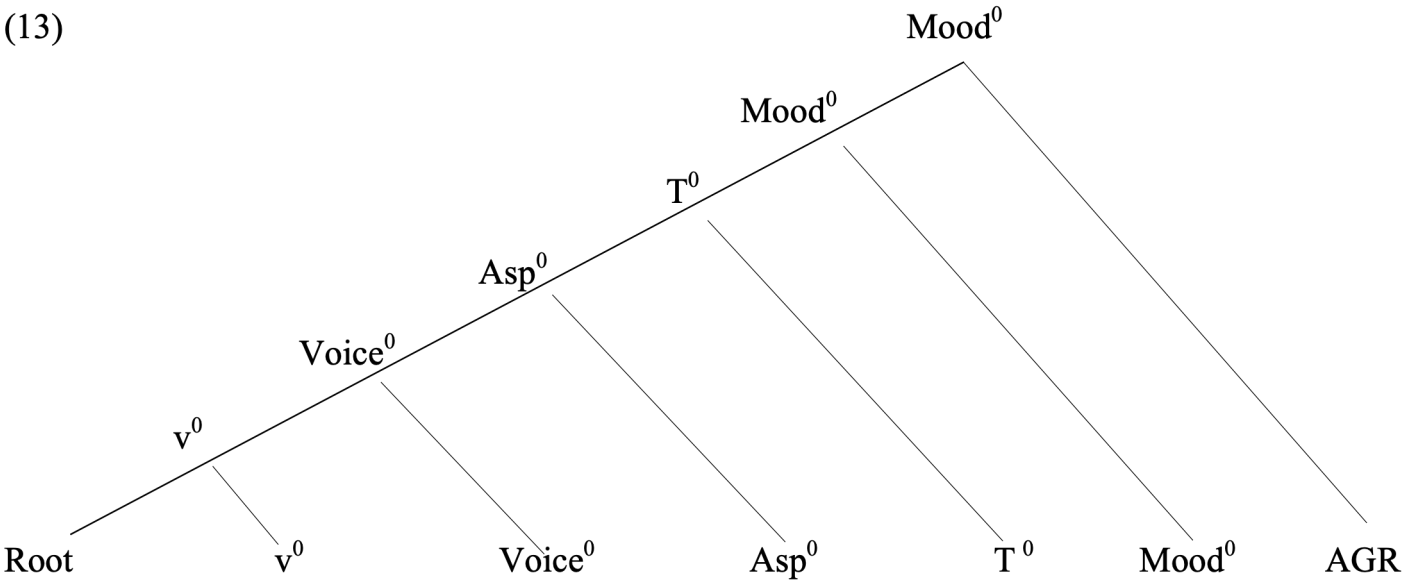
(12)



The Node AGR

Following Halle & Marantz (1993) and Bobaljik (2000), the node AGR is adjoined to the highest X^0 in the complex verbal X^0 head. The resulting structure is reported below; as opposed to (12), all terminal nodes are on the same horizontal line for reasons of graphic simplicity:

(13)



The structure in (13) undergoes Vocabulary Insertion, i.e. the procedure of association between (a bundle of) morpho-syntactic features (i.e., functional nodes) and phonological content (exponence). It is assumed to occur cyclically from the inside out (Bobaljik 2000).

Silence in Morphology

Putting aside the Voice node which is is systematically absent , the structure in nicely accounts for the morpheme orders we see in (9),

(14) Pluperfect Subjunctive form

laud-a-vi-s-se-mus

[[[[***laud-***]$_{\text{Root}}$ [-***a***]$_{\text{TV}}$]$_{\text{v}}^{0}$-***v-***[-***i***]$_{\text{TV}}$]$_{\text{[+perf]-Asp}}^{0}$ -***s***]$_{\text{[+Past]-T}}^{0}$ -***s*** -[-***e***]$_{\text{TV}}$]$_{\text{[+irr]-Mood}}^{0}$]-***mus***]$_{\text{[1pl-AGR}}$

'praise.pluprf.subj1pl'

If one considers the segmentations in (9), it is apparent that a few of the nodes in (13) are not realized overtly in the Latin morphemic string.

Silence in Morphology

It is natural to assume that node silence results from their being marked with the null exponent Ø.

However, adoption of zero-exponence leads to problems pointed out by many authors (among others, Anderson 1992, Halle & Marantz 1993, Marantz 1997, Trommer 2012, Dahl & Fabregas 2022).

Zero-exponence may allow for a proliferation of theories, none of which are testable.

To exemplify, consider the Latin form *laud-ā-b-ā-mus* 'praise.Imperf.Ind.1pl'. In this form, many of the terminal nodes are silent, and only one of them is realized as *-b-*. In principle, DM currently allows for the practitioner to analyze *-b-* as any of the existing nodes above the root. Consider the possible solutions in (15); there is no independent way to motivate one over the others (Pullum & Zwicky 1991).

(15) a. … $[_{Mood}{}^{0}[_{T}{}^{0}[_{Asp}{}^{0}[_{Voice}{}^{0}[_{v}{}^{0}$*laud* -ā- $]_{v}{}^{0}$ b-ā- $]_{Voice}{}^{0}$ -Ø-$]_{Asp}{}^{0}$ -Ø-$]_{T}{}^{0}$-Ø-$]_{Mood}{}^{0}$…

b…. $[_{Mood}[_{T}[_{Asp}[_{Voice}[_{v}$ *laud* -ā- $]_{v0}$ -Ø-$]_{Voice0}$ -b-ā-$]_{Asp0}$ -Ø-$]_{T}{}^{0}$-Ø-$]_{Mood}{}^{0}$ …

c …. $[_{Mood}[_{T}[_{Asp}[_{Voice}[_{v}$ *laud* -ā- $]_{v0}$ -Ø- $]_{Voice0}$ -Ø-$]_{Asp0}$ - b-ā-$]_{T}{}^{0}$-Ø-$]_{Mood}{}^{0}$

d…. $[_{Mood}[_{T}[_{Asp}[_{Voice}[_{v}$ *laud* -ā- $]_{v0}$ -Ø- $]_{Voice0}$ -Ø-$]_{Asp0}$ - Ø-$]_{T}{}^{0}$- b-ā-$]_{Mood}{}^{0}$

Against silence as morpho-syntactic absence

Note at this point that Øs in the structures in (9) could also be analyzed as involving the absence of a node before vocabulary insertion.

For example, one could assume that nodes with unmarked features are not syntactically projected (see Embick and Halle (2004) and also Halle (2018) with regard to Latin).

This move would be welcome insofar as it would simplify syntactic structures *ab origine,* a matter of representational parsimony.

Against silence as morpho-syntactic absence

Unfortunately, the evidence is that the distribution of morphological zeros does not follow from syntactic activity/inactivity but is simply a property of the node exponence.

First, note that [+]-marked, and therefore syntactically active, nodes such as $Mood^0$ in the Subjunctive Present and Imperfect, T^0 in the irregular futures of the III and IV conjugations, and also Asp^0, as mentioned before, are phonologically null.

These marked, active nodes must be syntactically projected; null nodes must be assumed to explain their silence. With their existence independently established, null nodes are available for the treatment of all other cases of silence.

It follows that phonological silence is not due to syntactic inactivity/unmarkedness.

Against silence as morpho-syntactic absence

The existence of null exponents is also motivated by the patterns of certain exponents.

Specifically, the features of unmarked phonologically silent nodes are needed by rules of vocabulary insertion and other rules of exponence.

A striking case is that of the exponent of the 1st Sg AGR node, which, putting aside the Perfect where we find /-ī/ (cf. *laudāvī*), is /-ō/ in Present and Future Indicative forms (*laud-ō, laudāb-ō, laudāver-ō*), otherwise -m (*laudāba-m, laudāvera-m, laude-m, laudāre-m laudāveri-m, laudāviss-em*).

The only way to characterize the distribution of /- *ō*/ is to refer to the feature specifications [-Past, -Irrealis]. These are clearly unmarked, yet they must be present when Agreement exponence is inserted. This could not be accounted for if the relevant nodes were not syntactically projected.

Against silence as morpho-syntactic absence

Other similar cases.

The exponent /-b-/

It appears to have a much more restricted distribution with respect to the exponent /-*s*-/, which occurs in a larger variety of contexts as the exponent of a node with marked features.

The exponent /-*b*-/ occurs as the exponent of a [+Past] or [+Future] node only in a context featurally characterized as [-Perfect, -Irrealis]. Both feature specifications are unmarked but must be representationally available to determine the insertion of /-*b*-/. This is not expected if the relevant dominating nodes are not syntactically projected.

The Subjunctive Imperfect and in the Subjunctive Present.

If /-*s*-/ is the exponent of nodes with marked features, we should expect to find it as the exponent of the $[+\text{Past}]_{T}^{0}$ node of the Imperfect and as the exponent of the $[+\text{Irrealis}]_{\text{Mood}}$ node of the Present. This is not borne out in the data; (9) shows that both have Øs.

To account for this, we need to refer to unmarked features: in the case of the Imperfect Subjunctive, we need to say that the $[+\text{Past}]_{T}^{0}$ is realized as Ø in the context [-Perfect, +Irrealis], and in the other case that $[+\text{Irrealis}]_{\text{Mood}}$ is realized as Ø in the context of [-Perfect, -Past].

The distribution of these exponents cannot be accounted for if nodes with unmarked features are not projected syntactically. The most adequate way to formally deal with such a situation is to assume that these features are associated with a Ø.

Constraining zeros

PROPOSAL:

Once it is determined what nodes, or better what features, receive overt exponents, all other nodes and features are automatically assigned zeros.

The nodes, or features, receiving zeros are obviously constrained.

Some zeros will be inserted in positions that have overt counterparts. For example, an overt exponent for $[+\text{Past}]_T0$ motivates a Ø for $[-\text{Past}]_T0$ if there is no overtly marked exponence for this configuration.

However, a zero can also be assigned to silent positions containing features triggering morpho-phonological rules.

This is the case of the number terminal node in many southern Italian dialects where one finds alternations such as péʃʃ/píʃʃ 'fish-SG/PL. [+plural] triggers systematic metaphonic alternations such as.

It follows that zeros are automatically assigned to otherwise non-overt nodes containing contrastive morphological features, therefore, to features that are morphologically active in a language.

Zeros, fusion and null node pruning

Null exponents, Øs, are also needed for another reason.

The Subjunctive Pluperfect form *laud-ā-**v- i-s-s-**ē-mus* 'Praise-Subj.Pluperfect', is an agglutinative structure, i.e., an accumulation of morphological nodes; however, in the case of the form *laud-ā-**r**-ē-mus* 'Praise-Subj.Imperfect', a single morpheme seems to appear instead of the string of exponents for the Asp^0+T^0+$Mood^0$ nodes.

Zeros were used to account for this in the representation in (9), as mentioned above.

Now, alternatively, **fusion** could be used in the DM model of Halle & Marantz (1993) to account for the merging of some of these nodes.

Zeros, fusion and null node pruning

Since the beginning of DM, both the use of **surface zeros** and **fusion** have been considered problematic.

On the one hand, Zwicky and Pullum (1990) have argued that the use of surface zeros leads to insufficiently restrictive analyses.

On the other, fusion has a look ahead problem insofar as nodes must be fused pre-vocabulary insertion to allow the insertion of the relevant port-manteaux exponent (Chung 2007, 2008).

But use of both fusion and zero exponents can be used to accomplish the same surface outcome.

Zeros, fusion and null node pruning

An operation that can directly connect fusion and zero exponents is null node pruning.

Pruning was originally proposed by Embick (2010) only for non-overt category defining nodes. Following Christopolous & Petrosino (2017) and Christopoulos (2018), Calabrese (2019) extended it to all types of non-overt category nodes and reformulated it as discussed below.

Pruning consists of delinking nodes with non-overt exponence, where Øs are inserted when independently motivated terminal nodes fail to have phonological realization.

This is followed by the upward docking of features that had become floating due to pruning.

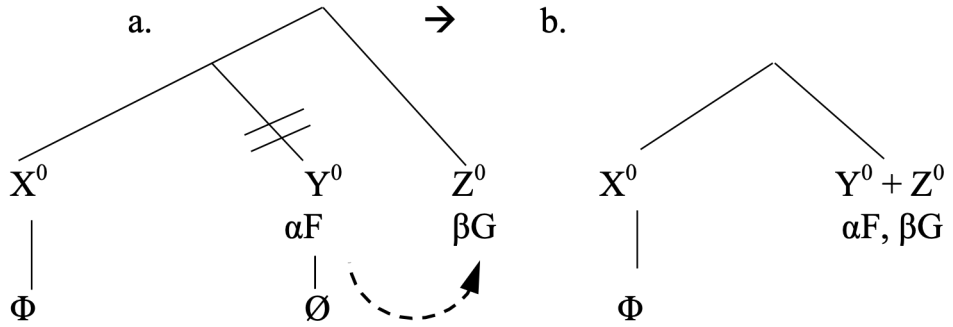
The procedure was independently proposed by Calabrese (2019) for the following reasons:

a) to simplify the phonological realization of morphosyntactic structures,
b) to account for the convergence of complex morphosyntactic structures and their simpler PF surface shape, and also crucially
c) to explain why phonologically null exponents—regardless of their marked/unmarked status— appear not to act as interveners for morphological locality (cf. Embick (2010), Calabrese (2019)).

Pruning

Pruning applies as in (16) where the terminal node Y^0 is assigned a null exponent during cyclic vocabulary insertion in phonological spell out. Pruning detaches Y^0 from its immediately dominating node. However, Y^0 is not deleted; its features become floating and are merged with an adjacent higher terminal node, if there is one. The lower adjacent node has already undergone VI—Φ is an overt exponent, and therefore can no longer be assigned morphological features. This results in the fusion of the two terminal nodes where fusion is always triggered by this pruning operation. A further application of cyclic vocabulary insertion applies to this fused node at this point:

(16)



Unattached floating features are eventually deleted but only at the end of phonological spell out, so they can play a role in triggering morpho-phonological rules such as ablaut processes.

Pruning

Thus, what matters is the pattern of overt exponence.

Given an independently motivated morpho-syntactic structure such as the hierarchy in (13) and the distribution of overt exponents, zero exponent insertion and bottom-up cyclic pruning can generate the relevant simplified morpho-syntactic structures.

Once null exponents are identified, Øs can be considered as devices triggering pruning and subsequent fusion and I will be using them with this function.

The resulting bundles will include features of nodes that do not have overt exponence despite being morpho-syntactically active.

Pruning could be thought of as triggered by the UG filter in (17) which disallows a terminal node exhaustively dominating a null exponent, i.e. phonologically realized as Ø (see Arregi and Nevins 2012 and Calabrese 2019 for a theory of morphology including morphological filters and repairs):

(17) * Y^0 / αF / Ø or better: Avoid zero exponents!

Pruning

The constraint(17) target morpho-syntactic configurations.

Null exponents are independently needed as argued earlier to account for the silence associated with certain morphosyntactic features. Null exponents can be cyclically inserted during Vocabulary Insertion as motivated earlier.

Once these null exponents are inserted in terminal nodes, they violate (17) . But then they are immediately removed by pruning as a repair. This theory has consequences on the structure of the VIs and on the feature specification to be used in them. In fact, due to (17) , the use of Ø is costly. The following principle governing VI composition can then be proposed:

(18) Vocabulary Items can only assign overt exponence.

Pruning

It follows that, given an overt exponent whose distribution involves the features of more nodes, it must be postulated in such a way that it maximally expones the entire sequence of nodes and must therefore be inserted in the highest node.

At the same time, Øs are assigned by default and not by VIs.

Procedure after pruning

Establish features used in the morpho-syntax of the language I. Assuming a universal set of functional nodes prune away all nodes whose features are never morphologically realized in I.

The remaining features define the surface paradigms: the set of the morphological realizations of the feature combinations of terminal nodes of the morpho-syntax.

(18) a. . Identify the morphological pieces of words (=exponents) and their structural arrangement where Each exponent is assigned to a terminal node of the pruned morpho-syntactic structure
b. Determine the feature sets that govern the distribution of the pieces

Analytical Procedures

The featural distribution of an exponent is determined by looking at the paradigm including that exponent. The principle that governs feature assignments to an exponent, i.e., the relevant vocabulary item, is given in (Calabrese (2008)):

(19) For each vocabulary item I in a paradigm P, the minimal set of feature specifications able to account for the maximal distribution of I in P is assigned to I.

Analytical Procedures

For example, consider the Imperfect Indicative form *laudābāmus*. Once it is compared with the other forms of the Latin verbal paradigm, it can be decomposed as *laud-ā-b-ā-mus*.

The focus here is on the piece /-b-/. Given the analysis proposed in (9), it competes with the other exponents /-Ø-/, /-v-/and /-s-/ and, as already mentioned, its distribution is characterized by the features in (20) where [+F] can be [+Future] as in *laudābimus,* or [+Past] as in this case.

(20) [+F, -Perfect, -Irrealis]

The featural distribution of an exponent is determined by looking at the paradigm including that exponent and resorting to (19).

Analytical Procedures

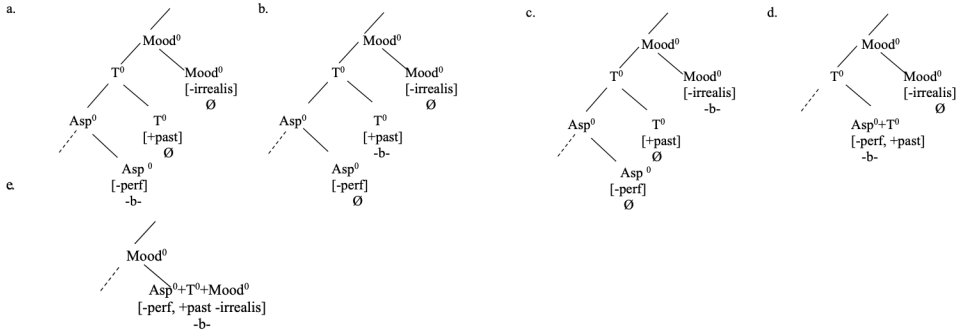
Once the featural distribution of an item such as /-b-/ is established, one must determine its structural distribution: the insertion site of the exponent.

If the specification(s) belong(s) to a single terminal node, there is no issue: the exponent is inserted into this terminal node.

The situation is more complicated if the Vocabulary Item includes specifications belonging to multiple terminal nodes. This is the case of Latin /-b-/.

Consider the possible structures in (21) with the relevant exponent assignments and the related VIs in (22) where the feature specifications in the square brackets must match those contained in the VI insertion site:

(21)



(22)
a. [-Perfect] → /-b-/ / [___ +Past, -Irrealis]
b. [+Past] → /-b-/ / [___ , -Perfect, -Irrealis]
c. [-Irrealis] → /-b-/ / [___ +Past, -Perfect]
d. [-Perfect, +Past] → /-b-/ / [___ -Irrealis]
e. [+Past, -Perfect, -Irrealis] → /-b-/

Analytical Procedures

The two following well-established requirements restrict analytic possibilities:

i) Once feature specifications of the morphosyntactic structures are used up in their relevant insertion cycle, they are no longer available (Bobaljik 2000) (Feature Obsolescence).

ii) ii) Vocabulary insertion requires morphological Locality, specifically structural adjacency between the elements in the structural description of the VI (Bobaljik 2012, Embick 2010)(Locality).

Analytical Procedures

Consider first cases where pruning, and subsequent fusion, are disallowed.

In this case, Ø must be assigned, and preserved, to nodes in violation of (19). These is the case of the structures in (21)a), b) and c).

The structure in (21)a), and the related VI in (22)a) are excluded by Locality: when the VI applies to insert /-b-/ in the Asp node, the feature [-Irrealis] is too far away.

Let us consider (21)b) now. In this case, /-b-/ is inserted in the T node, which contains only the feature [+Past]. Feature Obsolescence forbids this option because once the vocabulary insertion inserts Ø in the Asp node, the feature [-Perfect] becomes unavailable for higher insertion cycles. Therefore, it is inaccessible for the VI (22)b). Therefore, this structure and the related VI in (22)b) can be rejected.

We now turn to (21)c) and the related VI in (22)c), which are excluded by both Locality and Obsolescence: when /-b-/ is inserted in the Mood node, it requires access to the feature [-Perfect], which is too far away up and rendered inaccessible by vocabulary insertion cycle in Asp0.

Analytical Procedure

If we assume feature Obsolescence and Locality, we must assume that features of nodes with zero exponents can be made available to the c-commanding adjacent node.

I represented this availability in (21) by including the relevant features in the insertion site of the VI, i.e. by using pruning, and subsequent fusion.

The option in (21)d) with the related VI in (22)d) postulates the presence of a null exponent terminal node.

This option then requires the further application of a pruning operation in comparison to the option in (21)e) with the related VI in (22)e), where all the relevant features are maximally used in the vocabulary insertion process.

Derivational parsimony selects the latter more economical option. This is the option implemented by (19) and (20).

The VIs for the functional nodes of Latin verbal structures.

Remember the distribution of the exponent /Ø/ and /s/ in (11)-(12): with the exception of some cases discussed below, /Ø/ occurs as the exponent of functional nodes characterized by unmarked (-) features and /s/ as the exponent of functional nodes with marked (+) features.

At the same time, /s/ competes with two other exponents: with /b/ in the Imperfect and Future Indicative, and with /v/ in the regular forms of the Perfect (where also /-s-/ and /-Ø/ can appear after athematic roots, as discussed below).

The VIs for the functional nodes are then the following. Note that +F can be any marked feature specification; Ø is assigned automatically to any node not satisfying (23)a),b) and c). The Ø assigned in this way then triggers pruning:

(23) a. [-Perfect, +F, -Irrealis] → /-b-/

b. [+Perfect] → /-v-/ (Provisional. See later)

c. [+F] → /-s-/

d. Otherwise: Ø

Thus, as mentioned already, what matters is the pattern of overt exponence. All follows from that.

Freezing

Before going on further with the analysis of the Latin verbal forms, I will introduce an independently needed modification of the DM theoretical machinery. It was originally proposed in Calabrese (1997), where I called it feature freezing.

As already discussed, insertion of phonological exponents is governed by the Subset Principle (Halle 1997).

The phonological exponent of a Vocabulary item is inserted in the terminal string if the item matches all or a subset of the grammatical features specified. Now, there are cases where insertion of the more specific vocabulary item does not occur and instead a less specific one is inserted.

Since Bonet (1991), feature impoverishment has been used to account for these cases (see also (Bobalijk 2003, Halle and Marantz 1993, Noyer 1992, 1998, a.o.). Impoverishment deletes or removes features from the morpheme in a terminal node.

By doing so, it blocks the insertion of a more specific Vocabulary item and allows the insertion of a less specified one.

Freezing

.A problem noticed by Calabrese (1997), however, was that impoverished features are often used by other rules applying after the relevant VI. This should not be possible if they are actually deleted as in impoverishment.

For example, in the case of the Present Subjunctive *laudēmus* the mood node [+Irrealis] is assigned a null exponent Ø instead of the expected [-s-].

Impoverishment of the [+Irrealis] feature would account for what happens in this case as the removal of this feature would prevent the application of the VI inserting [-s-]; the elsewhere Ø can be inserted instead.

The problem is that the feature [+Irrealis] also plays a role in the insertion of the TV /-ē-/ in the higher up insertion site.

If it is assumed that this feature is deleted by impoverishment during the earlier insertion cycle, we have a problem here.

Due to similar cases in Italian dialects, Calabrese (1997) proposed to use an alternative strategy: **feature freezing during Vocabulary Insertion**. Feature freezing prevents the use of a feature by a VI at a given insertion site; the same feature, though, can then be used by another rule (since it was not deleted as in impoverishment).

Freezing

So, to account for what happens in *laudēmus,* one can say that there is freezing of the marked [+Irrealis] when Vocabulary Insertion reaches the Mood^0 terminal node.

Therefore, not /-s-/ but /-Ø-/ is inserted in the Present Subjunctive (cf.). Freezing, being temporary, allows the feature [+Irrealis] to be available later for the insertion of the TV /-ē-/.

(24) Freeze [+Irrealis] for the Mood^0 VI insertion rule in the context [-Perfect, -Past, __]

I will consistently use Freezing instead of Impoverishment in this paper.
The final step of this theoretical introduction concerns the possibility of inserting ornamental morphology.

THEMATIC VOWELS

Latin is described as having four conjugations characterized by different thematic vowels (Halle 2018):

(25)

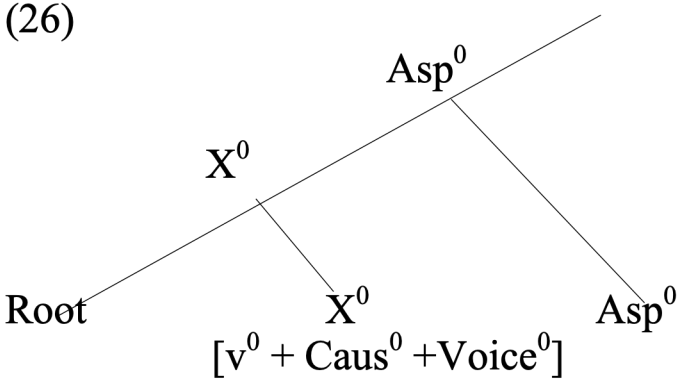
Conj. I	*-ā-,*	e.g.,	*laud-ā-mus/laud-ā-re;*
Conj. II	*-ē-,*	e.g.,	*mon-ē-mus/mon-ē-re;*
Conj. III	*-ĕ-,*	e.g.,	*dūc-i-mus/duc-ĕ-re;*
Conj. III(i)	*-ĭ-,*	e.g.,	*cap-i-mus/cap-ĕ-re,*
Conj. IV	*-ī-,*	e.g.,	*aud-ī-mus/aud-ī-re*

The Thematic Vowel (TV) may be absent in specific morphological categories such as irregular perfects, past participles, and specific verbs.

THEMATIC VOWELS IN LATIN

A simple glance at the structure of segmentations in (9) shows that at least two of the nodes of the VP-shell below Asp^0 have null exponence, so that after pruning the structure in (26) is generated. At first sight, it would be possible to assume that the root-adjacent vocalic piece /-*ā*-/, as well as the other root adjacent vocalic pieces: /-*ē*-, -*I*-, *ĭ*-/ and /-*ī*-/, are exponents of this bundled node.

(26)



Aronoff (1994)

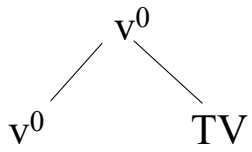
In his analysis of Latin morphology, Aronoff (1994) stresses the double nature of the Latin root-adjacent vocalic pieces *-ā-, -ē-, -ĕ-, -ĭ, -ī*.

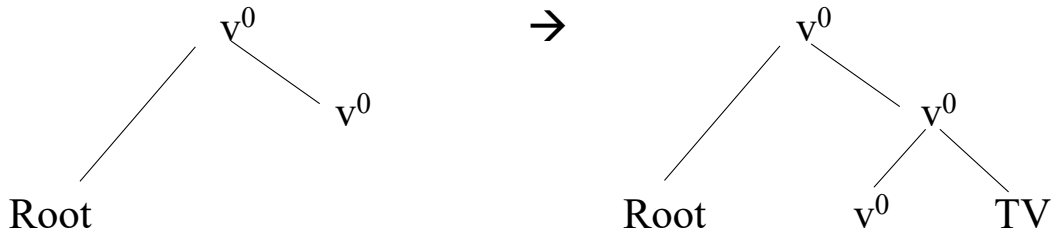
I. On the one hand, these vocalic pieces are legitimate morphemes, separate from the nearby root and/or derivational suffix (on the left side), and the further inflectional suffixes (on the right side). These pieces (a) are in complimentary distribution with one another, and (b) consistently occur within the same verb paradigm.

ii. On the other hand, they seem to carry no consistent syntactico-semantic meaning to the word. According to Aronoff, the most adequate analysis is one in which the Latin TVs are considered purely structural ("ornamental") elements inserted in stem-final position.

Ornamental Thematic Vowels

In the theory adopted here, following Oltra-Massuet and Arregi 2005, they are analyzed as ornamental elements which are devoid of syntactico-semantic functions or content. They are adjoined to the verbalizers (v^0 heads which carry consistent functional meaning) as in (28) by the rule in (27).

(27) v^0 → 

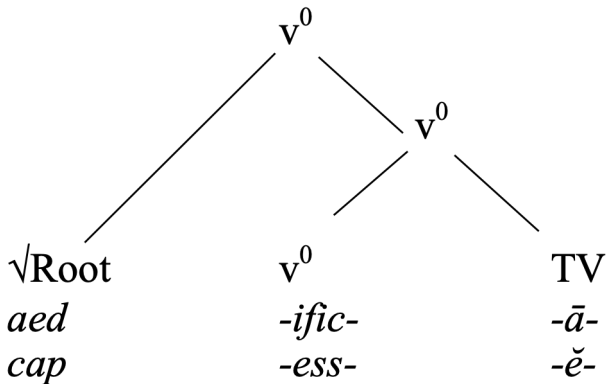
(28) 

Co-occurrence of TVs with overt verbalizers

As epectedin this analysis, ornamental elements TVs can co-occur with true overt verbalizers:

aed- ific- ā- re < *aed-e* ‘house’
house-CAUS-TV-INF
‘construct’

cap-ess-ĕ-re < *cap- ‘seize’*
take-INTENS-TV-INF
‘seize eagerly



Athematic Constructions

The Thematic Vowel (TV) may be absent in specific morphological categories such as perfects, past participles, and specific verbs: e.g., *ten-uĭ-mus, vom-uĭ-mus, scrip-sĭ-mus* vs. *am-ā-vĭ-mus, aud-ī-vĭ-mus.*

Calabrese (23a): A structural TV position associated with v^0 present across verbal forms and aspectual contexts. If it is missing in the *perfect*, it is due to a short vowel being deleted by morpho-phonological rules.

Bertocci (2017), Bertocci and Pinzin (2021)

The Latin root-adjacent vocalic pieces have been carefully investigated by Bertocci (2017) and Bertocci and Pinzin (2021) with the precise goal of identifying their morpho-syntactic status and their semantic properties.

They distinguish between the formatives /-*ā*-, -*ī-/,* which are found both in the *īnfectum* and the *perfectum,* and the formatives */-ē-, -e-, -ĭ-/*, which are found only in the *īnfectum*.

According to their analysis:

I. /-*ā*-/ and /-*ī-/* are productive verbalizer due to the Causative/agentive semantic Aktionsart these verbs have.

II. In contrast, /-*ē-,-ĕ-, -ĭ-/* realize functional features related to the actional-aspectual domain insofar as they are consistently absent with perfective aspect:

First problem: Pattern congruity

As observed by Aronoff, the other root-adjacent vocalic pieces have the same distribution.

Assuming that /-*ā-*/ or /-*ī-*/ are verbalizers (or as ornamental pieces related to verbalizers) and /-*ē-*/, /-*ĭ-*/, and /-*I-*/ /-aspectual elements implies that root-adjacent, distributionally indistinguishable, vocalic pieces end up being analyzed as having different statuses.

But this violates the analytic criterion of **pattern congruity**. **An identical distribution should entail the same structural position provided that there is no other evidence, which in this case is missing**. An analysis that morphological pieces with the same distribution have the same morphological identity is to be preferred over one that assumes that they are different.

Forms such *as laud-ā-bā-mus/ laud- ā-vi-mus, aud-ī-[ē]-bā-mus/aud-ī-vi-mus* show that /-*ā-*/ and /-*ī-*/ cannot be aspectual markers. Therefore, assuming an hypothetical structure where /-*ē-*/, /-*ĭ-*/, and /-*I-*/ are aspectual is inconsistent with this patterning

In fact, the identical morphological patterning of these vocalic pieces has been recognized since early Latin Grammarians such as Varro, Sacerdos and Priscian (Ernout 1953). This has led to the traditional systematization of the Latin verbal conjugations based precisely on these vocalic elements.

Bertocci and Pinzin's analysis of 1st conjugation /-*ā*-/

The verbs of the 1st conjugation, i.e., the verbs that include the vocalic piece /-*ā*-/.

Bertocci and Pinzin's (2021): most /-ā-/-verbs can be thought of as secondary formations (see also De Vaan 2012) where /-ā-/ attaches to a noun or an adjective (*armāre 'to arm'* (cf. *arm-a* 'weapons, arms'), *novāre* 'to make new' (cf. *nov-o-* 'new'), *congregāre* 'to collect into a flock/herd' (cf. *greg-e-* 'flock/herd'), or to an existing verb (*cantāre* 'to sing' (cf. *can-e-* 'sing').

Their proposal: **the piece /-*ā-/* is a productive verbalizer characterized by a Causative/Agentive Aktionsart.**

Cf. the residual causativizing function in couples like stative *liqu-ē-re* 'to be liquid' vs. Causative *liqu-ā-re* 'to make liquid'; *placēre* 'to please' *vs. placāre* 'to appease' and *sedēre* 'to sit' vs. *sedāre* 'to settle' (but very few pairs of this type)

Problems for the Bertocci and Pinzin's analysis of 1st conjugation /-*ā*-/

Crucially, there is an important subset of the the 1st conjugation verbs that cannot be characterized in this way.

These are verbs that seem to be **the direct output of ancient primary verbs, i.e., they cannot be derived from attested nouns, adjectives or verbs** (De Vaan 2012). They are verbs like *amāre, arāre, putāre, volāre*, etc. In addition to transitive activity verbs like *amāre* 'to (make) love', *arāre* 'to plough', *dolāre* 'to hew', this third group also contains intransitive verbs like *fāri* 'to speak'and *volāre* 'to fly'.

These verbs mostly have animate subjects which can be considered initiators of processes. However, this is not true for verbs like *cubāre* 'lie down', *flagrāre* 'to glow', which are **unaccusative** and obviously non-agentive.

cf. *flagrābānt ignes* Ov. F.6, 439 'the fires were glowing' where the verb is clearly unaccusative, not agentive.

The same holds for the IV conjugation /-*ī*-/-verbs

Some of them are indeed clearly related to a nominal/adjectival basis (e.g. *finio* ‘I limit’ -*finis* ‘limit’).

However, many others are not such as *dormio* ‘I sleep, *venio* ‘I come’.

Problems for the Bertocci and Pinzin's analysis of conjugations /-*ā*-/ and /-*ī*-/

I. **Identifying common semantic properties in the case of the /-*ā*-/ and /-*ī*-/ vocalic pieces is not possible.**

The /-*ā*-/ and /-*ī*-/ verbs are a rather composite class where no clear common features can be established, both in terms of morpho-syntactic and semantic properties.

ii. **A further problem;**
whatever their etymological or derivational bases, all of the /-*ā*-/ and /-*ī*-/ verbs can undergo suppression or demotion of agentivity in Passive or impersonal constructions*: amātur, liqu-ā-tur; plac-ā-tur, sed-ā-tur, congreg-ā-tur, cant-ā-tur, fin-ī-tur* ,etc.

Despite this, they preserve the /-*ā*-/ and /-*ī*-/ markers. This shows that these markers cannot be associated with "agentivity". In this sense, Aronoff is right in proposing that root-adjacent pieces such /-*ā*-/ or /-*ī*-/ do not carry any syntactico-semantic meaning to the word.

Problems for the Bertocci and Pinzin's analysis of conjugations /-*ā*-/ and /-*ī*-/

III. As shown before, vocalic pieces such as /-*ā*-/ can cooccur with Causative verbalizers as in the forms in (3). If /-*ā*-/ carried a Causative/agentive meaning, it should be incompatible with the markers below.

(29) Derivational verb suffixes

Suffixes	Thematic vowel	Meaning	Example	Gloss
-fic-	*ā*	Causative	*aed-ific-ā-re*	'construct'

To account for cases like those in (3), Bertocci and Pinzin propose that a derivative like /*-fic-/* "lexicalizes *v* only when it is related to complex actional semantics, whereas /-*ā*-/ closes the derivation enhancing the agentive function properly".

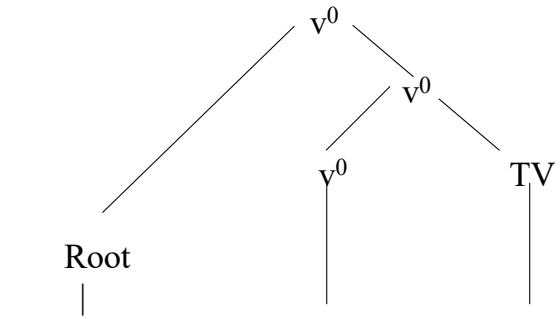
It is unclear to me what this really entails from the syntactic and semantic point of view. The point is that **the derivative like /*-fic-/* includes agentive semantics**, and the **piece /-*ā*-/ is simply semantically an empty, redundant morphological element**.

Problems for the Bertocci and Pinzin's analysis of conjugations /-*ā*-/ and /-*ī*-/

The most adequate analysis of the constructions in (29) is thus Aronoff's original proposal, reanalyzed in DM as involving the complex structure in (28) . It consists of a v^0 head with a clear functional meaning, followed by the "thematic vowel", another v^0-head but without a functional meaning.

The theme vowel in this case is essentially a "redundant" v^0 head devoid of syntactico-semantic functions or content:

(30)



a. [[[[*vīs*]$_{Root}$ [-*it*-]$_{v0}$ [-*ā*]$_{TV}$]$_{v0}$ -*re*]$_{T0+AGR}$ 'see often-infinitive'
b. [[[[*aed*-]$_{Root}$ [-*ific*-]$_{v0}$ [-*ā*]$_{TV}$]$_{v0}$ -*re*]$_{T0+AGR}$ 'construct-Infinitive'
c. [[[[*ēs*-]$_{Root}$ [-*ur*-]$_{v0}$ [-*ī*-]$_{TV}$]$_{v0}$ -*re*]$_{T0+AGR}$ ''be hungry-Infinitive'

Bertocci and Pinzin's analysis of 2nd and 3rd conjugations: the other root-adjacent vocalic pieces /-*ē-, -ĭ-/* and /-*ĕ-/*.

Bertocci and Pinzin propose that the other root-adjacent vocalic pieces /-*ē-, -ĭ-/* and /-*ĕ-/* realize functional features related to the actional-aspectual domain insofar as they are consistently absent with perfective aspect:

(31)		Present	Perfect			Infinitive
a.	II	*ten-ē- mus*	*ten-u-ĭ-mus*	'hold'	Athematic + *-v-*	*ten-ē-re*
b.	II	*aug-ē-mus*	aug-s-*ĭ-mus*	'increase'	Athematic + *-s-*	*aug-ē-re*
c.	II	*sed-ē- mus*	*sēd-ĭ-mus*	'hold'	Athematic + -Ø	*ten-ē-re*
d.	III(i)	*rap-ĭ-mus*	*rap-u-ĭ-mus*	'pillage'	Athematic + *-v-*	*rap-ĕ-re*
e.	III(i)	*-spec-ĭ-mus*	*spec-s-ĭ-mus*	'look at'	Athematic + *-s-*	*-spec-ĕ-re*
f.	III(i)	*cap-ĭ-mus*	*cēp-ĭ-mus*	'seize'	Athematic + -Ø	*cap-ĕ-re*
g.	III	*vom-ĭ-mus*	*vom-u-ĭ-mus*	'vomit'	Athematic + *-v-*	*vom-ĕ-re*
h.	III	dūc-ĭ-mus	dūc-s-ĭ-mus	'lead'	Athematic + -s-	dū-ĕ-re
i.	III	vert-ĭ-mus	vert-ĭ-mus	'turn'	Athematic + -Ø	vert-ĕ-re

Problems for the Bertocci and Pinzin's analysis of /-ē-/, /-ĭ-/ and /-*ĕ*-/-verbs

Also in this case, there are issues.

I: **/-ē-/, /-ĭ-/ and /-*ĕ*-/-verbs cannot be characterized in terms of common special aktionsart properties**. As a matter of fact, the same aktionsart properties can be found across Latin verbal conjugations, and it has never been possible to classify Latin conjugation classes in semantic terms. The aktionsart properties of the verbs in question do not change with the change of aspectual features as Bertocci and Pinzin observe.
If the root adjacent vocalic pieces are markers of these properties, it is unclear why they disappear when these properties are still preserved.

The Imperfect Indicative

II. **/-ē-/, /-ĭ-/ and /-*ĕ*-/- cannot be characterized as aspectual markers**.

Under this analysis, they would realize [-Perfect] Asp^0. Thus, they would be the imperfective counterparts of the [+Perf] Asp^0 exponents /-v-, -s-, -Ø-/

(32) a. [-Perfect]Asp^0 → /-ē-/ /Root^{ē}____
b. [-Perfect]Asp^0 → -/ĭ-/ /Root^{ĭ} _____
c. [-Perfect]Asp^0 → /-*ĕ*-/ /Root^{ĕ} _____

But **this is inconsistent with the distribution of the exponent /-*b*-/** in forms such as *monēbāmus, legēbāmus capiēbāmus* where the last two forms display the insertion of a the long vocalic /-*ē*-/ piece before /-*b*-/ (< /*leg-I-ē-b-ā-mus/, /cap-i-ē-b-ā-mus/.* (</*leg-ĕ-b-ā-mus/, /cap-i-b-ā-mus/.*

The distribution of the exponent /-*b*-/ in a form such *laud-ā-bā-mus* (vs. *laud-ā-vi-mus)* requires the feature [-perf] to appear in the /-*b*-/-insertion site together with the Tense feature [+Past] , i.e., /-b-/ <--> [-perf, +past, -irr]

If we assume that/-*ē*-/ is the exponent of the [-perf] Asp^0 in *monēbāmus*, /-*b*-/ can only appear in T^0. This is not consistent with the preceding assumptio Therefore, /-*ē-/* cannot be an aspectual exponent. The same holds for forms such as *legēbāmus capiēbāmus*,

Therefore, the hypothesis that vocalic pieces such as /-*I*-/, /-*ē-/* and */-ĭ-/* are exponents of [-perf]$_{\text{Asp}}{}^0$ is difficult to maintain.

Conjugation changes and the preservation of morpho-syntactic structure

Many verbs with the short thematic vowels /-ĭ-/ and /-I-/may have a root adjacent vocalic piece in the Perfect under certain conditions.

Thus, verbs like *petō* 'seek', *quaerō* 'search', *sapiō* (*cf. sapĕre*) 'taste', *cupiō (cf. cupĕre)* 'desire' and all the verbs formed with the suffix /-*ess*-/(cf. *cap-ess-ō* 'seize eagerly') change their thematic vowel to /-*ī*-/ -in the *perfectum* (cf. *petīvī, quaesīvī*, *sapīvī*, *cupīvī, capessīvī)*.

Conjugation changes and the preservation of morpho-syntactic structure

Consider *cap-ess- ĕ -re* 'seize eagerly'. One can exclude that [ĕ] (=UR /I/) is the exponent of v^0 since this position is occupied by /-*ess*-/.

If /- I -/ is not an ornamental TV, it must belong to $[\text{-perf}]_{Asp^0}$

But then this exponent should be replaced by a [+Perf] exponent in the *perfectum* and the form should be athematic (see ii) as expected in Bertocci and Pinzin's approach:

(33)i. Present vs. ii. Perfect

$[[[cap]_{Root}\ ess\text{-}]_{v0}\ \text{-}\ \check{e}\ ]_{[\text{-perf}]Asp0}$ … $[[[[cap]_{Root}\ ess\text{-}]_{v0} – ?X?\ ]_{[\text{+perf}]Asp0}$ …

Preservation of morpho-syntactic structure and Conjugation changes

The presence of the long /-*ī-*/ of *capessīvī* is therefore totally unexpected. It can belong neither to v^0 , which is occupied by /-ess/, nor to Asp^0, which is realized by /-v-/. Its presence cannot be motivated in semantic, morpho-syntactic, or phonological terms.

Bertocci and Pinzin must stipulate the insertion of an Ornamental-like position special to the *perfectum* of these verbs.

The most parsimonious analysis for these forms is instead one that assumes there is an ornamental TV for both the *īnfectum* and the *perfectum*. This position can be realized as /-e-/ (=/I/) in *cap-ess-e-re, petō* 'seek', *quaerō, etc.* or as /-ĭ-/ in the case of s*apiō* (*cf. sapere*) taste', *cupiō (cf. cupere)* 'desire'. The process of lengthening in (9) accounts for what happens in the Perfect with these verbs:

(34) N → N / X \ X / $Head^L$ [__]$_{TV}$ [+perf], $head^L$ =*pet-, quaer-, cup, -ess-*, etc.

This is to be expected if there is preservation of morpho-syntactic structure

Participial [i]

Similar evidence against root-adjacent vocalic pieces being Asp^0 realizations is provided by /-*ē*-/ and /-*I*-/ verbs. These display a root adjacent [i] in the participle.

As argued in Calabrese (2020) (see also Embick and Halle (2004) Remberger (2012)), the piece /-t-/ is an exponent of $[+perf]_{Asp^0}$ in participle forms:

(35)	*monēre*	*monuimus*	*monĭtum*	'warn'
	gignere	*genuimus*	*genĭtum*	'beget'
	molere	*moluimus*	*molĭtum*	'grind'
	cubāre	*cubuimus*	*cubĭtum*	'recline'

Participial [i]

As before, the most adequate analysis preserves the morpho-syntactic structure across forms.

As argued below, in these forms, the TV is reduced to a short vowel /-I-/.

This accounts for the appearance of the Perfect exponent /v-/, which, as will be seen, occurs only after vowels.

The thematic element /-I-/ is deleted by a phonological rule before /v-/ but is preserved before /-t/, thus accounting for the pre-aspectual vocalic element of the participles.

(36) [[[*mon*]$_{Root}$ -ē-]$_{V}^{0}$ +*perf*]$_{Asp}^{0}$… → + d) → [[[*mon*]$_{Root}$ *-I-*]$_{V}^{0}$ +*perf*]$_{Asp}^{0}$… →*VI*→[[[*mon*]$_{Root}$ *I*]$_{V}^{0}$-***v***-]$_{Asp}^{0}$…→
→ [[[*mon*]$_{Root}$]$_{V}^{0}$ -***v***-]$_{Asp}^{0}$… → *[resyllabification]* → [[[*mon*]$_{Root}$]$_{V}^{0}$ -***u***-]$_{Asp}^{0}$… → …. → *monuimus*

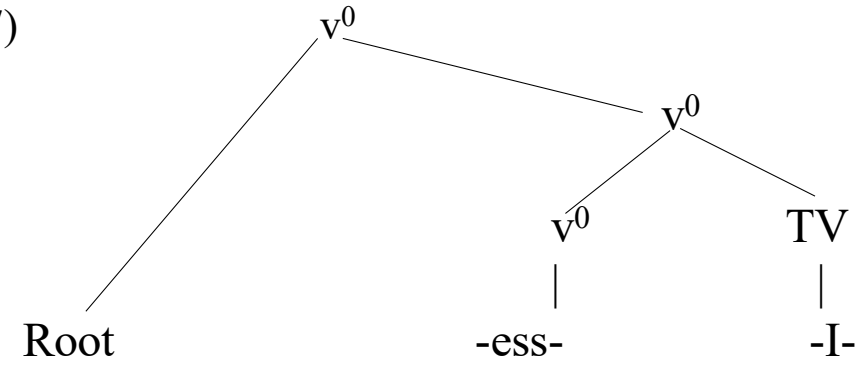
[[[*mon*]$_{Root}$ -ē-]$_{V}^{0}$+*perf*]$_{Asp}^{0}$… → + d) → [[[*mon*]$_{Root}$ *-I-*]$_{V}^{0}$ +*perf*]$_{Asp}^{0}$… → *VI* →[[[*mon*]$_{Root}$ *-I-*]$_{V}^{0}$ *-t-*]$_{Asp}^{0}$… →
→ [[[*mon*]$_{Root}$ *-i-*]$_{V}^{0}$ -***t***-]$_{Asp}^{0}$… *monĭtum*

The most adequate analysis: /-ē-/, /-ĭ-/ and /-*ĕ*-/- are ornamental TVs are attached to v and not in Asp^{0}

All root-adjacent vocalic pieces are ornamental

If this analysis is on the right track, one must conclude that all root-adjacent vocalic pieces are the same: they are devoid of syntactic and semantic properties and are, therefore, ornamental. Thus, the pieces /-*I*-, -*ē,*/and -/-*ĭ*-/ are inserted by the rule in , as shown in for the form *cap-ess-e-re.*

(37)



[[[[*cap*]$_{Root}$ [-*ess*]$_{v0}$ [-*I*]$_{TV}$]$_{v0}$ -*re*]$_{T0+AGR}$ ‘seize eagerly-infinitive’

Other Vocalic pieces

We can now turn to the different exponents we see in the strings in (9) and consider the status of the vocalic pieces appearing within. Specifically, the vowels that appear in the inflections in (9) must be considered.

Putting aside the /u/ of /-*mus*/, which is part of the 1plural ending, what is the role of the vowel /*ā*/ of -*bāmus*-, -*verāmus* or the /i/ of -*bimus*-, -*vimus*, -*verāmus*- (>/e__r), and -*verimus*? Consider the different phonological pieces that can be associated with each of the functional nodes in - as shown in :

(38)	-u -i <--> $[+perf]_{Asp}{}^{0}$	laud-ā+**v-i**+Ø+Ø+mus	*laudā**vi**mus*
	-s -i <--> $[+fut]_{T}{}^{0}$ / $[+perf]_{Asp}{}^{0}$ ___	laud-ā+v-i+**s-i**+Ø+mus	*laudāve**ri**mus*
	-b -i <--> $[+fut]_{T}{}^{0}$ / ___ $[-irr]_{Mood}{}^{0}$	laud-ā+Ø+**b-i**+Ø+mus	*laudā**bi**mus*
	-b -ā <--> $[+Past]_{T}{}^{0}$ / $[-perf]_{Asp}{}^{0}$ ___	laud-ā+Ø+**b-ā**+Ø+mus	*laudā**bā**mus*
	-s -ā <--> $[+Past]_{T}{}^{0}$ / $[+perf]_{Asp}{}^{0}$ ___	laud-ā+v-i+**s-ā**+Ø+mus	*laudāve**rā**mus*
	-s -ē <--> $[-perf, +Past, +irr]_{Mood}{}^{0}$	laud-ā+Ø+Ø+**s-ē**+mus	*laudā**rē**mus*
	-s -Ø <--> $[+Past]_{T}{}^{0}$ / $[+perf]_{Asp}{}^{0}$ ___ $[+irr]_{Mood}{}^{0}$	laud-ā+v-i+**s-Ø**+s-ē+mus	*laudāvi**s**sēmus*
	-Ø -ē <--> $[-Past]_{T}{}^{0}$ / $[-perf]_{Asp}{}^{0}$ ___$[+irr]_{Mood}{}^{0}$	aud-ā+Ø+Ø+**Ø-ē**+mus	*laudēmus*

Other Vocalic pieces

A system that considers all the pieces in (38) as possible exponents of the different functional nodes is not very parsimonious.

A simpler system can be achieved if we segment away vowels and consonants as independent pieces. A first possibility was put forward by Halle (2018), who assumes that the exponents of the nodes are the vowels. Consonants, meanwhile, are considered ornamental "augments".

Corresponding rules are given in (39) for vowels and in (40) for consonants (where +F indicates a marked feature (e.g. +Perfect, +Future), and obviously [-F] an unmarked feature (-Perfect, -Past, etc.):

(39) a. $[+\text{Past}]_{T}^{0}$ → ā
b. $[+\text{irreal}]_{\text{Mood}}^{0}$ → ē
c. $[+\text{F}]_{X}^{0}$ → I

(40) a. Ø➔ /-b-/ / $[-\text{perf}]_{\text{Asp}}^{0}$ ___ $[+\text{F}]_{T}^{0}$ $[-\text{irreal}]_{\text{Mood}}^{0}$ (+F=+Past or +Fut)
b. Ø➔ /-v-/ / ___ $[+\text{perf}]_{\text{Asp}}^{0}$
c. Ø➔ /-s-/ / ___ $[+\text{F}]_{T}^{0}$ (+F=+Past or +Fut)

Other Vocalic pieces

The problem of the system in (39)-(40) is that it fails to account for the striking overlap between the functional vowels in and the verbal thematic vowels, which must be introduced by another set of rules as in(41) :

(41) a. Ø ➔ /-ē-/ Root^{e} [__]$_{TV}$
b. /-ī-/ Root^{ī} [__]$_{TV}$
c. /-ĭ-/ Root^{ĭ} [__]$_{TV}$
d. /-I-/ Root^{i} [__]$_{TV}$
e. /-ā-/ Root^{ā} [__]$_{TV}$

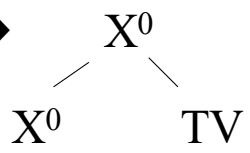
Notably, the functional vowels of and the thematic vowels of belong to the same set of phonemes [*ā, ē, ī, ĭ* / and /*I]*.

There are seven other contrastive Latin vowels; such an overlap can only be accounted for for if it is the same set of vowels occurring in both functional and thematic positions.

Other Vocalic pieces

This follows if the exponents of the functional nodes are the consonants (see below for an analysis) and the vowels are ornamental "thematic" elements. These thematic vowels are simply those in (41). An overarching generalization of Latin morpho-phonology, therefore, appears to be that the **exponents of the verbal functional nodes are consonantal pieces and that vowels have just an ornamental function**.

Ornamental TVs are inserted by the rule in (42), namely a generalization of (27) to all functional nodes.

(42) $X^0 \rightarrow$ 

Other Vocalic pieces

Thematic vowels are inserted by the rules in (43). They are sensitive to a special diacritic assigned to the head. For v^0, the diacritic is inherited or copied from the root; it is assigned by the rules in (44) for other functional nodes (provisional, see later for a revision). The diacritics $^{\bar{e}}$, $^{\bar{\imath}}$, $^{\check{\imath}}$, and ^{I} are idiosyncratically specified as root information, and from there transmitted to v^0. The diacritic $^{\bar{a}}$ is instead inserted as the default diacritic for v^0 by c) when an idiosyncratic root diacritic is missing. This accounts for the default status of the ā-conjugation. On the other hand, the fact that I is the most common inflectional vowel is accounted for by d).

(43) a. Ø ➔ /-ē-/ /Head$^{\bar{e}}$ [__]$_{TV}$
b. /-ī-/ /Head$^{\bar{\imath}}$ [__]$_{TV}$
c. /-ĭ-/ /Head$^{\check{\imath}}$ [__]$_{TV}$
d. /-I-/ /Head^{I} [__]$_{TV}$
e. /-ā-/ /Head$^{\bar{a}}$ [__]$_{TV}$

(44) a. Ø➔$^{\bar{e}}$ / [+Irrealis]$_{Mood}{}^{0}$ —
b. Ø➔$^{\bar{a}}$ / [+Past]$_{Mood}{}^{0}$ —
c. Ø➔$^{\bar{a}}$ / v^0 —
d. Ø➔^{I} / X^0 —

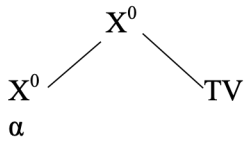
Final discussion of TVs

Still some refinements are needed. Note that the thematic vowels are not present in all functional nodes. The following generalization can be postulated: thematic vowels always occur after v^0, after a [+Perfect] Asp^0, and after the highest node that contains a [+F] feature in the verbal complex X^0, where F could be [Irrealis], [Past] or [Future]. Thus, there can be a maximum of three TVs per verbal form. So, we have a form like that in (45a) instead of a form like that in (45b) where each functional head has the expected TV.

(45) a. *laud-ā -v-i-s-s-ē -mus* 'praise.pluprf.sbjv.1pl'
[[[[***laud-***]$_{Root}$ [***-a***]$_{TV}$]$_{v}^{0}$***-v-***[***-i***]$_{TV}$]$_{[+perf]\text{-}Asp}^{0}$ ***-s***]$_{[+Past]\text{-}T}^{0}$ ***-s*** **-**[- ē]$_{TV}$]$_{[+irr]\text{-}Mood}^{0}$]***-mus***]$_{[1pl\text{-}AGR}$

b. †l*aud-a-v-i-r-ā-r-ē-mus* /UR: *laud-a-v-i-s- ā- s-ē-mus/.*

In order to account for this fact, I propose that a TV is adjoined only to X^0 containing marked feature specifications (see(46) with the proviso that above Asp^0 only the highest marked functional node receives it: the output constraint in (47) accounts for this restriction. It blocks the insertion of a TV in T^0 if there is a marked mood feature:

(46) X^0 → 

(α=marked feature, V^0 is always marked)

(47) *[TV]$_T$0 / __ [+F]$_X$0

I will now derive the basic Latin verbal forms beginning with regular verbal forms.

The derivation of Latin verbal forms I: Regular and irregular morphology

Irregular morphology = morpheme-specific morphology, i.e., situations in which morphological operations are dependent on lexical diacritics, root specific information.

Example: the Imperfect and the Perfect in the Italian verbal system: The Imperfect is regular in always having the same exponent across verbs and conjugations. The Perfect, on the other hand, is irregular in having different exponents according to verbs and conjugations.

To account for these different exponents, the **Perfect must have special vocabulary item that reference root information**—represented by **diacritics**— **in their structural description**. **No such contextual restrictions are needed for regular morphology**, i.e., for the Imperfect -v- or for the Ø which otherwise characterizes regular Italian Perfect (see Calabrese (2015) for detailed discussion; X triggers Gemination).

(48) **Regular morphology** **Irregular morphology**

Italian Imperfect forms — Italian irregular Perfect

ama-v-o/ama-re 'love' — *per-s-i/perdere* 'lose'

batte-v-o/batte-re 'beat' — *ven-X-i [venni]/venire* 'come'

parti-v-o/parti-re 'leave'

ama-Ø-i/batte-Ø-i/parti-Ø-i

(49) a. [-Perfect, +Past] → /-v-/

b. [+Perfect] →/-s-/ / root^{s} __ (root^{s}=perd, etc.)

c. [+Perfect]→/-X-/ / root^{X} __(root^{X}=perd, etc.

d. /otherwise -Ø-

Regular and irregular morphology and diacritics

Lexically restricted generalizations require diacritics identifying the forms characterized by a certain property (see Calabrese (2019). Any theory must state something similar: thus, for example, even if listing is used, a lexically restricted set of forms is nothing else than a set of forms identified by a special property (a diacritic).

As discussed below, **the transmission of information necessary for morphological operation application, and more generally any morpheme-to-morpheme interaction, can occur only in a local configuration, where locality involves structural adjacency** (Bobaljik 2012, Embick 2010, 2013, Calabrese 2019).

Latin regular and irregular morphology

Latin verbal morphology is regular in the sense that there is no need to posit special VIs referring to root specific information in the Latin verbal system.

(23) a. [-Perfect, +F, -Irrealis] → /-b-/
b. [+Perfect] →/-v-/
c. [+F] → /-s-/
d. Otherwise: Ø

(Provisional.)

(43) a. Ø ➔ /-ē-//Head$^{\bar{e}}$ [__]$_{TV}$
b. /-ī-/ /Head$^{\bar{I}}$ [__]$_{TV}$
c. /-ĭ-/ /Head$^{\check{I}}$ [__]$_{TV}$
d. /-I-/ /Head^{I} [__]$_{TV}$
e. /-ā-// Head$^{\bar{a}}$ [__]$_{TV}$

(44) a. Ø➔$^{\bar{e}}$ / [+Irrealis]$_{Mood}{}^{0}$ —
b. Ø➔$^{\bar{a}}$ / [+Past]$_{Mood}{}^{0}$ —
c. Ø➔$^{\bar{a}}$ / v^{0} —
d. Ø➔^{I} / X^{0} —

Instead, root-contextual irregular allomorphy in Latin is exclusively due to the action of root-triggered morphophonological and freezing operations.

Below, I will deal only with verbal forms that do not require access to these root-triggered operations.

The derivation of Latin verbal forms: *laudābāmus*

Let us start with the Indicative Imperfect *laudābāmus* 'we.pl were praising'.

The complex X^0 for this form is derived as in (51).

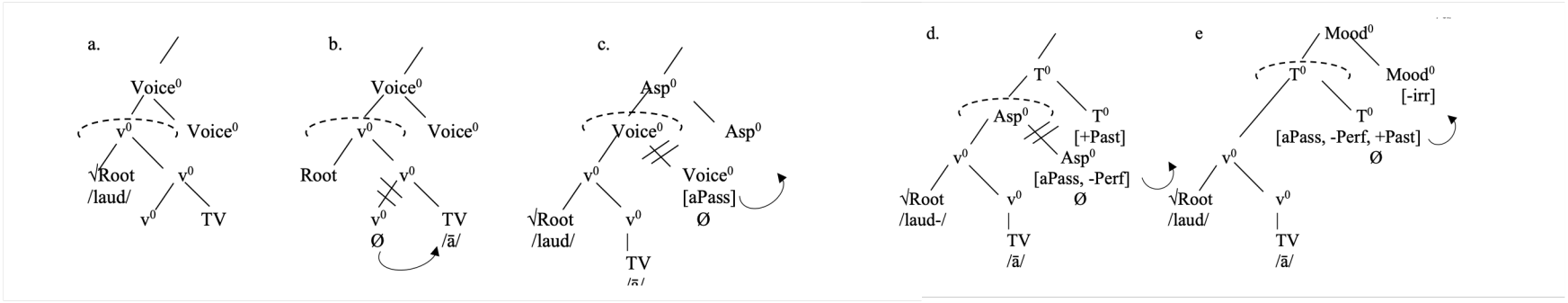
Phonological spell out operates cyclically node-by-node bottom up. Thus, the cyclic derivation in is generated with the relevant application of Vocabulary Insertion, TV insertion and AGR insertion. In addition to overt exponents, Øs are cyclically inserted when independently motivated terminal nodes fail to have phonological realization, followed by pruning of these Øs and feature docking; thus, some verbal functional nodes become fused together.

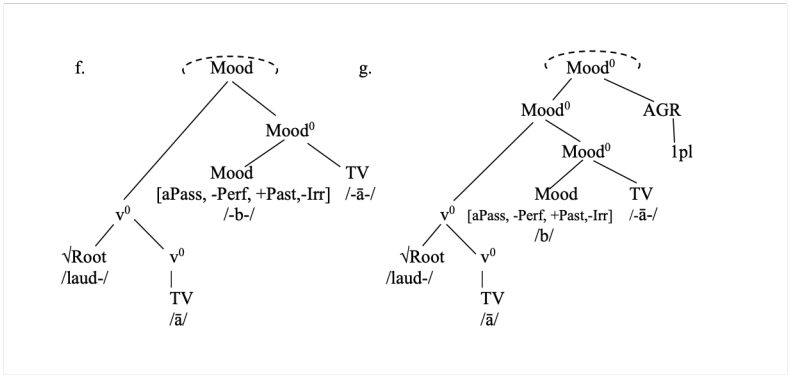
All the VIs needed for this form were introduced earlier, with the exception of spelling out AGR. Since I am considering only 1pl forms, this VI can phonologically spell out AGR in all forms under discussion:

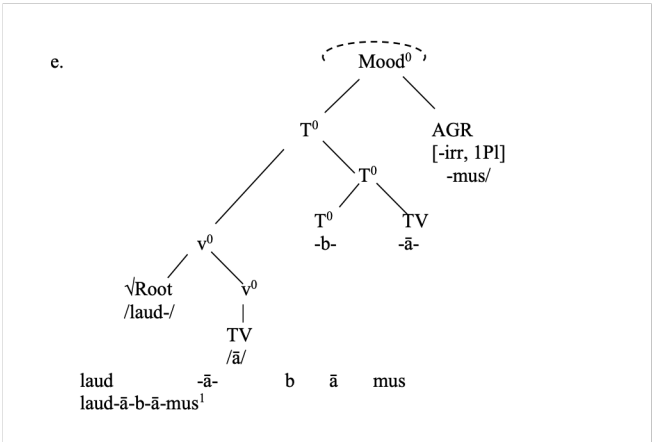
(50) $[+\text{participant}, +\text{author}, +\text{plural}]_{\text{AGR}} \quad \rightarrow \quad$ /-mus/

The derivation of Latin verbal form *laudābāmus*

(51)







The present subjunctive and Freezing

Not all cases of Ø are predictable according to the VIs in (23) and (43), however. For example, in the case of the Present Subjunctive *laudēmus* , the mood node [+Irrealis] is assigned a Ø instead of the expected [-s-].

Feature freezing during Vocabulary Insertion accounts for this case. Feature freezing prevents the use of a feature by a VI at a given insertion site; the same feature, though, can be used by another rule (since it was not deleted as in impoverishment). Thus, the marked [+Irrealis] is realized as /-Ø-/ through feature freezing in the Present Subjunctive (cf. (52))

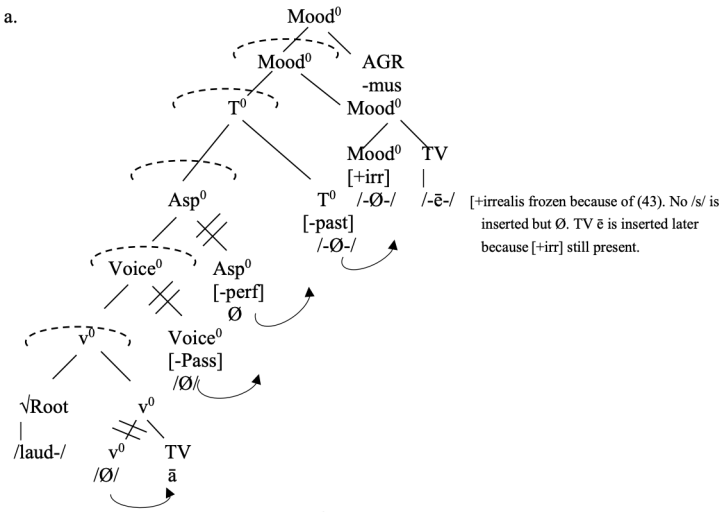
(52) Freeze [+Irrealis] for the $Mood^0$ VI insertion rule in the context [-Perfect, -Past, __]

The feature [+Irrealis] can still play a role in the insertion of the TV /-ē-/ because the relevant VI applies in the higher up insertion site. I represent the derivation of this form as in (53a) where all the different cyclic steps are compacted together. The final output is given in (53b):

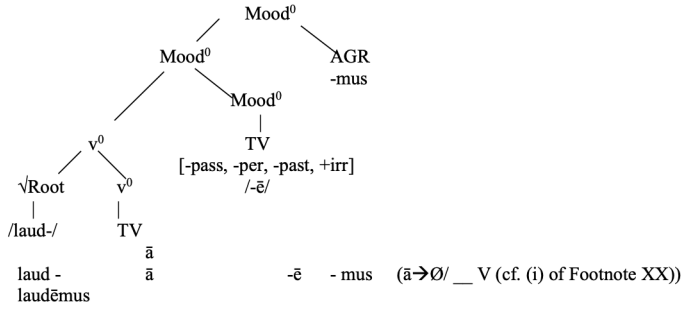
The derivation of Latin verbal form *laudēmus*

(53)

a.



b.



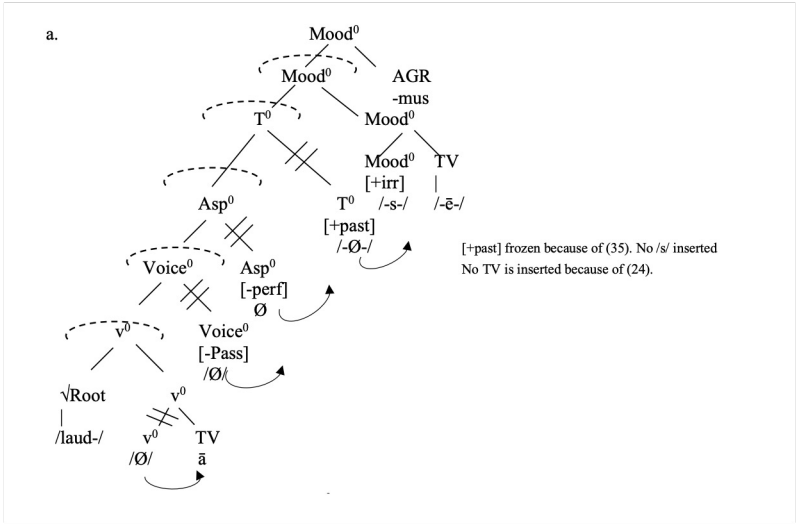
The derivation of Latin verbal form *laudārēmus* ‘

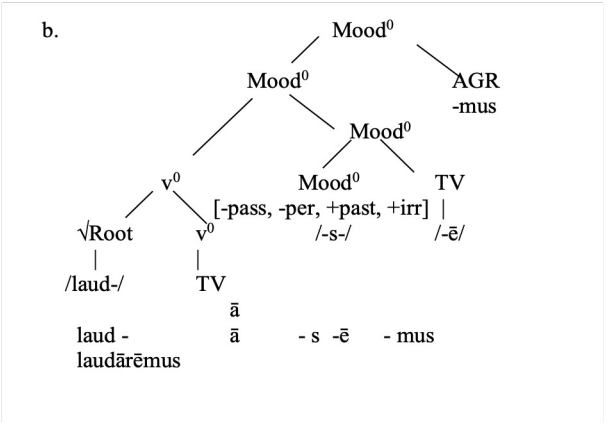
Feature freezing occurs also in the case of the Subjunctive Imperfect *laudārēmus* ‘we would be praising’ where the marked Tense [+Past] node is unexpectedly assigned the null exponent Ø. In this case the freezing operation in (54) occurs:

(54) Freeze [+Past] for the T^0 VI insertion rule in the context [-Perfect, ____][+Irrealis]

The derivation is given in (55a) and the eventual output is that in (55b):

(55)

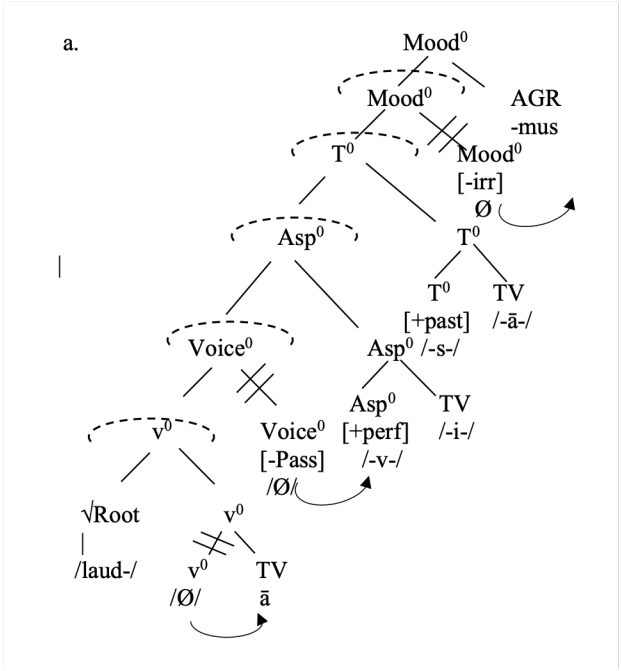


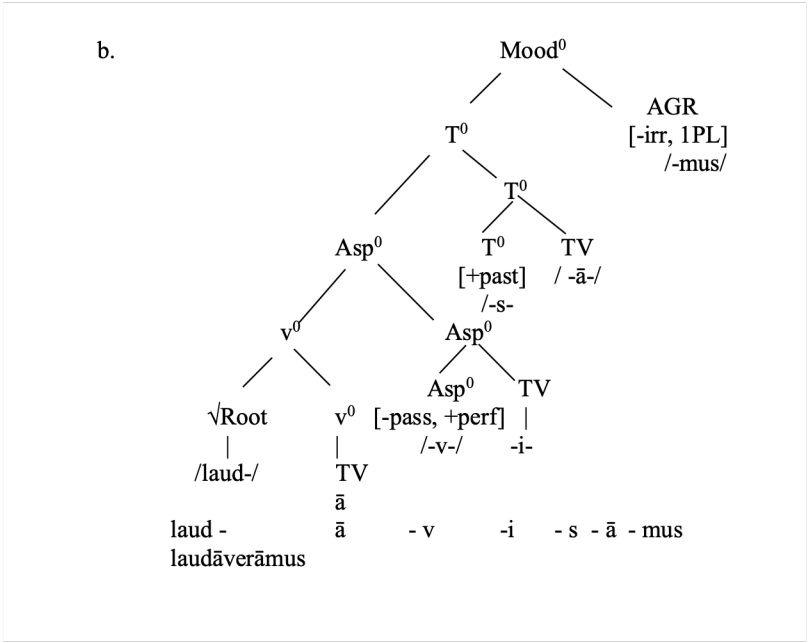


The derivation of Latin verbal form *laudāverāmus*

The Indicative Pluperfect form *laudāverāmus* can be cyclically derived as in (56a). The output is given in (56b):

(56)



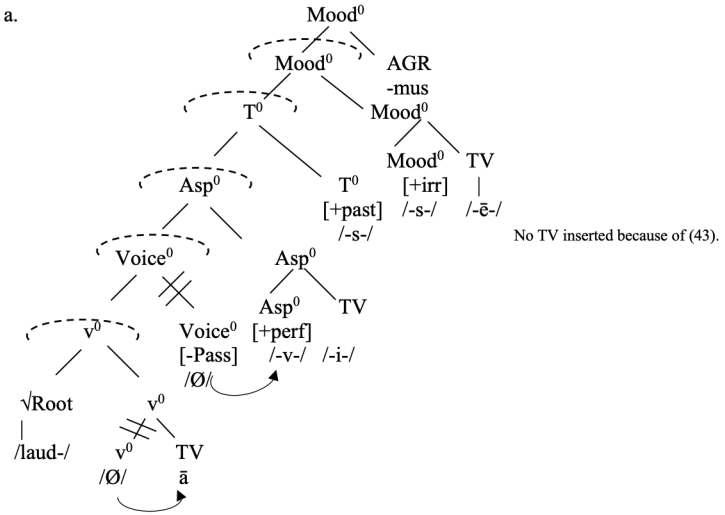


The derivation of Latin verbal form *laudāvissēmus*

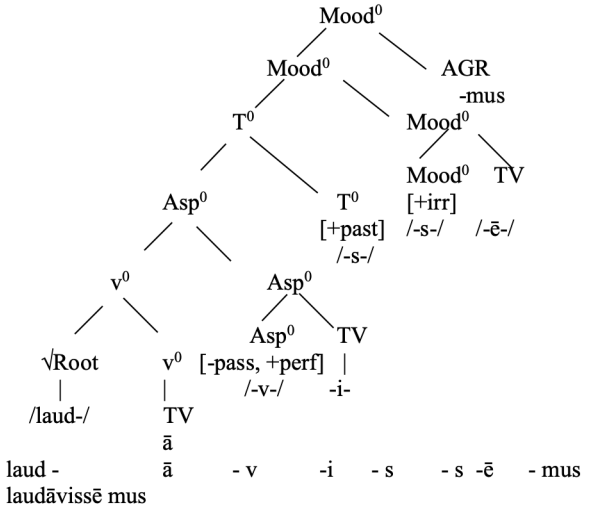
On the other hand, the Subjunctive Pluperfect form *laudāvissēmus* can be cyclically derived as in (57a). The output is given in (57b):

(57)

a.



b.

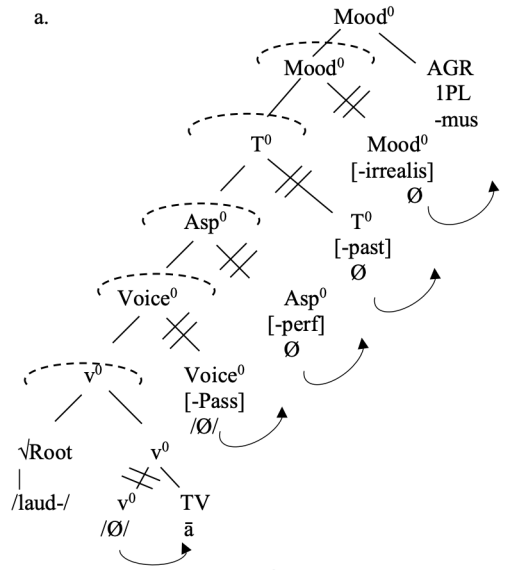


The derivation of Latin verbal form *laudāmus*

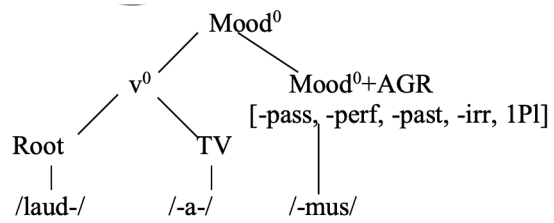
The Present Indicative form *laudāmus* is derived in (58a); the output is in (58b).

(58)

a.



b.

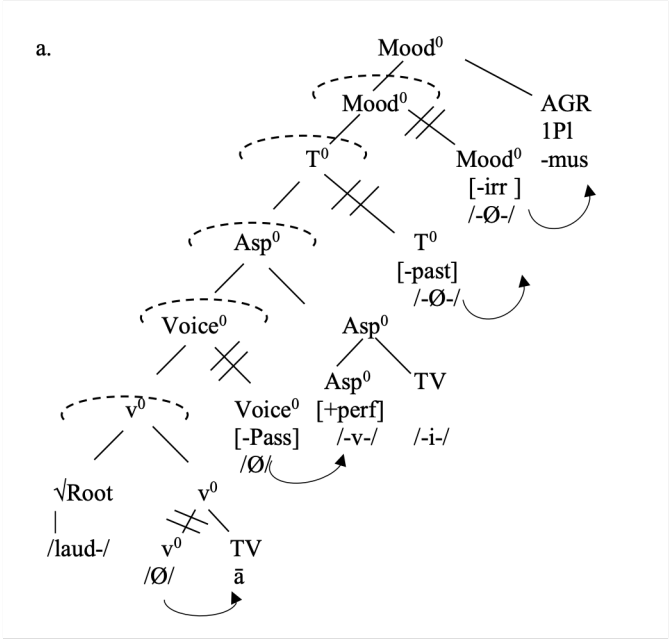


Perfect forms. The regular perfect *laudāvimus*

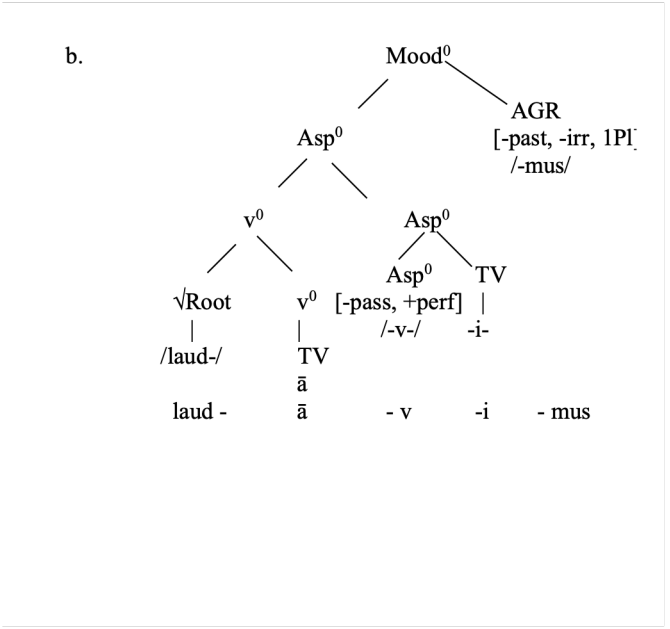
Latin regular Perfect form *laudāvĭmus* is derived as in (59a) assuming the VI in (23).. The output is in (59b):

(59)

a.



b.



Irregular perfect forms

Irregularities, however, are found in the Perfect

Consider now the III conjugations forms in (60):

(60)

a.	*vom*	-	*v*	*-i*	+	Ø	+	Ø	+*mus*	(cf. *vom-i-mus*	'vomit-Pres')
b.	*scrīb*	-	*s*	*-i*	+	Ø	+	Ø	+*mus*	(cf. *scrīp-s-i-mus*	'write-Pres')
c.	*vert-*		Ø	*-i*	+	Ø	+	Ø	+*mus*	(cf. *vert -i-mus*	'turn-Pres')

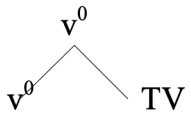
They are athematic.

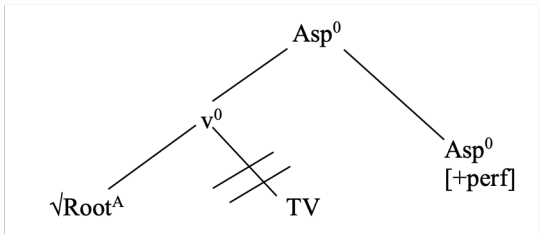
Irregular perfect forms: athematicity

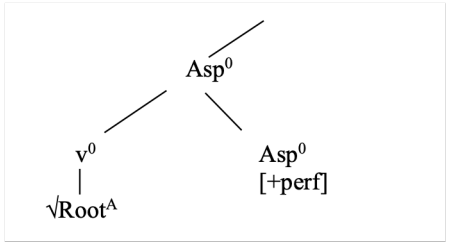
Assuming that the general rule of TV insertion —repeated here as (61)— applies to the v^0 of all verbs, one can propose that athematicity is due to a rule delinking the TV of certain roots before [+Perfect] Asp^0. This is triggered by roots with the diacritic A, for Athematic, as in 0a) (see Embick and Halle (2004) for a similar proposal).

The use of this diacritic is temporary and employed for now just for the sake of the exposition. Once the analysis of the underlying TVs is revised (2.2), I will propose that no diacritics are needed.

The rule applies cyclically once the [+Perfect] Asp^0 is reached. The unlinked TV is then phonologically deleted. Removal of this TV thus results in the structure in 0b) (See Section 3.3 for a discussion of the diachronic development of athematicity in Latin).

(61) v^0 → 

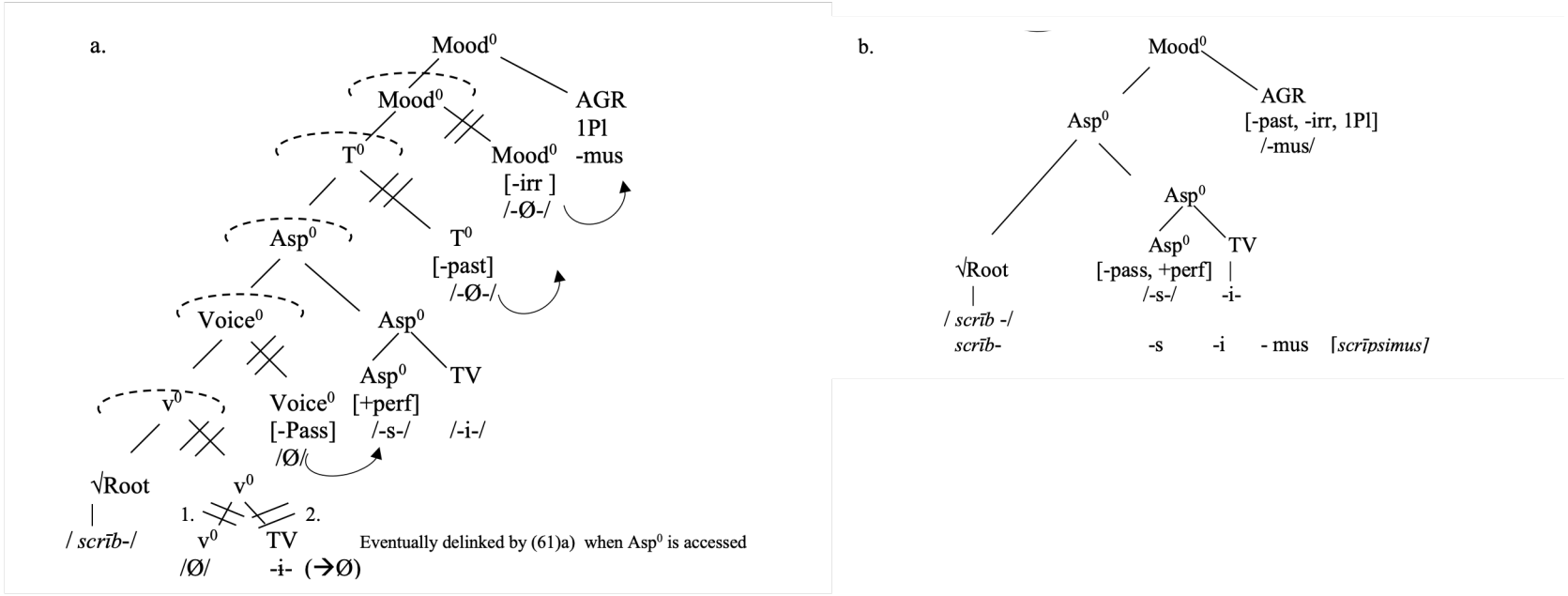
(62) a. 

→ b. 

Derivation of irregular perfect form *scrīp-s-i-mus*

The derivation in (63a) with the output in (63b) for the verb form *scrīp-s-i-mus* 'write-Pres' by (60b) (see below on /-s-/ as a Perfect exponent):

(63)



Root conditioned morpho-phonological rules

Root conditioned morpho-phonological rules account for the root allomorphic changes. The most important are mentioned below:

(64) a. Lengthening (e.g., *sedēmus/sēdimus*'sit-pres/perf', *legimus/lēgimus* 'readpres/perf', *capimus/cēpimus* 'seize-pres/perf', *agimus/ēgimus* 'drive pres/perf'):

N N
| / \
X→ X X/ [__]$_{Root}^{L}$ [+Perf], Root^{L}=*vid, fug, leg*, etc.

b. Ablaut (e.g., *capimus/cēpimus* 'seize-pres/perf'' *agimus/ēgimus* 'drive-pres/perf'):

[-cons, +low] → [-low, -back]/ ___ C]$_{Root}^{A}$ [+Perf], Root^{A}=*fak, cap,* etc.

c. Nasal deletion (e.g., *vincimus/vīcimus* 'win-pres/perf'', *fundimus/fūdimus* 'pour-pres/perf'', *rumpimus/rūpimus* 'break-pres/perf'')

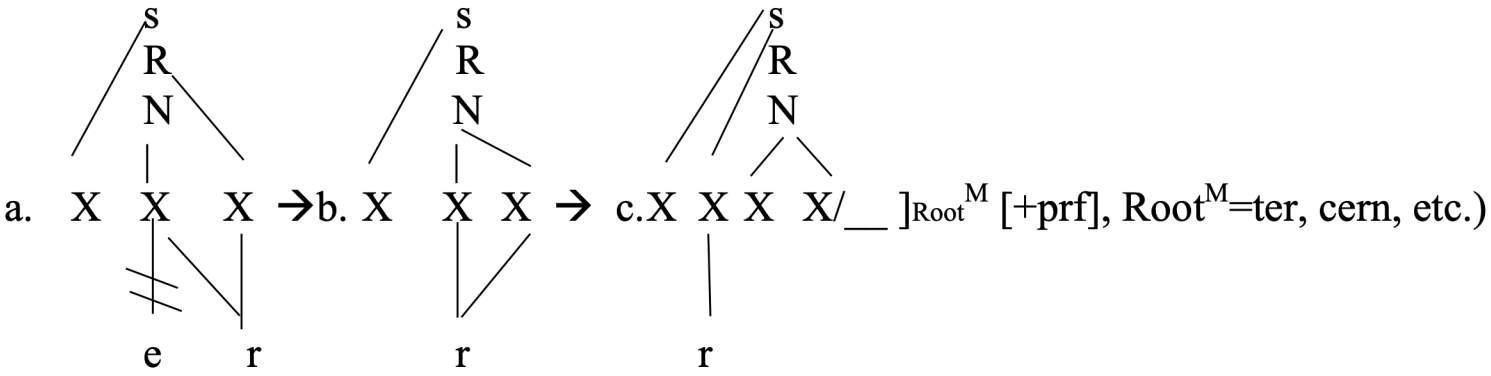
X → Ø/ __ C] Root$^{[ND]}$ [+perf], Root$^{[ND]=}$ *vinc-, fund-, frang-*, etc.

(+consonantal
  +nasal)

Root conditioned morpho-phonological rules

(64)

d. Rhotic Metathesis (e.g. *terimus/trīvimus* 'rub-pres/perf'; after *n*-deletion: *cernimus/crēvimus* 'distinguish-pres/perf', *spernimus/sprēvimus* 'despise-pres/perf', *sternimus/strāvimus* 'stretch-pres/perf'). It involves re-syllabification of /r/ as the root syllable nucleus as in a) below. Then, fission repairs the illicit syllabic rhotic (*r̥) resulting in the structure in c) below. The unspecified nucleus is then filled in with vocalic features (Ø→*ē*); further ablaut operation lead to *ī* or *ā*.)(see Calabrese (2009:269-277) on fission as the repair of syllabic sonorants. The historical roots of this alternations will not be dealt with in this article)



Root conditioned morpho-phonological rules

(64) e. Reduplication *(e.g., discimus/didicimus* 'learn-pres/perf'*, mordēmus/momordi* 'bite-pres/perf', *currimus/cucurrimus* 'run-pres/perf' *spondēmus/spopondimus* 'promise-pres/perf' *' scindimus/scicidimus* 'cut-pres/perf' *''cadimus/cecidimus* 'fall-pres/perf', *fallimus/fefellim*us 'fail-pres/perf', *parcimus/pepercimus* 'spare-pres/perf', *tangimus/tetigimus* 'touch-pres/perf')

RED / [_____]$_{Root}^{R}$ [+Perf], Root^{R}=*mord, curr, spond*, etc.

(i) RED= Copy root syllable, skipping appendix /s/. Insert Copy to the left of root. Remove coda in Copy. Apply ablaut rule (64b) to /a/ in Copy. Further ablaut rules may apply to Root base vowel.

(ii) a. *mord-*→Copy→[*mord*]-*mord*→Coda reduction→[*mo*]-*mord-*
b. *spond-*→Copy→*s* [*pond*]-*pond*→Coda reduction→*s* [*po*]-*pond-*
c. *cad-*→Copy→[*cad-*]-*cad*→Coda reduction→[*ca*]-*cad-*→ CopyAblaut→[*ce*]-*cad*→Root Ablaut→→[*ce*]-*cid-*
d. *tang-*→Copy→[*tang-*]-*tang*→Coda reduction→[*ta*]-*tang-*→ CopyAblaut→[*te*]-*tang*→Root Ablaut→[*te*]-*ting-* →*(64c)* →[*te*]-*tig-*

f. Root conditioned consonant assimilation:
iubēmus/iūssimus 'order-pres/perf' , cf. *scrībimus/scrīpsimus* above*)*

Regular phonological processes

Regular phonological processes account for many other alternations:

coronal stop deletion before /s/ (e.g., *dīvidimus/dīvisīmus* 'divide-pres/perf'', *lūdimus/lūsimus* 'play-pres/perf', *ardēmus/arsimus* 'kindle-pres/perf', *mittimus/mīsimus* 'put-pres/perf');

obstruent devoicing (e.g., *scrībimus/scrīpsimus* 'write-pres/perf', *frīgimus/ frīximus* 'fry-pres/perf';

cluster simplification after liquid codas (e.g., *algēmus/alsimus* 'be cold-pres/perf', *spargimus/sparsimus*'strew- pres/perf', *fulgēmus/fulsimus* 'glow-pres/perf')

More on Athematic forms

Note that structures which appear to be athematic can be found in all conjugations, not only in the III conjugation forms (at least in the surface string, see below for discussion). So, in addition to the III conjugation athematic Perfect forms in , we also have athematic Perfect forms in other conjugations as in (from Embick and Halle (2004)):

(65)	Conj.	Verb	Perfect	Gloss.	Type
a.	I	*dom-ā-mus*	*dom-u-ī*	'tame'	Athematic + -v-
b.	I	*sec-ā-mus*	*sec-u-ī*	'cut'	Athematic + -v-
c.	II	*mon-ē- mus*	*mon-u- ī*	'warn'	Athematic + -v-
d.	II	*sed-ē- mus*	*sēd-ī*	'sit'	Athematic + -Ø-, +lengthening
e.	II	*man-ē- mus*	*man-s-ī*	'remain'	Athematic + -s-
f.	II	*mord-ē-mus*	*mo-mord-ī*	'bite'	Athematic + -Ø-, +Reduplication
g.	III(ĭ)	*rap-ĭ-mus*	*rap-u-ī*	'seize'	Athematic + -*v*-
h.	III(ĭ)	*cap-ĭ-mus*	*cēp-ī*	'take'	Athematic + -Ø-, +lengthening, ablaut
i.	III(ĭ)	*-spic-ĭ-mus*	*spec-s-ī*	'peer'	Athematic + -*s*-, +ablaut
j.	III(ĭ)	*par-i-mus*	*pe-per-ī*	'bring forth'	Athematic + -Ø-, +Reduplication
k.	IV	*aper-ī-mus*	*aper-u-ī*	'open'	Athematic + -*v*-
l.	IV	*ven-ī-mus*	*vēn-ī*	'come'	Athematic + -Ø, +lengthening
m.	IV	*farc-ī-mus*	*far-s-ī*	'stuff'	Athematic + -s-

Root- Asp^0 interaction and athematic morphology

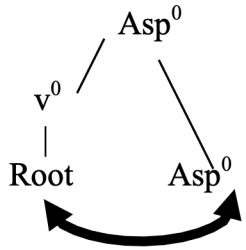
Root- Asp^0 interaction is observed only in athematic morphology.

Following Embick (2010, 2013), see also Embick and Shwayder 2018), I account for this basic fact by assuming, , that any morpheme-to-morpheme interaction, can only occur locally, where locality involves adjacency (See Calabrese (2019) for refinements of this idea).

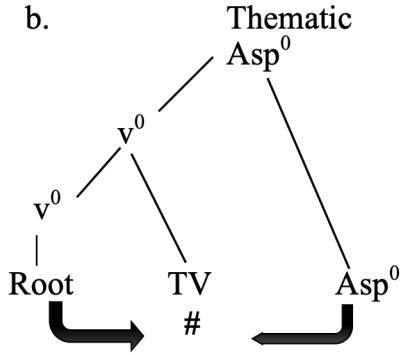
Root-conditioned [+Perfect] Asp^0 exponents, as well as aspect-conditioned root morpho-phonological changes such as vowel-lengthening, ablaut and reduplication—accounted for by the rules in (64)—can only appear in athematic contexts.

Only regular morphology can appear in thematic forms (where the bolded hashsign # indicates impossibility of morphological interaction):

(66) a. Athematic



b. Thematic



A crucial difference between athematic forms

NOTE:

A crucial difference between athematic forms.

There is no [+perf] Asp^0 conditioned root- allomorphy when the Asp^0 exponent is syllabic [u] (from /-v-/). \

There is such allomorphy when the exponent is /-Ø-/ (the most common situation (e.g. a)), /-s-/(e.g. b)) or /-v-/(e.g. c)). But **there are no cases when Asp^0 exponent is [u],** such as †*CeC-ē-mus/ CēC-u-imus* (with lengthening), †*CaC-ē-mus/ CēC-u-imus* (with ablaut, and lengthening), †*CaC-ē-mus/ CeCiC-u-imus* (with reduplication), etc.

(67) a. /-Ø-/ i. Lengthening: *sed-ē-mus/sēd-Ø-imus*‘sit-pres/perf’, *leg-i-mus/lēg-Ø-imus* ‘read- pres/perf’;
ii. Ablaut (and lengthening): *cap-i-mus/cēp-Ø-imus* ‘seize-pres/perf’;
iii. [n]-deletion: *vinc-i-mus/vīc-Ø-imus* ‘win-pres/perf’’, *fund-i-mus/fūd-Ø-imus* ‘pour-pres/perf’,
iv. Reduplication: *disc-i-mus/didic-Ø-imus* ‘learn-pres/perf’*, mord-ē-mus/momord-Ø-i* ‘bite-pres/perf’, *currimus/cucurrimus* ‘run-pres/perf’ *);*

b. /-s-/ Lengthening: *dīvid-i-mus/ dīvid-Ø-s-īmus [dīvisīmus]* ‘divide-pres/perf’, *iub-ē-mus/iūb-s-simus* [*iūssimus*]‘order-pres/perf’ cf. also Ernout 1953: 199: *reg-i-mus/ rēg-s-imus [rēximus*] ‘rule-pres/perf’, *trah-i-mus/ trāg-s-imus* [*trāximus*] ‘drag-pres/perf’)

c. /-v-/ Rhotic metathesis: *ter-i-mus/trī-v-imus* ‘rub-pres/perf’; with *n*-deletion: *cern-i-mus/crē-v-imus* ‘distinguish-pres/perf’).

This is a striking fact that needs an explanation.

The exponent of the Perfect forms

The exponent of functional heads proposed earlier:

(23) a. [-Perfect, +F, -Irrealis] → /-b-/
b. [+Perfect] → /-v-/ (Provisional.)
c. [+F] → /-s-/
d. Otherwise: Ø

As discussed earlier in this section, the insertion of Ø in a node containing a marked feature, requires a freezing operation; in this case, a root-conditioned operation freezes the feature [+Perfect], as in (68) (where ^{Ø} is the relevant root diacritic):

(68) Freeze [+Perfect] for the Asp^0 VI in the context of the $root^{Ø}$

Remember: freezing does not impact application of other rules so [+Perfect] can be active for the application of the morpho-phonological rules in (64) .

The exponent of the Perfect forms

The exponent /-v-/ is the only one that is found in thematic structure. Let us postulate that it occurs only after a syllabic nucleus (=always a vowel in Latin), as in the VI in (69):

(69) [+Perfect]-→ /-v-/ / $\overset{N}{\underset{|}{X}}$] _____

However, this exponent can also appear in forms that seem to be athematic such as *monuimus* 'warn-Perfect', *cubuimus* 'recline-Perfect', etc.

Interestingly, many of the verbs that display /-v-/ in an athematic context have a participial form with a surface short thematic vowel [ĭ]. Several of these verbs are from the /-*ē*-/ conjugation but they are also found in the other ones (Ernout 1953:206):

(70)

Verb	Perfect participle	Perfect	
monēre	*monĭtum*	*monuimus*	'warn'
gignere	*genĭtum*	*genuimus*	'beget'
molere	*molĭtum*	*moluimus*	'grind'
cubāre	*cubĭtum*	*cubuimus*	'recline'
domāre	*domĭtum*	*domuimus*	'tame'
vomāre	*vomĭtum*	*vomuimus*	'vomit'

Hypothesis on athematic *monuimus* –type perfects

Hypothesis:

The *perfectum* and participial forms in (70) haven the thematic vowel /-*I*-/ (See below for an account).

Insofar as all these verbs are thematic in the *perfectum,* the Asp^0 VI in , i.e., /-v-/, is inserted. The thematic /-I-/ could be then deleted before the [-consonantal] [v] by the rule in (71).

(71)
$$\overset{X}{|}$$
$$[\text{-cons}] \rightarrow \emptyset \;\; / \;\; [\;\_\_\;]_{TV} \; [\text{-consonantal}]$$

(72) $[[[mon]_{Root}\, I]_V{}^0 + perf\,]_{Asp}{}^0 \ldots \rightarrow VI \rightarrow [[[mon]_{Root}\, I]_V{}^0$ **-*v*-** $]_{Asp}{}^0 \ldots (71) \rightarrow [[[mon]_{Root}\,]_V{}^0$ **-*v*-** $]_{Asp}{}^0 \ldots \rightarrow$
$\rightarrow$ *[resyllabification]* $\rightarrow [[[mon]_{Root}\,]_V{}^0$ **-*u*-** $]_{Asp}{}^0 \ldots$

Some exceptions

According to Aronoff (1994:43), this pattern is followed by the 75% of these verbs. Another group of verbs, which like those in (73), display a /-v-/ in an athematic context but appear as athematic in participial forms:

(73)	doceō	docuī	doctum	docēre	teach
	cēnseō	cēnsuī	cēnsum	cēnsēre	assess
	secō	secuī	sectum	secāre	cut
	saliō	saluī	saltum	salīre	jump
	aperiō	aperuī	apertum	aperīre	open
	rapiō	rapuī	raptum	rapere	seize

PROPOSAL: they also have a TV /-I-/ in the perfectum and undergo the rule in (71) . An additional rule must be postulated to delete the TV in the Past participle.

The perfect strā-v-imus of sternō

Athematic roots that display a final vowel in the Perfect underlyingly (plē-) or as the outcomes of morphological readjustment (cf. stern-/strā-, cern-/crē- (cf. rule (64d) always display the exponent /-v-/ :

(74) strā-v-imus stretch-Perf , crē-v-i-mus distinguish-perf, plē-v-i-mus fill-perf, etc.

Analysis:
The rule inserting /-v-/ is sensitive to the phonological properties of the preceding string, i.e., a preceding vowel as cyclically constructed up to that point due to the application of the morpho-phonological adjustments in . Thus, forms such *as strā-v-imus* or *crē-v-i-mus* require a derivation in which the morpho-phonological adjustments precede the VI-insertion of the Asp^0-exponent, as shown below for strā-v-imus (at the cyclic point where Asp0 is reached).

(75) $[[[\text{stern-}]_{\text{Root}}\ [\text{I}]_{\text{TV}}\ ]_{v^0}\ [\text{+perf}]_{\text{Asp}^0}$ ➔TV-Del➔$[[[\text{stern-}]_{\text{Root}}\ ]_{v^0}\ [\text{+perf}]_{\text{Asp}^0}$➔(64c)➔
➔$[[[\text{ster-}]_{\text{Root}}\ ]_{v^0}[\text{+perf}]_{\text{Asp}^0}$ ➔(64d)➔$[[[\text{strā-}]_{\text{Root}}\ ]_{v^0}\ [\text{+perf}]_{\text{Asp}^0}$➔VI➔$[[[\text{strā-}]_{\text{Root}}\ ]_{v^0}\ [\text{-v-}]_{\text{Asp}^0}$➔

The exponent of the Perfect forms

Once we assume the VI in (69) and the analysis in (72) for the verbs in (70) , one can generalize the VI inserting /-s-/ in the Perfect as /-s-/ <---> [+Perfect], but this is nothing more than an instance of the more general rule in (23c).

The derivation in (72) and the special freezing operation in (68) account for the [u] exponents and for the occurrence of /-Ø-/, respectively.

Thus, it follows that /-s-/ is the default exponent of [+perf] Asp^0 in athematic structures. This conclusion is possible because Latin roots end in consonants, thus excluding the application of (68) where Asp^0 is adjacent to the root.

The VI rules accounting for the phonological spell out of functional nodes in Latin verbal forms are, therefore, those in (76), which is a decidedly parsimonious system given the surface complexity of Latin verbal morphology (where [+F] is a marked feature):

(76) a. [-Perfect, +F, -Irrealis] → /-*b*- /

N

|

b. [+Perfect] →/-*v*-/ <---> / X] _____

c. [+F] → /-*s*-/

e. Otherwise /-*Ø*-/

About (76) and underlying representations

Observe:

the generalizations leading to (73) can be captured only if the underlying morphosyntactic configuration is accessed.

In surface representations, the exponent /-v-/ is found both after vowels and consonants, e.g. strāvī, monuī , and the exponent /-s-/ is found both after vowels and consonants: divīsī, scrīpsī.

If the underlying morphosyntactic configurations are accessed, one can observe that /-s-/ and /-Ø-/ are found only after consonants, which means that these exponents are directly attached to a root, i.e., they can occur only in an athematic construction.

The exponent /v-/ is found only after vowels, which could be either TVs—the clear majority of cases, or root-final segments in an athematic context , either underlying as in de-lē-v-ī 'destroyed' or the result of the morpho-phonological adjustment in (64)d) as discussed above.

A further simplification of the Latin verbal morpho-phonology

A further simplification of the Latin verbal morpho-phonological system is now possible. Earlier, it was postulated that the *perfectum* forms of the verbs in (70) and in (73) contain the thematic vowel /-*I*-/. **A way to account for this is to generalize the status of /-*I*-/ as the default inflectional TV also to v^0, i.e., /-*I*-/ is the general default TV as in (77) and in (78).**

(77) a. Ø ➔ /-ē-/ /Head$^{\bar{e}}$ /[__]$_{TV}$
b. /-ī-/ /Head$^{\bar{i}}$ /[__]$_{TV}$
c. /-ĭ-/ /Head$^{\breve{i}}$ /[__]$_{TV}$
d. /-ā-/ /Head$^{\bar{a}}$ / [__]$_{TV}$
e. /-*I*-/ / [__]$_{TV}$

(78) a. Ø➔$^{\bar{e}}$ / [+Irrealis]$_{Mood}{}^0$ —
b. Ø➔$^{\bar{a}}$ / [+Past]$_{Mood}{}^0$ —
c. Ø➔$^{\bar{a}}$ / v^0 —

On /-*I*-/ as the verbal TV of conjugations other than the III.

The appearance of /-*I*-/ as the verbal TV of all II conjugation verbs, and of some verbs of the other conjugations, can be accounted for by a rule of TV neutralization in (79)

Rule (79) deletes the vocalic content of the TV inserted in the preceding v^0 cycle.

(79) X^0 / $Root^X$ __ $[+perf]_{Asp}{}^0$ $Root^X$= *cub-,son- sec-*, *aper, sal*, etc

|
TV
⫽
N.

Note that the rule preserves that TV position which must then be filled in (79)

On /-*I*-/ as the verbal TV of conjugations other than the III

The rule preserves that TV position which must then be filled in. Root diacritics are not available at this point, and therefore the default rule in (77e) applies inserting /-I-/. This vowel is deleted in the Perfect by the rule (71), after the insertion of /-v-/ (see (80) below). The vowel is instead preserved in the participle, as shown by the derivation in (81) (see Calabrese (2020) for discussion of the feature [+Perfect] in participles; see also Embick (2004), Alexiadou (2010)).

(80) a. [[[*mon*]$_{Root}$ -ē-]$_{V}^{0}$ +*perf*]$_{Asp}^{0}$... → (79)+ (77e) → [[[*mon*]$_{Root}$ -*I*-]$_{V}^{0}$ +*perf*]$_{Asp}^{0}$... → *VI* →
[[[*mon*]$_{Root}$ *I*]$_{V}^{0}$-**v**-]$_{Asp}^{0}$... → *(71)* → [[[*mon*]$_{Root}$]$_{V}^{0}$ -**v**-]$_{Asp}^{0}$... → *[resyllabification]*
→ [[[*mon*]$_{Root}$]$_{V}^{0}$ -**u**-]$_{Asp}^{0}$... → …. → *monuimus*

b. [[[*cub*]$_{Root}$ -ā-]$_{V}^{0}$ +*perf*]$_{Asp}^{0}$... → (79)+(77e) → [[[*cub*]$_{Root}$ -*I*-]$_{V}^{0}$ +*perf*]$_{Asp}^{0}$... → *VI* →
[[[*cub*]$_{Root}$ *I*]$_{V}^{0}$-**v**-]$_{Asp}^{0}$... → *(71)* → [[[*cub*]$_{Root}$]$_{V}^{0}$ -**v**-]$_{Asp}^{0}$... → *[resyllabification]*
→ [[[*cub*]$_{Root}$]$_{V}^{0}$ -**u**-]$_{Asp}^{0}$... →…. → *cubuimus*

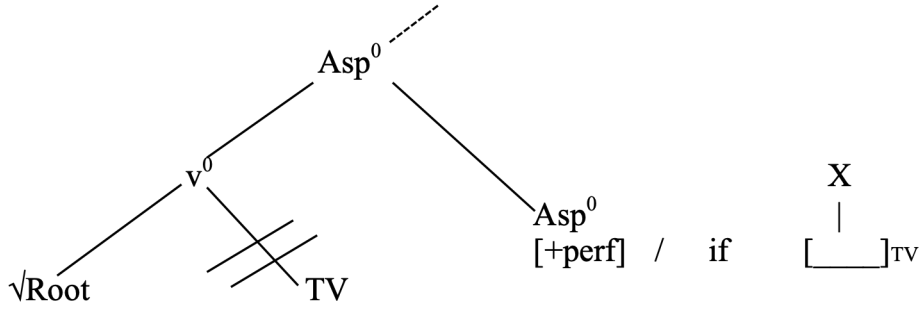
(81) a. [[[*mon*]$_{Root}$ -ē-]$_{V}^{0}$+*perf*]$_{Asp}^{0}$... → (79)+ (77e) → [[[*mon*]$_{Root}$ -*I*-]$_{V}^{0}$ +*perf*]$_{Asp}^{0}$... → *VI* →
[[[*mon*]$_{Root}$ -*I*-]$_{V}^{0}$ -*t*-]$_{Asp}^{0}$... → *(4)* → [[[*mon*]$_{Root}$ -*i*-]$_{V}^{0}$ -**t**-]$_{Asp}^{0}$... *monĭtum*

b. [[[*cub*]$_{Root}$ -ā-]$_{V}^{0}$+*perf*]$_{Asp}^{0}$... → (79)+ (77e) → [[[*cub*]$_{Root}$ -*I*-]$_{V}^{0}$ +*perf*]$_{Asp}^{0}$... → *VI* →
[[[*cub*]$_{Root}$ *I*]$_{V}^{0}$ -*t*-]$_{Asp}^{0}$...→ *(4)* → [[[*cub*]$_{Root}$ -*i*-]$_{V}^{0}$ -**t**-]$_{Asp}^{0}$... → …. → *cubĭtum*

A new account for athematic constructions

Notice that a consequence of all of this is that the only TVs that undergo systematic deletion are short /-ĭ-/ and /-I-/. No diacritics are needed. These vowels are inserted at the v^0 cycle or result from the TV neutralization process in However, they are deleted by two different rules: a) (71) and b) (82) which replaces (62) in no longer referring to lexical diacritics:

(82)



The rules (71) and (82) account for the presence of two types of athematic structures in the Perfect. The first type consists of the structures of the III and III(i) conjugations, which undergo the rule in (82) , and are therefore athematic during cyclic spell out. The second type includes the structures of the II and other conjugations, which undergo rule (71) and therefore become athematic only after VI insertion.

Root-Asp^0 morpho-phonological interactions are possible only under structural adjacency. It follows that these interactions are not found in the latter forms where athematicity is due to phonology. This explains why no such interaction occurs in Perfect forms displaying syllabic /-u-/, which as discussed above are phonologically athematic due to rule (71)

Some adjustments: the /-*ē*-/ and /-*ī*-/- *perfectum* forms taking /-*s*-/ or Ø

Given that the rule in (82) , differently from (62) , is no longer sensitive to diacritics and applies only to short vowels, some adjustments are needed.

For example, **one can no longer account for the athematic structure found in the *perfectum* of the /-*ē*-/ and /-*ī*-/- verbs that take /-*s*-/ or Ø + reduplication**.

Assuming just the rule of neutralization in (79), one would find only /-v-/ with these verbs.
Note that these perfectum forms display /-*s*-/ or reduplication especially when **the root is prosodically heavy** (Meiser (2003), Weiss (2009)).

(83) (i) Light roots: *doc-ē-/doc-u-i-mus* 'we taught', *eg-ē-/ eg-u-i-mus i* 'we lacked', *hab-ē-/hab-u-i-mus* 'we had', *mon-ē-/ mon-u-i-mus* 'we warned', *tac-ē-/ tac-u-i- mus* 'we were silent'.

(ii) Heavy roots: i. *alg-ē-/al[k]-s-i-mus* 'we were cold' *aug-ē-/au[k]-s--i-mus* 'we increased' *rīd-ē-/rīd-s-i-mus* 'we laughed' *suad-ē-/ suad-s-i-mus* ' we persuaded'

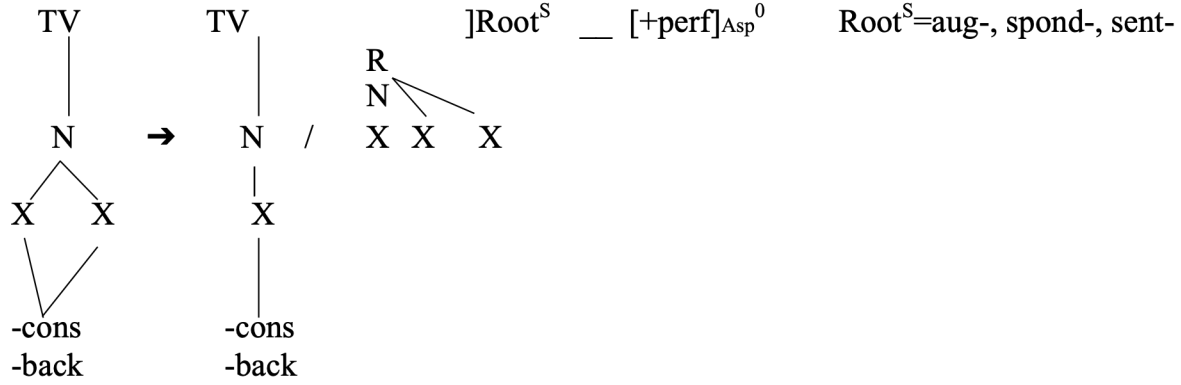
ii. *mord-ē-/momord- i-mus* 'we bit', *spond-ē-/ spopond-i-mus* 'we promised'

(84) (i) Light roots: *aper-ī-/aper-u- i-mus* 'we opened, *oper-ī-/ oper-i-mus* 'we covered', *dē-sil-ī-/ dē-sil-u-i-mus* 'we leaped down'

(ii) Heavy roots: *haur-ī-/haur-s-i-mus* 'we drank, *saep-ī-/ saep-s-i-mus* 'we surrounded', *sanc-ī-/sank-s-i-mus* 'we ordained' *vinc-ī-/ vink-s-i-mus* 'we fettered'.

Some adjustments: the /-*ē*-/ and /-*ī*-/- *perfectum* forms take /-*s*-/ or Ø

To account for these cases, an additional process is needed. I hypothesize the rule of TV shortening in (84). This rule applies before (82) , and feeds it. The shortened vowels that result from this rule are deleted by (82). The need for a process independent from (79) is evidenced by the fact that this rule is sensitive to the prosodic structure of the root. No such prosodic conditioning is needed for the application of (79) to verbs of the III and II(i) conjugations:

(84) 

The derivations in (85) illustrate what happens in these cases:

(85) a. [[[*alg*]$_{Root}$ -ē-]$_{V}^{0}$ +*perf*]$_{Asp}^{0}$... → (84)→ [[[*alg*]$_{Root}$ -*ĕ*-]$_{V}^{0}$ +*perf*]$_{Asp}^{0}$... → *(82)* →
[[[*alg*]$_{Root}$ +perf]$_{Asp}^{0}$...→*VI* → [[[*alg*]$_{Root}$ -***s***-]$_{Asp}^{0}$...→….→ *alksimus*

b. [[[*mord*]$_{Root}$ -ē-]$_{V}^{0}$ +*perf*]$_{Asp}^{0}$... → (84) → [[[*mord*]$_{Root}$ -*ĕ*-]$_{V}^{0}$ +*perf*]$_{Asp}^{0}$... → *(82)*→
[[[*mord*]$_{Root}$ +perf]$_{Asp}^{0}$...→*VI*→[[[*mord*]$_{Root}$ -*Ø*-]$_{Asp}^{0}$...→….→ *momordimus*

c. [[[*saep*]$_{Root}$ -*ī*-]$_{V}^{0}$ +*perf*]$_{Asp}^{0}$... → (84) → [[[*saep*]$_{Root}$ -*ĕ*-]$_{V}^{0}$ +*perf*]$_{Asp}^{0}$... → *(82)* →
[[[*saep*]$_{Root}$ +perf]$_{Asp}^{0}$...→ *VI* → [[[*saep*]$_{Root}$ -*s*-]$_{Asp}^{0}$...→….→ *saepsimus*

Final issues

Another set of cases that are still needed to be accounted are those of the /-I-/ and /-ĭ-/ conjugations where /-v-/ is found in the Perfect, as in (86) . They must be treated as exception to rule (82) . Therefore, in these forms, a TV is present when [+perf] Asp^0 undergoes Vocabulary Insertion; so, /-v-/ is inserted by (76c). The TV is then deleted by (71).

(86) I-verbs: *gem-I-/gem-u-i-mus* 'we sighed'
al-I-/al-u-i-mus 'we nourished'
col-I-/col-u-i-mus 'we cultivated'
ser-I-/ser-u-i-mus 'we sowed'
ĭ-verbs: *rap-i-/rap-u-i-mus* 'we seized'

Finally, I assume that a TV is not inserted in vowel-final roots such as those in (87) . They can be considered systematic exceptions to the rule of TV-insertion . Roots of this type behave like athematic roots, and therefore can undergo reduplication:

(87) stā-re 'stand', flā-re 'blow' , nā-re 'swim' intrā-re 'enter' de-l*ē*-re 'destroy', pl*ē*-re

Reduplication
da-/ded-Ø-i-mus 'I gave'
sta-/stet-Ø-i-mus 'I stood'

Roots ending in the back vocoid [u/v]

Roots ending in the back vocoid [u/v] have a special behavior in the perfect.

First consider verbal forms such as those in (i) which are regularly athematic in the perfect because their thematic vowel is short and undergoes (82).In these forms ,

(i) solvere/ solvī ‘solve, statuere/statui, ‘decide’ (ab)luere/(ab)lui ‘release’, imbuere/imbui ‘dip’

In these forms, /-u-/ should be inserted because they are vowel final. However, the expected perfect exponent [u] is missing, One can assume that is indeed inserted and then it undergoes a rule deleting it when following a back vocoids(Meiser 1998:206)

(i) [-cons, +high, +back]→Ø/ [-cons, +high, +back] ___

(ii) $[[[solu]_{Root}\text{-}I\text{-}]_{V}^{0}\ +perf\ ]_{Asp}^{0}\ldots$ → (82)→ $[[[solu]_{Root}\ +perf\ ]_{Asp}^{0}\ldots$ → $[[[solu]_{Root}\ u\ ]_{Asp}^{0}\ldots$ →(i) → $[[[solu]_{Root}\ \ ]_{Asp}^{0}\ \ldots$ → solvi

Now consider the following verbal forms with [u] final roots. They belong to other conjugations, but they also appear to be athematic in the perfect since they undergo perfect-conditioned root allomorphy . Furthermore, the expected perfect exponent [u] is missing:

(ii) lavāre/ lāvī ‘wash’, (ad)iuvāre/ (ad)iūvī ‘help’,’, movēre/ mōvi ‘move’, cavēre/ cāvi ‘avoid’,

I assume that they undergo a rule similar to (84) shortening the TV which then undergoes deletion by (82) . /-u-/ is inserted because they are vowel final. It is then deleted by (ii):

(iv) $[[[lau]_{Root}\text{-}ā\text{-}]_{V}^{0}\ +perf\ ]_{Asp}^{0}\ldots$ → (84)→ $[[[lau]_{Root}\text{-}a\text{-}]_{V}^{0}\ +perf\ ]_{Asp}^{0}\ldots$ → *(82)* → $[[[lāu]_{Root}\ +perf\ ]_{Asp}^{0}\ldots$ → $[[[lāu]_{Root}\ u\ ]_{Asp}^{0}\ldots$ →(i) → $[[[lāu]_{Root}\ \ ]_{Asp}^{0}\ \ldots$ → lāvi

$[[[mou]_{Root}\text{-}ē\text{-}]_{V}^{0}\ +perf\ ]_{Asp}^{0}\ldots$ → (84)→ $[[[mou]_{Root}\text{-}ĕ\text{-}]_{V}^{0}\ +perf\ ]_{Asp}^{0}\ldots$ → *(82)* → $[[[mōu]_{Root}\ +perf\ ]_{Asp}^{0}\ldots$ → $[[[l\ mōu]_{Root}\ u\ ]_{Asp}^{0}\ldots$ →(i) → $[[[mōu]_{Root}\ \ ]_{Asp}^{0}\ \ldots$ → *mōvi*

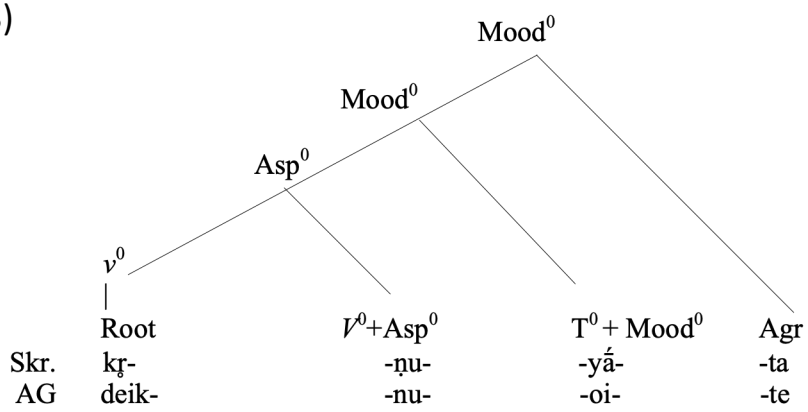
A full account of the Latin Perfect forms can thus be provided.’

The development of Latin verbal morphology

Morpho-syntactic structure of PIE verbs

The basic structure of the later Proto-Indo-European verbs (as illustrated by Sanskrit and Ancient Greek (AG):

(88)



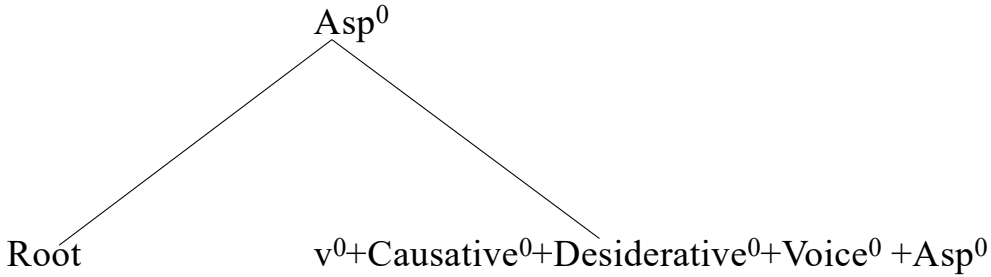
Skt.	kr̥-n̥u-yā́-ta
	make-PRES-OPT-3SG.ACT
	's/he would make'
AG	deik-nú-oi-te
	show-PRES-OPT-3SG.ACT
	's/he would show'

➢ PIE root adjacent *e is an aspectual exponent. Simplifying a bit, one can assume it is a [-perfective] one

Historical development of Latin TVs

PIE Asp and VP-shell structure (Calabrese 2019, 2023, Calabrese and Petrosino 2023)

(89)



This accounts for why different exponents or morphological constructions were required for Aorist or Perfect [+perf] Asp^0 of secondary derived stems. For example, -Ø- was used in Aorist Denominative forms, or Perfect Causative forms were periphrastic.

A SINGLE POSITION INCLUDING VP-SHELL CATEGORIZER ANS ASP NODES—PORTMANTEAU EXPONENCE

The PIE Present (Imperfect) system

In PIE, as in ancient IE languages such as Sanskrit and Greek, the Present (Imperfect) system displays a wide variety of affixes (cf. Ringe (2006), Rix (1986, 2001), Szemerenyi (1996)), which traditionally form the different classes of the Present and involve root dependent realizations of [-Perfect] aspect.

(90) I.	Sanskrit	PIE	cf. Greek
[[*bhav*]$_{\text{Root}}$	- *a*]$_{\text{Aspect}}$	*- *e*] $_{\text{Aspect}}$	- *e*]$_{\text{Aspect}}$
[[*raudh*]$_{\text{Root}}$	- *na*]$_{\text{Aspect}}$	*- *ne*] $_{\text{Aspect}}$	- *ne*]$_{\text{Aspect}}$
[[*pas*]$_{\text{Root}}$	- *ya*]$_{\text{Aspect}}$	*- *ye*] $_{\text{Aspect}}$	- *ye*]$_{\text{Aspect}}$
[[*star*]$_{\text{Root}}$	- *nau*]$_{\text{Aspect}}$	*- *new*] $_{\text{Aspect}}$	-*nü*]$_{\text{Aspect}}$
[[*ad*]$_{\text{Root}}$	- *Ø*]$_{\text{Aspect}}$	*- *Ø*] $_{\text{Aspect}}$	- *Ø*]$_{\text{Aspect}}$
		*- *sk'ē*-] $_{\text{Aspect}}$	- *skē*-] $_{\text{Aspect}}$

The PIE Aorist and Perfect system

The Perfect and Aorist system are also characterized by the same complex root-dependent realization of Asp^0 one observes in the Present system.

(90) II. a. Root perfects:

**woyd-Ø-* ~ **wid-Ø-*	'know'

b. Reduplicated perfects:

**me-món-Ø-* ~ **me-mn-Ø-*	'remember'

III. a. The root Aorist with no overt suffixal element:

**gwém-Ø-* ~ **gwm̥-Ø-*	'step'
**bhuh$_2$-Ø-*	'become'

b. The /*-s-*/ Aorist.

**dḗyk'-s-*	'point out'
**wḗg'h-s-*	'transport'

c. The /*-é-*/ Aorist (traditionally called the thematic Aorist)

**h$_2$ludh-é-*	'arrive'

d. Reduplicating Aorist

**wé-wk-e-*	'say' (root *wek)*

Co-occurrence restrictions in PIE Aspect systems

Perfect and Aorist formatives may never co-occur with different Present system exponents, *within the same conjugation*. Table below is from Sanskrit, while also generalizable to PIE (cf. Ringe 2006, Szemerenyi 1996). shows that , at the paradigmatic level, none of the affixes occurring in the Present stem occurs in the Aorist stem of the same verb.

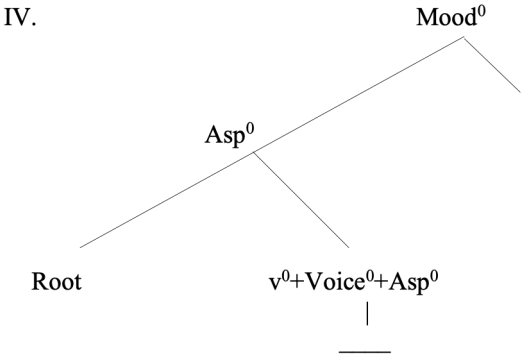
(90) IV.

Present stem	Aorist stem	
ján-a-	jan-	'generate'
bháv-a-	bhu-	'be'
srj̥-á-	srj/sraj-	'emit'
vr̥h-á-	vr̥k-śa-	'tear'
ruh-á-	rauh-/ruh-/rauk-sa/	'ascend'
bhi-n-d-/bhi-na-d-	bhid-/bhaid-	'split'
ru-n-dh-/ru-na-dh-	rudh-/raudh-	'obstruct'
kar-nau-/kar-nu-	kar-/kr̥-	'make'
su-nau-/nu-	sau-/su-	'press'

Formal structure of PIE Verb

It follows that the Present, Aorist, and Perfect suffixes appear to compete for the same morpho-syntactic position. Given their semantics, one can propose that all of them are exponents inserted under the Asp^0 node in (90IV):

(90) IV.



One can therefore propose that Aspect is realized through the different root dependent VIs listed below. Note that /*-*e*-/ can be treated as an elsewhere aspectual exponent insofar as it also appears as the exponent of the Aorist. Otherwise, Ø is inserted.

(90) V.

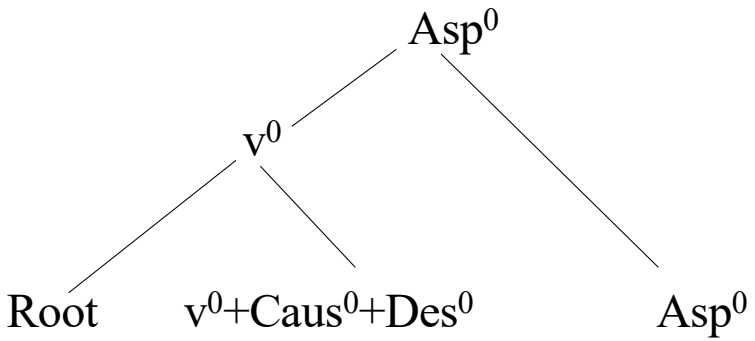
a.	$[+PFV, -STAT]_{Asp0}$	→	/*-*s*-/	/ Root $^{-s-}$____
b.	$[-PFV]_{Asp0}$	→	/*-*ye*-/	/ Root $^{-ya-}$____
c.	$[-PFV]_{Asp0}$	→	/*-*ne*-/ /	Root $^{-na-}$____
d.	$[-PFV]_{Asp0}$	→	/*-*new*-	/ Root $^{-neu-}$____
e.	$[-PFV]_{Asp}0$	→	/*- *sk'ē*-/	/ Root $^{-sk'ē-}$____
f.	$[\ ]_{Asp}0$	→	/*-*e*-/	
	Otherwise		/*-Ø-/	

Splitting of Asp from VP-shell derivatives

Forms like those in must have been reanalyzed as involving a dedicated VP-shell node, so that VP-shell features were inserted in this position.

Therefore, there was no longer bundling with Asp^0; hence this node could get its own exponent. The derived verbs in then had the morpho-syntactic structure in :

(90)



Splitting of Asp from VP-shell derivatives

This structure is preserved in Ancient Greek. There is evidence, however, that VP-shell exponents began to co-occur with aspectual exponents at some point in the history of late PIE as in Vedic Sanskrit.

The cases are few but clearly show a trend:

(91) Aorist Denominative/Causative

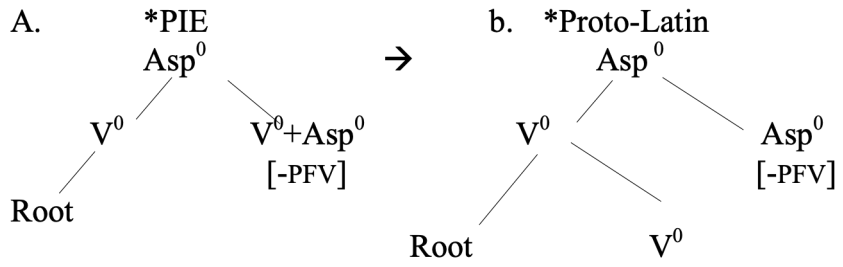
pāpa-y-iṣ- Aorist of	*pāpa-yá-*	(Denominative /-ya-/)	'lead into evil (*pāpa*)'
vyath-áy-iṣ-	*vyath-áya-*	(Causative /-aya-/)	'disturb'
dhvan-áy-iṣ-	*dhvan-áya-*	"	'envelope'

Splitting of Asp from VP-shell derivatives

NOTA BENE: V^0 and Asp^0 nodes were bundled . PIE VP-shell derivatives, i.e., denominatives, causatives, etc., occurred in only the present system only (i.e., imperfective aspect).

In a prehistorical stage Latin reanalyzed PIE V^0+Asp^0 formatives (i.e., denominative *-*yé-,* causative/iterative *-*éye*-, etc.) as realizing the V^0 node (and the features therein) only. As not bundled with V^0 anymore, Asp^0 could get its own dedicated exponence (cf. Latin *am-ā-vĭ-mus* vs Skt. *á-bhār-s-ma*

(92)



The Development of TVs in Latin

➢ Latin TVs such as *-ā-, -ē-, -ī-, and -ĭ-* had disparate sources; they developed mostly from VP-shell derivatives but also from other sources (see Ernout (1989), Sihler (1995), Meiser (2003), Weiss (2009) Bertocci &Pinzin (2022).

➢ /-*ā*-/ < from the Denominative sequence /*-eh_2-*ye*-/
< from de-adjectival factitive with the suffix /*-h_2/. *novare* 'to renew' from *novu-,* 'new.'
< from a root-final laryngeal (in the primary verbs in /-*ā*-/ cf. *amāre* 'to (make) love', *arāre* 'to plow', *volāre* 'to fly', *cubāre* 'lie down', *flagrāre* 'to glow' (

➢ /-ī-/ < from the Denominatives in /*-*ye*-/,
< from deverbal actional/aspectual /*-*ye*-/.

➢ ./-*ē*-/ < from statives in *-eH_1- : e.g., *sedēre* 'to be sitting' (< **sed*-eH_1-);
< from causatives in *-*eye*-: e.g. *monēre* 'to warn' (< **mon*-*eye*-).

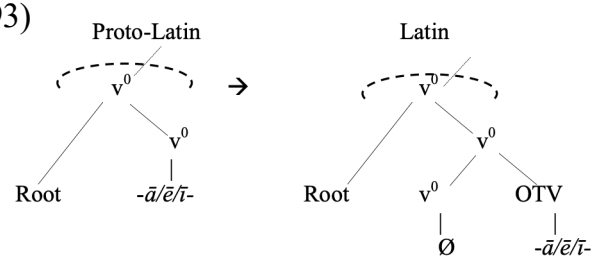
HYPOTHESIS: Learners could no longer assign a clear semantic or morpho-syntactic function to derivatives like /-ā-/ and /-ī-/. Thus, they became devoid of syntactic or semantic features. The same happened with the other root-adjacent vocalic pieces. Given this generalization, these derivatives were reanalyzed as ornamental nodes inserted by rule.

The Development of TVs in Latin

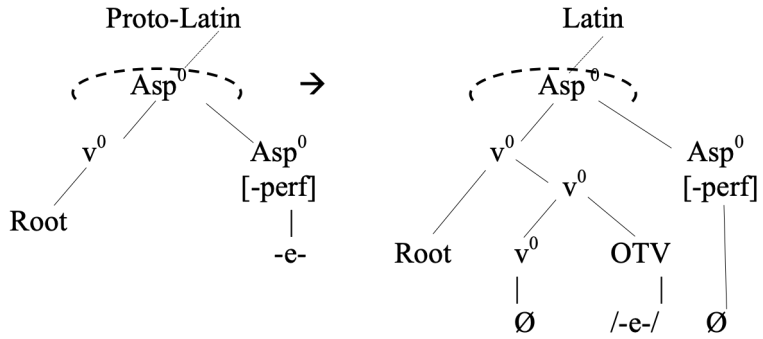
Once this happened, new verbalizers (e.g., *-fic-*) developed and were able to cooccur with the newly formed ornamental TVs. Cf. forms such iterative [[[[*vīs*]$_{Root}$ *-it*]$_{v^0}$ *-ā-*]$_{TV}$]$_{v^0}$*-re*]$_{T^0+AGR}$ 'see.often-infinitive', causative [[[[*ex-carn-*]$_{Root}$ *ific-*]$_{v^0}$ *-ā-*]$_{TV}$]$_{v^0}$*-re*]$_{T^0+AGR}$ 'flesh out-Infinitive', desiderative [[[[*ēs-*]$_{Root}$ *-ur -*]$_{v^0}$ *-ī-*]$_{TV}$]$_{v^0}$*-re*]$_{T^0+AGR}$ ''be hungry-Infinitive'

All root adjacent vocalic pieces became ornamental TV. This includes not only /-*ā*-/ and /-*ī*-/, and /-*ē*-/, which developed from a VP-shell element but also /-*ĕ*-/ and some of the /-*ĭ*-/, which developed from /*-e-/ and from /*-*ye*-/, which were both true aspectual [-perf] markers in Proto-Indo-European.

(93)



(94)



Athematicity accounted as above—deletion of short TVs n the perfect— results from the reanalysis of the absence of short *e in the perfect forms

Latin TVs

As a summary, I assume that this historical development involved the following steps: at first, v^0 and Asp^0 appeared to be bundled into a single node in the proto-language.

Eventually they were reanalyzed as involving different independent nodes; the verbalizers were positioned under v^0, as expected, and therefore could co-occur with (regular) aspectual markers.

Finally, in Latin, verbalizers were re-analyzed as ornamental TV.

The development of inflectional Thematic Vowels

I assume that the same generalization was extended to the other vowels appearing in the inflections.

They were re-analyzed as ornamental TVs inserted by the rule in (42)

As assumed earlier, this re-analysis was motivated by a morphological generalization: an ornamental role was assigned to vocalic pieces and a functional one to consonantal pieces.

Thus, as proposed earlier, the Imperfect Indicative /-ā-/ and the Subjunctive /-ē-/ were re-analyzed as ornamental TVs.

Importantly, these are etymologically based on original vocalic exponents of the relevant functional nodes (cf. Ernout (1953), Meiser (2003), Sihler (1995) and Weiss (2009)). This led to the development of alternative consonantal functional exponents such as /-b-/ and /-s-/ in these cases.

This eventually developed into the Romance situation investigated by Oltra-Massuet and Arregi (2000), where all verbal inflectional vowels (both those associated with v^0 as well those associated with other functional nodes) behave as a single class of ornamental elements in terms of stress and other phenomena.

Conclusion: Reanalysis by bleaching

I.Semantic bleaching=it includes preservation of some semantic content

i. Upward raising of roots (Roberts and Rossou 2002, Robert 2010): an operation of semantic impoverishment (=bleaching) that affects the root semantics in such a way that 1) it removes its ability to identify and describe an independent eventuality but 2) it preserves its abstract logical framework
cf. will 'want' > will 'FUTURE', in English, or avere 'have' > 'must' in Italo-Romance varieties

ii. Upward raising of functional exponents=impoverishment of exponent morpho-syntactic feature (with possible intermediate insertion of features):
Inflectional /s/ for PIE to Romance:
PIE Aorist /-s-/ > Latin Perfect /-s-/ ` > Romance Preterite /-s-/
[+perf, -stat] ➔ ~~[-stat]~~➔ [+perf] ➔Insertion of [+past] =[+perf, +past]➔ ~~[-perf]➔~~ [+past]

II**. Ornamental bleaching= full loss of semantic content/morpho-syntactic features**

- **The exponent requires the insertion of an autonomous morphological position attached to a functional head but not present in the syntax.**

The Latin TVs,

The piece *–ē-* in the indicative imperfect forms *mon-ēbā-mus, leg-ēbā-mus cap-i-ēbā-mus* vs. *laud-ā-bā-mus*

The other Latin verbal inflectional vowels (Calabrese 2023)

The development of athematicity

Recall that the PIE formatives that developed into the Latin OTVs were originally restricted to the Present system, i.e., to what became the Latin *īnfectum*.

So, when they are found in the *perfectum*, one must assume that these formatives were generalized across forms in the same paradigm. However, this extension was not consistent.

As a matter of fact, paradigmatic TV spreading occurred only with the verbal forms characterized by TVs /-ā-/ and /-*ī*-/. In this case, these TVs spread from the form of the *īnfectum* to those of the *perfectum (*see below). In this way, thematic forms such Present, Imperfect, and Perfect ones such as those in developed:

(95)	*am-ā-mus*	*am-ā-bāmus*	*am-ā-bimus*	*am-ā-vimus*	*am-ā-verāmus*	*am-ā-verimus*	*'love'*
	aud-ī- mus	*aud-ī-ēbāmus*	*aud-ī-ēmus*	*aud-ī-vimus*	*aud-ī-verāmus*	*aud-ī- verimus*	*'hear'*
	Pres. Ind.	Imperf. Ind.	Fut. Ind.	Perf. Ind	Pluperf.Ind	Fut.Perf. Ind	

As already observed, verbal OTVs such as /-*I*-/, /-ĭ-/ and /-*ē*-/ show up only in the *īnfectum* and not in the *perfectum*.

Given the analysis proposed earlier, we can assume that this is just a surface property of forms in the *perfectum*.

The development of athematicity

PROPOSAL:

A structural v^0 -TV position was systematically introduced across verbal forms and aspectual contexts: the structural presence of a verbal OTV became the characteristic feature of the *īnfectum* and of the *perfectum* regardless of the root.

If it was missing in the *perfectum*, this was due to a short vowel (either /-I-/ or /-ĭ-/) being deleted either by (71) or (82).

The most parsimonious and adequate account for this situation is then the one, already proposed before, where a rule like (42) applies in a general fashion to all verbs, and where athematicity is, instead, analyzed as being due to rules pruning or deleting short TVs.

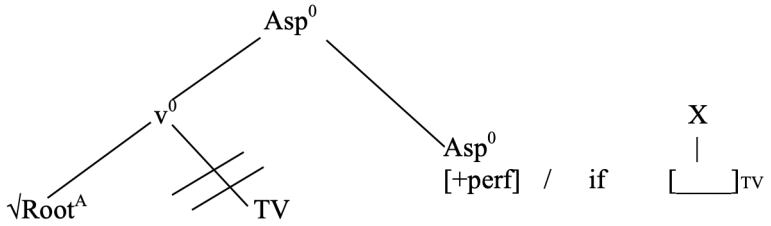
The development of athematicity

I identified three situations that leads to athematicity.

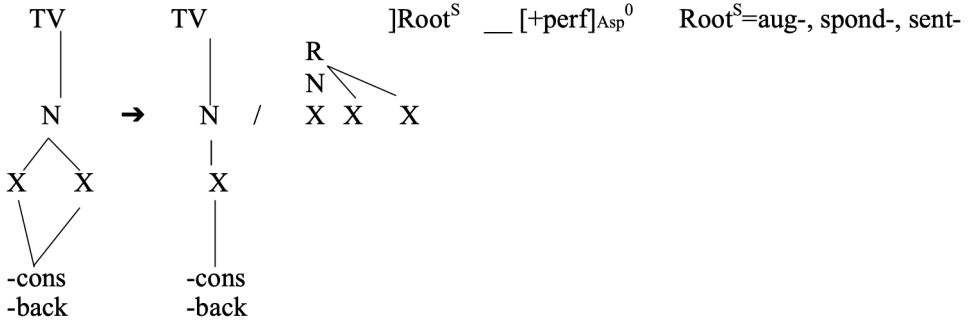
Two are accounted for by the application of (82) repeated here as (96). As already discussed, (96) applies before Vocabulary Insertion at the Asp^0 node and therefore leads to the appearance of the exponents /-s-/ and /-Ø-/ (and to the application of morpho-phonological rules like reduplication and lengthening). (96) applies to the short TV vowels inserted by the rules in (77), i.e., /-I-/ or /- ĭ-/, or to the short vowels generated when (84), repeated here as (97), applies to /-*ē*-/ and /-*ī*-/.

I assume that the rules in both cases developed through the reanalysis of the surface situation that was found in Latin after rule (46) was introduced. Specifically, /-I-/ (from /*-e-/ or /- ĭ-/ (from /*-ye/) were missing in Perfect primary verbs, and the derivatives /-*ē*-/ and /-*ī*-/ had not spread to the *perfectum (*possibly due to the prosodic effect of heavy roots).

(96)



(97)



The development of athematicity

In contrast, the TV-neutralization rule in (79), repeated here as (98a), and the subsequent TV deletion rule in (71), repeated here as (98b) are morpho-phonological rules which explain the remaining cases of surface athematicity in the *perfectum*. They account for the appearance of the exponent /-v-/ in *perfectum* athematic constructions and, at the same time, for the appearance of thematic [i] in the participle (*monuimus/monitum* 'warn', *domui/domitum* 'tame'). Rule (98a) may have originated in cases that displayed short vowels in the participle in the case of /-*ē*-/-verbs, i.e. **mone-to*- instead of **monēto* (See Weiss 2009:439 for a possible explanation). This reanalysis was systematically extended to all /-*ē*-/-verbs where (97) did not apply.

(98) a. X^0 / $Root^X$ __ $[+perf]_{Asp}{}^0$ $Root^X$= *cub-,son- sec-*, *aper, sal*, etc ii. (74d)

TV

-cons .

b. X

[-cons]→Ø / [__]$_{TV}$ [-consonantal]

The development of athematicity

HYPOTHESIS:

All these processes are due to reanalyses that took place after the changes in (93)-(94) were introduced in Latin morpho-phonology. In particular, the reanalyses were triggered by the absence of the original aspectual markers /-I-/ and /-ĭ-/ and by the fact that /-ē-/, and instances of /-ā-/ and /-ī-/ had not spread to the *perfectum*. Since rules (96), (97) and (98) were restricted to apply only in the *perfectum*, TVs were free to appear in the *īnfectum*. Therefore, all verbal structures are systematically thematic in the *īnfectum* even in the case of the primary verbs, i.e., the III conjugation, which originally lacked a vocalic secondary derivative after the root.

A restructuring in irregular exponence

This led to a restructuring in irregular exponence: root-conditioned exponents became characteristic of the *perfectum* system (cf. the III conjugation forms below) since their insertion was possible only in athematic structures, where root-Asp^0 interactions could occur:

(99) Athematic Perfects

dūc-s-īmus	*dūc-s-erāmus*	*dūc-s-erimus*	*dūc-s-erīmus*	*dūc-s-issemus*
(dūximus)	*(dūxerāmus)*	*(dūxerimus)*	*(dūxerīmus)*	*(dūxissemus)*
lēg-Ø-i	*lēg-Ø-erāmus*	*lēg-Ø-erimus*	*lēg-Ø-erīmus*	*lēg-Ø-issemus*
crē-v-imus	*crē-v-erāmus*	*crē-v-erimus*	*crē-v-erīmus*	*crē-v-issemus*
momord-Ø-imus	*momord -Ø-erāmus*	*momord -Ø-erimus*	*momord -Ø-erīmus*	*momord -Ø-issemus*
Perf. Ind	Pluperf.Ind.	Fut.Perf. Ind	Perf. Subj.	Pluperf. Subj.

A restructuring in irregular exponence

Meanwhile, irregular allomorphy due to root-Asp^0 interactions disappeared from the *īnfectum* system where only thematic structures were possible. So, even in the case of the III conjugation, Asp^0 allomorphy was no longer possible in this system; the forms below are perfectly regular from that point of view.

(100) *dūc-i-mus* *dūc-ē-bāmus* *dūc-ē-mus* *dūc-ā-mus* *dūc-e-remus* *dūc-e-re*
leg-Ø-imus *etc.*
Pres. Ind. Imperf. Ind. Fut. Ind. Pres. Subj Imperf. Subj. Inf.

Aspect exponence does show irregularities in the *īnfectum* but they are conjugation-based, i.e., conditioned by the TV properties, and not by the root properties.

A restructuring in irregular exponence

It follows that Latin stand in contrast to Sanskrit and Greek , where root-conditioned irregular aspectual exponents can be found in all aspectual systems.

In these languages, Asp^0 is always adjacent to the root, and therefore irregular exponence is present not only in the Aorist and the Perfect (equivalent to the Latin *perfectum*) but also in the Present (equivalent to the Latin *īnfectum*).

In Latin, however, irregular aspectual exponents became a characteristic feature of the *perfectum* system.

Generalization of the OTV in the primary verbs īnfectum

It is now important to discuss a crucial difference between the distribution of the PIE FTV /*-e-/ (/-a-/, /-e-/ of Sanskrit and Greek, respectively) and that of the Latin short OTV /-I-/, which may be etymologically related with this /*-e-/ (see below for an analysis of the development of /-I-/ from /*-e-/).

In fact, the Latin OTV /-I-/ can co-occur with the other pieces that represented [-perf] aspect in the other languages (cf. (90I).

Since the OTV insertion rule applied systematically across verbs, restricted only by the rules (96), (97) and (98) in the *perfectum*, the primary verbs display it regularly in the *īnfectum*. Therefore, they display an OTV /-I-/ associated with v^0, together with a [-perf] Asp^0 with Ø exponence, as postulated in (94).

Generalization of the OTV in the primary verbs īnfectum

It follows that original Asp^0 exponence, mostly *ne*-infixation, but also more sporadically /-*nu*-/ and /-*sk*-/ suffixation, had to be reanalyzed as being part of the root. This includes undergoing morpho-phonological readjustments in the *perfectum*, i.e., a rule deleting a nasal coda (cf. c) in cases such *sper-n-ō/sprēvi, findō/fidī,* but not in *iungo, /iunxi/iunctus*. A radical restructuring of the aspectual exponence was thus achieved.

(101) *Īnfectum Perfectum*

Nasal suffix:	cer-n-*i-mus*	crē-v-ī	'see'sight'
	sper-n-*i-mus*	sprē-v-ī	'spurn'
	ster-n-*i-mus*	strā-v-ī	'spread, strew'
Nasal infix:	fi-n-d-*i-mus*	fid-ī	'split'
	fu-n-d-*i-mus*	fūd-ī	'pour (metal)'
	sci-n-d-*i-mus*	scid-ī	'tear, split'
Suffix /sk-/	crē-sc--*i-mus*	crē-v-ī	'grow larger, increase'
	nō-sc-*i-mus*	nō-v- ī	'examine'
	adolē-sc-*i-mus*	adolē-v- ī	'grow up'

Generalization of the OTV in the primary verbs īnfectum

Note at this point that the exponent of the III conjugation TV—what I assume is /-*I*-/ cannot be directly developed from the PIE FTV /*-*e*-/.

It must really be a new morphological entity.

One can indeed assume that in primary verbs that originally had a F-thematic /-*e*-/, /-*I*-/ developed directly from this element by reanalysis as an OTV (cf.).

This, however, cannot be the case for the primary non-F-thematic verbs, in particular for those with suffixal or in infixal /-*n*-/as in .

In this case, the TV exponent cannot be the original /*-*e*-/ and must be a new entity.

The phonological nature of the new TV in originally primary verbs (i.e., III conj.)

TV in these verbs must be a new morpho-phonological entity.

This vowel is normally [+high] (i.e., [*i*]) in surface representations unless it is before a rhotic, where it is [-high] (i.e., [*e*]; or it is before other vowels where it is deleted). This distribution readily indicates that this vowel is underlying [+high].

PROPOSAL: a short high vowel was inserted as the TV of the *īnfectum* of III conjugation verbs—the primary verbs— in all cases where there was no reanalyzed TV from PIE **-e-*. We can also assume that the latter *-e- was eventually phonologically reanalyzed as being an underlyingly [+high, -round] vocalic segment.

➢Distribution of 3rd Plural suffixal /-unt/ after [+high]: III and IV conjugations

The phonological nature of the new TV in originally primary verbs (i.e., III conj.)

➢ Consider the development of the 1st sg. ending /-*o*/, which is characteristic of the present of all conjugations.

➢ Historically, this ending was restricted to the 1st sg. of the primary verbs with thematic */-*e*-/ and involved an /-*o*-/ alternant of this vowel (cf. Greek *lṻ-ɔ,* Ernout 1953, Sihler 1995, Meiser 1998, Weiss 2005*)*.

➢ Once the alternation e/o was no longer rule-governed in Proto-Latin, this element became re-analyzed as the ending of the 1st person and extended to the derived conjugations, where a general Latin rule shortened vowels before another vowel (/*ā, ē, ī*/➔[*a, e, o*]/ __ V).

(102) a. [[[*laud*]$_{\text{Root}}$ -*a*-]$_{\text{TV}}$ *ō*]$_{\text{T+AGR}}$1sg],
b. [[[*mon*]$_{\text{Root}}$ -*e*-]$_{\text{TV}}$ *ō*]$_{\text{T+AGR}}$1sg]
c. [[[*aud*]$_{\text{Root}}$ -*i*-]$_{\text{TV}}$ *ō*]$_{\text{T+AGR}}$1sg]

This is the situation in Italic (cf. Umbrian *subocau* 'I invoke/call upon' <sub-uok-ā-ō, Lat. vocō

The phonological nature of the new TV in originally primary verbs (i.e., III conj.)

➢ **In early Latin, the hiatus cluster /-*a*-]$_{TV}$ *ō*]/ was disliked and removed by the deletion of the vowel /*a*/:**

(103) ***a*➔ Ø / __ V**

Compare:

a. **[[[*laud*]$_{Root}$ *ō*]$_{T+AGR^{1sg}}$]** **vs.** **b.** **[[[*mon*]$_{Root}$ *-e-*]$_{TV}$ *ō*]$_{T+AGR^{1sg}}$]**

c. **[[[*aud*]$_{Root}$ *-i-*]$_{TV}$ *ō*]$_{T+AGR^{1sg}}$]**

➢ Now consider the old primary verbs where the /- ō / appeared adjacent to the root *duk-ō* 'lead-Pres.1sg, *leg-ō* 'gather-Pres.1sg., *ed-ō* 'eat-Pres.1sg ([[[leg]$_{Root}$ -I-]$_{TV}$ ō]$_{T+AGR^{1sg}}$]), etc..

➢ Once a structural TV position was generalized across all verbs and aspectual contexts, as proposed earlier, one had to hypothesize the following UR structures for the just mentioned 1sg forms: [[[*duk*]$_{Root}$ *-I-*]$_{TV}$ *ō*]$_{T}$, [[[*leg*]$_{Root}$ *-I-*]$_{TV}$ *ō*]$_{T}$, [[[*ed*]$_{Root}$ *-I-*]$_{TV}$ *ō*]$_{T}$, etc.

➢ **To account for the surface forms *duk-ō*, *leg-ō*, *ed-ō*, etc., it is plausible to assume that the inserted (high) TV was reanalyzed as undergoing a process of vowel deletion before vocalic endings such as the first person [-ō]. The I conjugation /-ā-/was the only TV that behaved like that.**

- **This parallelism triggered a reanalysis in which this vowel was assigned [+back]**

III and IV conjugations 3rd plural ending /-*unt*/

Why is the 3rd plural ending for the present of the IV conjugation is /-*iunt*/ (cf. *audiunt)* instead of the /*ī-nt*/ (*†*audīnt*) as should be expected in this case, a development that is still unexplained (cf. Ernout ( ), Sihler ( )).

Consider the form l*egunt* (archaic *legont) 'collect-3pl.prs'*, where one can hypothesize that the /-*o*-/ was originally the *o*-grade of the aspectual F-thematic /-*e*-/ as in the Greek counterpart (Doric Greek *λεγοντι* (> Attic *λεγουσι*))

HYPOTHESIS:

Since the system of *Ø/o*-grade alternations were synchronic lost in Latin, the /-*o*/ of l*egont* could not have been analyzed as a surface alternant of an underlying thematic /-*e*-/. So, once the v^0-Ornamental TV were introduced, this vowel, which was rounded and therefore inconsistent with the postulated TV in this case, which, otherwise, appears as being [-round] (cf, *legimus, legite),* was reanalyzed as being part of the ending.

Therefore, the ending was */-u-nt/* and the form l*egunt* had to be analyzed as involving the structure .

(104) $[[[leg]_{Root}\text{ -I-}]_{TV}\text{ -u-nt}]_{T+AGR}$

The /-u-/ piece was inserted by the morpho-phonological rule in (105), where the feature [-irrealis] is needed to restrict its application to the indicative. The subsequent application of the independently needed TV deletion rule accounts for the surface form l*egunt*.

(105) $Ø \rightarrow$ -u- / $[+high]_{TV}$ __ $[+part, -auth, -perf., -irrealis]_{AGR}$ (cf. the structure in (104))

III and IV conjugations 3rd plural ending /-*unt*/

At this point, given rule , the ending [-*u-nt*] was analyzed as being selected by high TV. This immediately accounts for why this ending was extended also in the case of the long [+high] /i:/.

(106) $[[[aud]_{Root}\ \text{-ī-}]_{TV}\ \ \text{-u-nt}]_{T+AGR}$

Note that the ending /-u-nt/ not only in the present indicative where it follows [+high] v^0-TV but also in other cases such as in the future form *laudābunt* where it appears after an inflectional TV that was postulated to be I as expected given .

Perfect exponence and locality form PIE to Latin

These innovations from PIE to Latin led to a situation in which there was irregularity in the athematic forms, therefore in the *perfectum*, and regularity in the thematic forms.

The presence of TVs involved regular morphology. The thematic vowel appears in all cases where there is no root-conditioned contextual allomorphy.

If there is root-conditioned contextual allomorphy, then there is no TV.

This follows from the fact that this is the only case where the aspectual node can access the root diacritics needed for the application of the specific VIs.

Perfect exponence and locality form PIE to Latin

As already mentioned, a major development in the history of the Latin Verbal System was the conflation of the PIE Aorist and Perfect.

The Perfect exponents of Latin are /-s-/ and /-v-/, and /-Ø-/ as the default. Their VIs are given again in (102), together with that of /-b-/.

(107) a. [-Perfect, +F, -Irrealis] → /-*b*-/

N

|

b. [+Perfect]] → /-*v*-/ / X] _____

c. [+F] → /-*s*-/

Otherwise /-*Ø*-/

Development of the perfect exponence: /-v-/

The exponent /-v-/ cannot be traced back to PIE and can be characterized as a development peculiar to Italic, or most properly to Latin (see Sihler (1995), Rix (1992), Weiss (2009), a.o., for discussion of its possible development). Whatever its origin, it is found in thematic structures.

As mentioned by Sihler (1995: 585), this exponent may have become a hiatus breaker between the thematic vowel and a following suffixal vowel, which may have also been the TV /-I-/ in some verbs. One can assume that the hiatus breaking /-*w*-/ (i.e., the /-v-/ used in this text) was eventually reanalyzed as an exponent of Asp^0.'

Development of the perfect exponence: /-Ø-/

Latin /-Ø-/ is inherited from both default Perfect and Aorist /-Ø-/.

So, we have Perfect forms with reduplication that underwent changes such as the following *sēd-Ø-ī* < **se-sd-Ø-*> 'sit' (Sihler (1995:582).

At the same time, we have Aorist forms that were preserved in Latin: *fīd-Ø-ī* < **bheid-Ø-*, Īnfectum Present *findō* 'split' (cf. Skt. *bhinátti* 3sg pres. vs. *bhét /bháit-Ø-t* 3sg. aor.), *līqu-Ø-ī* <*leik*^{w}, Īnfectum Present *linquō* 'leave' (cf. Skt. *riṇakti* 3sg pres. vs. *riktám /rik-Ø-tam*/ 2du Aor.) (see Sihler (1995:581-2) for more examples and detailed discussion).

Development of the perfect exponence: /-s-/

The exponent /-s-/ can be traced back to PIE. It is, in fact, etymologically related to the PIE VIs in (103) (see (90Va))

(108) [+Perfect, -stative] /*-s-/ / Root^{s} ___

Development of the perfect exponence /-s-/

Once /-v-/ was introduced in the Latin system, the null marker /-Ø-/, whose use was more general, became one of the exponents of Asp^0 for athematic roots not taking /-*s*-/ or /-v-/.

The distribution of Ø thus became root-conditioned in Latin as expressed by the freezing rule in (68), repeated below, which is locally governed by root-information.

(68) Freeze [+Perfect] for the Asp^0 VI in the context of the $root^{Ø}$

This is not the case for /-s-/ which was originally conditioned by root diacritic as stated in (103). As argued earlier., its distribution in Latin is actually context-free, as in (102d).

One can assume that what happened was a generalization of the originally Aorist exponent [s] to be the exponent of all marked inflectional nodes. This change is also hinted in historical grammars (cf. Sihler (1995: 590, Ernout (1953: 212).

Development of the perfect exponence

Note that all generalizations require mention of the cyclic stage where Asp^0 is reached and where access to root information is still possible (i.e., only in athematic structures). Once this stage is reached, there are three possibilities depending on the absence vs. presence of the TV, which results from the root-conditioned rule :

(109) a. /-v-/ is inserted either when there is a TV, or, if there is no TV, when the root undergoes the locally triggered morpho-phonological adjustment in d) that generates a root-fina vowel (e.g. *cer-n-i-mus* vs perf. *crē-v-i-mus*).

b. /-Ø-/ is inserted if there is no TV but the root-conditioned freezing in applies.

c. Default /-s-/ is inserted if there is not a TV, and if neither a) or b) occur.

It follows that the appearance of both /-Ø-/ and /-s-/ requires athematic structures as determined at the Asp^0 cyclic stage.

It also follows that, although the exponent /-s-/ was no longer conditioned by root diacritics, its distribution still requires access to root information. It must be locally established at the Asp^0 cyclic stage with no immediately preceding vowel present, so that the alternative /-v-/ cannot inserted. Its distribution is therefore still determined locally once that that cyclic stage is reached.

Development of the perfect exponence

Note that forms were not simply preserved in the passage from PIE to Latin.

Insofar as the exponent /-s-/ was the default exponent in athematic forms, there was a major redistribution of exponents so that the use of /-s-/ was extended to new verbs. For example, this is what we find in the following cases where the Ø-allomorph of the Perfect aspect is replaced by the /-s-/, especially when there is a prefixal element. We can simply say that the freezing rule in stopped applying in these contexts.

(i) Redistribution of the exponents in athematic contexts:

Present	Perfect
iungō 'join'	iunxī (<iugī, cf. vincō/vicī, frango/frēgi, rumpō/rūpī)
pingō 'paint'	pinxī (<pigī)
fingō 'shape'	finxī (<figī
pangÙ 'fasten'	panxī/pepigī

(ii) If there was a prefixal element:

Perfect	regularized perfect
momordī 'bite'	praemorsī (< prae-mord-) 'bite feracioulsy'
pepercī 'spare'	compersī (< con-perc-) 'save'
pupugī 'prick'	compunxī (< con-pung-) 'puncture severely'
pepulī 'drive'	expulsī (< ex-pulg-) 'drive out'

c.

ēmī 'buy'	dempsī (< de-em-) 'take away'
iēcī 'throw'	amixī (< ami-ic-) 'throw around'
lēgī 'read '	intellexī (< inter-leg-) 'see into, perceive'

Conclusion

Despite all the restructuring, irregular allomorphy still occurred under the required local configurations. So, reduplication, ablaut and vowel lengthening were never extended to thematic configurations. Thus, it also follows that allomorphic complexity—the possibility of multiple root conditioned exponents for Asp^0— is restricted to cases in which Asp^0 is adjacent to the root node, i.e. in athematic contexts.

Note that in all these diachronic developments, the actual forms changed; they were not preserved. There was no preservation of actual forms. What was preserved, however, was a structural property: complex root-conditioned allomorphy was possible only under adjacency with the root.