The DNA of Latin Conjugation
or
Latin Conjugation in a Single 'Smart' Principal Part
or
Regularity Hiding in Plain Sight

ROBERT FRADKIN
SCHOOL OF LANGUAGES
UNIVERSITY OF MARYLAND AND ANTWERP, BELGIUM

Carolo Townsendi in memoriam

1.0 A New Pattern of Latin Conjugation?

This article offers my fellow Latin teachers, prospective teachers, and interested (advanced) learners the opportunity to explore an alternative organization of Latin conjugation. The familiar facts of Latin conjugation have certainly not changed over the centuries. Still, a grammatical analyst's and a language teacher's (and learner's) view of the relations among the dozens of forms in a verbal paradigm can change. Long-standing textbook tradition groups Latin verbs into four (and a half) numbered "conjugations" and Latin tenses into three "systems": present, perfect, supine (using "tense" as a loose cover term for tenses and moods as well as participles and verbal nouns as equal members in the verbal system, all reviewed in Section 3, below). The facts of Latin sound and spelling, crucial to this presentation (with some comparisons to English), are reviewed in the Appendix with frequent references ([A] through [H] in square brackets) to it in the text itself. Readers already familiar with basic phonetics may not need these references, while other readers may find it useful to peruse the Appendix first before proceeding with the analysis and to prepare to flip back and forth. (The [H] section, devoted largely

to English, supports the old adage that "you learn your language better by learning another language.") The "conjugations" are of only limited usefulness as guides for forming these three tense systems since they point only to the present system with no reliable connection to the other two, giving the impression of myriad exceptions and irregularities. An awareness of Latin sounds and the ways Latin spelling represents them can go a long way to smoothing out that often bumpy path. The purpose of this article is to step back from textbook pages for a broader view of a classical Latin verb's entire "inflectional profile" as a unified whole, of which the traditional conjugations are only a part. Four such "inflectional profiles" emerge that cut across the conjugations and highlight the system's essential, though often hidden, regularity. The subject here is classical Latin as a synchronic system such as the toddlers Gaius or Publius might have intuited from their Julian or Vergilian parents' first century BCE (refined) speech, only subconsciously aware of the elegant choreography of their consonants and vowels. The project arose out of my background in Slavic linguistics, in which field R. Jakobson's 1948 analysis of Russian conjugation led to some advancements in Russian language pedagogy.

1.1 S-T-E

Every Latin verb form consists of a S(tem) that flows into a T(ense marker) that then flows into an E(nding). In other words, every Latin verb form exhibits, in principle, a clear S-T-E structure (read "ess-tee-ee" for classroom reference). Textbooks recognize this tripartite structure inconsistently, and spelling often obscures the picture. The current presentation keeps the three components rigorously apart in theory. It shows how a constellation of just a few connective

processes (perhaps very loosely or jocularly analogous to the millions of ways the nucleotides A-C-G-T combine and recombine in DNA or that protons, neutrons, and electrons combine into myriad types of atoms, and atoms into molecules) produce an entire regular paradigm. An idealized, theoretical S-T-E form may have to proceed through some slightly abstract "steps" to the actual pronounceable forms. Some of these steps retrace some aspects of linguistic history, but I do not claim that Romans uttered or were conscious of them. If this exercise in "practical linguistics" (and my fellow linguists will recognize the signatures of a few different schools of thought and will forgive my side-stepping a host of issues since I do not assume that background on the part of the intended readership) proves useful to teachers for their own interest, even enjoyment, and possible classroom application for the benefit of (some) learners, so much the better, and I welcome reports of those experiences.

The fulcrum of the system is the verb stem, that is, a lexical verb root plus one of four "stem vowels" (see 3.3, below): three long ā, ē, ī, which textbooks number 1st-2nd-4th conjugation and one short i with two behaviors, numbered 3rd and 3-iō. As far as this article is concerned, a particular root's choice of stem vowel is a given. The basis for that choice is a topic for another forum. These stem vowels encode their instructions for choosing among variants of the present system tense markers (3.2.1, below) but do not pretend to point reliably to the perfect or supine systems. (The numbering is a superfluous layer of metalanguage. Tagging verbs self-referentially as the *ā-type*, *ē-type*, *ī-type*, *i-type* frees the numbers to designate the larger inflectional profiles about to be introduced.) Those tense markers, in

turn, choose among variants of personal endings irrespective of the stem. In other words, the stem vowel has control over the present system tense markers, and the tense markers have control over the endings. There are no "first conjugation" or "fourth conjugation" endings, per se. Textbooks for beginners often conflate the tense marker and ending as "endings," e.g., imperfect 1st-2nd-3rd -bam, -bās, -bat, and materials for more advanced learners do not usually reexamine those early formulations. The crux of the matter is which stem vowel a root chooses before each group of tense markers as a whole package. It may choose (1) the same long vowel for all three groups, (2) a long vowel for the present system markers, a specific short vowel for the supine system and no vowel for the perfect system marker, (3) a long vowel for the present system and no vowel for either of the other two, (4) a short vowel for the present system and none for the other two. This broader view calls for either an expanded definition of the term "conjugations" or a new term, namely, "inflectional profile." The characterizations just given are tagged Profile-1, Profile-2, Profile-3, Profile-4, and its subgroup 4°. Under conditions to be discussed throughout, the stem (S-) may need to undergo certain predictable alterations or "adjustments" as it flows into the tense markers (-T-), just as tense markers need some adjustment on their way to the endings (-E). Dictionaries and grammars choose one or two representative forms from each of the three tense systems, the well-known principal parts, that tacitly illustrate the stem vowel choice for each system, the choice of perfect system marker, and whatever alterations the stem undergoes. The stem "adjustments" account for most of what bedevils learners as "irregular," but they are, in fact, quite regular if one approaches them with some basic phonetic background.

The Appendix provides that background. This paper proposes, then, a field trip "behind the scenes at the principal parts factory." This endeavor may not aid in witnessing Caesar's conquest of Gallia or in appreciating Dido's distress at Aenēās's sudden and unannounced departure, but discovering order in the sometimes chaotic, even capricious, list of principal parts can be comforting and satisfying. This article, addressed to a reader who already "knows the answers," as it were, seeks to unite the information of the principal parts up front. Suppose one imagines stacking the principal parts on top of each other and looking down through them. In that case, they reveal common properties over the whole system and create a single "smart" principal part that makes the connections among them systematic and explicit. This procedure essentially redefines "regular" to include more of the facts than textbooks typically do. The inflectional profiles are statements about the choice of stem vowel before each group of tense markers. Familiarity with general phonetics and the ways Latin spelling represents its sounds (see Appendix) dispels almost all notions of irregularity.

Rather than three or four principal parts that may or may not appear connected, a single verb form, equipped with a superscript, encapsulates a verb's entire "inflectional profile" that includes but does not give priority to "conjugation." The familiar present infinitive steps forward to serve as that single "smart" principal part, outfitted with a superscript number—which is not the usual conjugation number—and a few added symbols. (The "truly irregulars" esse-posse, īre, velle-nōlle-mālle, ferre, dare, and a few others require separate treatment in a more expanded forum.)

The procedure here is to lay out a theoretical *S-T-E for each Latin verb form, and those parts combine into the actual pronounceable form. When cited separately in the text, these parts include the dashes in S-, -T- and -E to make clear that they must follow or precede another element. The alphabet letters s, t, ē, ā represent mere speech sounds irrespective of grammar. The dashes before and after -s-, -t-, -nt-, -ē-, -ā- mean "always preceded and followed by another element," that is, they are tense markers that occur in the middle of the word structure, namely, perfect, supine, active participle, future, and present subjunctive, respectively. A dash only before -s, -t, -nt means "personal or declensional endings following from a tense marker," that is, 2nd person sg. (also nom. sg. 3rd declension), 3rd sg. 3rd pl., respectively, while ē-, ā- with a dash after are stem vowels. The S-T-E components do not have to match the actual pronounceable syllables of the verb word. The syllables a•mā•bās, carp•sē•runt, ha•bi•tum separated by a raised dot are the results of abstract S-T-E forms with an asterisk *amā-bā-s, *carp-s-ērunt, *habi-t-um with dashes. The abstract S-T-E structure proceeds through successive steps applying one rule at a time (all explained in the appropriate sections), bringing the theoretical form eventually to the actual pronounced syllables, labeled *actual* for clarity, e.g., supine *aug-t-um [F1] > *auc-t-um > *actual* auc•tum; 3rd pl. perfect *rīd-s-ērunt [F1] > *rīt-s-ērunt [F2] > *rīs-s-ērunt [F3] > *rī-s-ērunt > *actual* rī•sē•runt, *audī-ā-m [E3] > *actual* au•di•am. Much of this material is well known and uncontroversial but not brought together under one roof.

Of possible, if peripheral, interest is the unconscious logic of the arrangement of the S-T-E elements from "general" to "specific" in terms of speech dynamics,

a strategy observable in many of the world's languages. At the risk of grossly oversimplifying, any given speaker—called "I/ego"—encodes a message at that person's "present" or "now/nunc" and addresses it to a hearer—called "you/tū"—who decodes it. (These two parties can, of course, be the same physical being as in soliloquy.) In the three-part verb forms in that utterance, the S- is "most general," that is, all speakers and hearers know what kind of action am-, doc- or scrīb- is in the abstract, irrespective of when it happens or who does it. The -T- narrows it down to a given occurrence of that action relative to that interaction (e.g., before, during, or after that "nunc," known as "tense") as well as how that action plays out (all at once, repeatedly, unfolding over time, etc., known as "aspect"). The -E then narrows it down further to *who* or *what* is involved in that action at that time. Of course, this all happens with lightning speed thousands of unconscious times a day in normal speech. Such is the wonder of human language.

1.2 Zero Alert!

Contrast is a basic principle of grammatical analysis. The S-T-E structure affords the opportunity to contrast the members of each component by replacing each other, not unlike the revolving day-date-month-year bands of an old-fashioned library stamp (for readers old enough to be familiar with such a device) or the hundreds-tens-units-tenths columns of a car's odometer. This is the essence of a declensional or conjugational paradigm. Contrasting tense markers as the middle element of a verb's structure with the same stem and ending, for example, differentiate imperfect amā-bā-s from future amā-bi-s, and contrasting endings differentiate active amā-bā-s from passive amā-bā-ris with the same stem and

tense marker. However, taking the spelling at face value makes present indicative amā-s or perfect respond-ī appear to have "no tense marker," apparently two-part forms in an otherwise three-part system. Similarly, the 2nd sg. present indicative has an ending in, e.g., amā-s, while the present imperative amā- appears to have "no ending." Just as "zero" is a placeholder in mathematics, so, too, can language analysis benefit from seeing "no marker or ending" as "zero" compared to other forms that do have an audible element in the same place. The approach to Latin conjugation taken here reveals four grammatical "zeroes." In this paper, I prefer the notation hashtag # to the perhaps more familiar mathematical Ø "null set" so that it is maximally different from an alphabet letter. They are: the marker for present indicative -#- in amā-#-s (as opposed to imperfect -bā-, future -bi-) as well as present active imperative (or Imperative-I), for which the personal ending is also -# (note the dashes), namely, amā-#-# as opposed to passive amā-#-re. The so-called future imperative (or Imperative-II) structure has an audible marker -tō- and the same zero ending in active amā-tō-#. The perfect system tense marker -#- in respond-#-ī is zero as opposed to -s- in carp-s-ī. Among the nominal members in the supine system, all the endings of the 3rd decl. ending begin in or consist entirely of a vowel, e.g., gen. sg. of the actor noun *āc-tōr-is and the verbal āc-tiōn-is except the nom. sg. *āc-tōr-# [E3] > *actual* āc•tor and *āc-tiōn-# > *actual* āc•ti•ō, all explained in their section. The practical effect of such an abstraction is, as in mathematics, to form regular columns and "neaten" the paradigm, something that Roman numerals cannot do in calculation or principal parts in grammar. If this idea fits a teacher's pedagogical philosophy or a student's learning style, so be it. Some teachers and

learners prefer to concentrate their efforts on actual, usable forms and not devote precious class time to such explorations.

1.3 From "Conjugation" to "Inflectional Profile"

The rows of Matrix 1, below, give verbs of the same "conjugation," that is, they form their present systems the same way as each other even if they form their perfect and/or supines differently and even if those cells contain only a small minority of a conjugation's members. The topic here is pattern, even a sparsely exhibited one, not statistics. One conjugation's "majority" pattern—usually considered "regular"—is another's "minority" pattern—often considered "irregular." These different perfect-forming strategies seriously reduce the usefulness of the conjugation number as a guide to all the tense forms. (Deponents and nondeponents of the same "type," defined below, are connected by a dash. Subtypes are separated by commas.) There are three "first conjugations," three "seconds," two "fourths," and a plethora of "thirds." The conjugations occur in no natural order. (The traditional 1-2-3/4 seem to reflect alphabetical order of the stem vowels ā-ē-i/ī to no pedagogical or linguistic purpose.) In Matrix 1, all the long stem vowels are in adjacent rows (1-2-4), and the short stem vowel with its two behaviors follows after. Reading down the columns shows that verbs of different conjugations share important properties across the whole system, all explained below, hence the four (and a half) "profiles" introduced in 1.1. (Profile-4 with a short stem vowel coincides entirely with the 3rd conjugation and recognizes the subgroup dubbed "3-iō" as 4°, a graphic bow to the iō mnemonic.)

		< < Profiles > >			
< < Conjugations > >		1	2	3	4, 4°
	1	amāre-mīrārī	vetāre	secāre, lavāre	
	2	dēlēre	habēre-verērī	docēre-fatērī, augēre, mulcēre, vidēre, spondēre	
	4	audīre-potīrī	* * *	aperīre-experīrī, saepīre, venīre	
	3				all "thirds"

Matrix 1

- Profile-4: carpere, gerere-querī, gemere, scrībere-lābī, legere, agere, frangere, cadere, tangere, cernere, mergere, petere;
- Profile-4°: capere-patī, rapere, (specere) inspicere, cupere, parere

2.0 Overview of the Profiles: the Message of the Principal Parts

In the S-T-E structure just discussed, the stem consists of a lexical "root" (in the usual botanical metaphor) with a "root vowel," e.g., am-, doc-, ven-, carp-, cap- etc. (a very few nonsyllabic roots, e.g., fl-, n- and always prefixed –pl- notwithstanding). In this study, a root becomes a stem by acquiring or choosing one of four "stem vowels," including no stem vowel as in 1.3, above, when combining with one or more sets of tense system markers (see 3.0, below). The purpose of the principal parts, whether or not textbooks specify it or are even aware of it, is to show which stem vowel a root chooses in the present system (its "conjugation") as well as whether or not it chooses the same, different or any stem vowel in the other two systems. Along with that, the third principal part displays the choice of perfect system tense marker (see 3.2). "Unlikes" make a smooth transition, that is, a stem ending in a consonant

and a tense marker beginning in a vowel or a stem ending in a vowel and a tense marker beginning in a consonant. "Likes," on the other hand, that is, vowel-vowel or consonant-consonant, may trigger a range of accommodations or "adjustments" in the stem itself. In other words, the real issue in Latin conjugation is the abstract boundary between S- and -T-. Classroom drills usually stress the endings, and beginners need that, but in fact, all verbs share endings, and they are secondary to the real action in the middle of the verb word. The four profiles suggested in 1.1 are merely ways of summarizing the full range of that behavior. (Many reference works list verbs in alphabetical order, and now it is clear why this is the least useful listing, at least for grammar purposes.) The single "smart" principal part is simply distilled from the principal parts and so can show all the relevant information at a glance. Forming any of a verb's several dozen forms is straightforward, even if that straightforwardness includes a few regular manipulations according to general phonetic rules (Appendix references [A] through [H] in square brackets). Linguists often create abstract forms with arcane symbols for encapsulating information (attempted in earlier versions of this project and judged too abstruse and unwieldy), but simply mobilizing the existing present infinitive is more efficient since it already shows the stem vowel. The infinitive ending shows whether the verb is deponent or not (the significance of which is in 3.1). Any 2nd sg. or 1st pl. present indicative or even imperfect subjunctive would render the same service. Further enriching that infinitive with a numerical superscript—at the risk of engendering cognitive clash in Latinists accustomed to the numbered "conjugations"—provides the information on the other two systems and allows immediate comparison with similar verbs

of other conjugations. In Profiles-1 and 2, those superscripts include the choice of perfect tense marker as part of their very definition, while in Profiles-3, 4, the superscript must indicate that choice of marker. A small set of additional, albeit non-Latin accent marks familiar from modern European languages—acúte, gràve, circumflêx, tĩlde, all explained below and not supported by any current textbook—encodes other crucial information, usually about the root vowel in the perfect or supine systems. Here is a brief overview of the usual principal parts in the order 1st sg. pres., pres. infinitive, supine (so that deponents are not in the embarrassing position of having to "skip" the traditional third principal part), 1st sg. perfect; and how to see in them the whole inflectional profile. Explanations of each part of the S-T-E structure follow in sections 3.1 (endings), 3.2 (tense markers), 3.3 (stems). Profiles-1, 2, 3 have a long stem vowel in common before the present system tense markers, represented here by the present indicative marker -#- "zero," though any other marker of that system will do.

2.1 Profile-1 is the most straightforward: these stems choose the same long stem vowel before all three sets of tense markers, like a slot machine producing a triplet of cherries. Each stem vowel contains, as it were, its instruction for forming the present system, namely, which of the two parallel sets of present system markers to choose (3.2.1): ā-, ē- choose the consonant-initial variants and differ only in their choice of present subjunctive marker; ī- chooses all the vowel-initial markers where a difference exists. Only the traditional first principal part needs to adjust its stem vowel before the following vowel ending: ē-, ī- shorten and ā- drops [E3] regularly and predictably.

*audī-#-ō >	*potī-#-or >	*dēlē-#-ō >	*amā-#-ō >	*mīrā-#-or >
audiō	potior	dēleō	amō	mīror
audī-#-re	potī-#-rī	dēlē-#-re	amā-#-re	mīrā-#-rī
audī-t-um	potī-t-um	dēlē-t-um	amā-t-um	mīrā-t-um
audī-v-ī	* * *	dēlē-v-ī	amā-v-ī	* * *

Chart1: Profile-1

That traditional first principal part is completely predictable from the infinitive and not the other way around—except for the tiny group *capere* vs. the larger group *carpere*. One wonders, then, why tradition accords it top billing in the grammar line-up.) All verbs share a single group of supine system markers, represented here by -t-, and they all fill their -E slot with declensional endings. Those verbs that can form a perfect tense always choose the consonantal perfect system marker -v-. This is the message of those principal parts. The superscript 1 "enriches" the infinitive by encoding "same long stem vowel for all three systems and the guaranteed choice of perfect tense marker -v-, where applicable" namely, amāre[1], mīrārī[1], dēlēre[1], audīre[1], potīrī[1]. This is the overwhelming majority pattern for ā-verbs (including all deponents), a sizable majority for ī-verbs (and most deponents), and only a tiny minority of ē- verbs (and no deponents). The most difficult aspect of this procedure is unlearning that number as conjugation and relearning it as a (cross-conjugational) "profile."

2.2 Profile-2 has in common with Profile-1, the long stem vowel in the present system. However before the supine system tense markers, that stem chooses a different stem vowel, namely, short-i. This is a choice of vowel rather than assuming

long-ā somehow changes to short-i, especially in an open syllable [E1]. Indeed, no rule of Latin phonetics would permit, e.g., imperfect *vetā-bā-s but forbid *vetā-t-um or change that ā to i. In the perfect system, such roots become stems by choosing no stem vowel before that tense marker. Again, this is quite different from assuming a stem vowel that "drops" for no reason. (It is reasonable to call this the "zero stem vowel," but at this stage of the project, I reserve "zero" for tense markers and endings.) This leaves the root-final consonant, and such verbs choose the vocalic perfect system marker -u-.

*vetā-#-ō >	*habē-#-ō >	*verē-#-or >
vetō	habeō	vereor
vetā-#-re	habē-#-re	verē-#-rī
veti-t-um	habi-t-um	veri-t-um
vet-u-ī	hab-u-ī	* * *

Chart 2: Profile-2

A mere half dozen ā- (and no deponents) and many ē- (including six of the seven ē-deponents) exhibit this profile. Their enriched infinitives are vetāre[2], habēre[2], verērī[2], which does not mean "second conjugation." (Some textbooks might say that vetāre and its partners "change conjugation." In the current view, these ā- and ē- verbs simply "share system-wide properties.")

2.3 Profile-3 has in common with Profiles-1, 2 the long stem vowel in the present system, and in common with Profile-2 the absence of a stem vowel in the perfect.

*docē-#-ō >	*fatē-#-or >	*lavā-#-ō >	*saepī-#-ō >	*experī-#-or >
doceō	fateor	lavō	saepiō	experior
docē-#-re,	fatē-#-rī	lavā-#-re	saepī-#-re,	experī-#-rī
doc-t-um,	*fat-t-um > fassum	lav-t-um (lautum)	saep-t-um,	exper-t-um
doc-u-ī	* * *	lāv-#-ī	saep-s-ī	* * *

Chart 3: Profile-3

The two distinctions of this profile are (1) the absence of a stem vowel in both the perfect and the supine systems. This means that the root-final consonant meets the consonantal supine marker -t-, often requiring regular "adjustments" [F], as in *fat-t- [F2] > *actual* fas-s-; (2) the nonautomatic choice among the perfect system markers. This sampling shows -u- for doc-u-ī, s for saep-s-ī and -#- "zero" for lā-v-ī with the concomitant lengthening of the root vowel [E4]. The superscript must indicate this choice, namely, docēre^{3u}, saepīre^{3s}, lavāre$^{3\#}$. The enriched infinitives of deponents, of course, show no perfect system marker in experīrī^{3}, fatērī^{3}. In the absence of a stem vowel, the root-final consonant bumps up against the consonantal perfect system marker -s- and the supine marker -t-. Latin sound structure and spelling welcome the resulting consonant clusters saep-s-, saep-t-, exper-t-, doc-t-, while *fat-t- undergoes sibilation [F2], as just shown above. The root-final glide of lav- forms a diphthong in the closed syllable of theoretical *lav-t-um, spelled as *actual* lau•tum [A5].

The enriched infinitive lavāre$^{3\#}$ must do one other job: to show that the short root vowel in an open syllable [E1] generally lengthens with the perfect tense marker -#- "zero" [E4]. This lengthening is a grammar-specific and not a general

phonetic phenomenon, and the enriched infinitive announces this up front by a non-Latin acute accent. The enriched infinitive announces this perfect-specific lengthening up front by a non-Latin acute accent mark [H1b.]: lávāre[3#], an unusual sight, to be sure, and no textbook supports it, but at least the two marks, -#- and acute á, mutually imply each other.

Turning Matrix 1, above, 90° produces Matrix 1a., with a slightly different perspective: rows of the same profile and columns of the same conjugation.

		<< Conjugations >>		
< < Profiles > >		1	2	4
	1	amāre[1]-mīrārī[1]	dēlēre[1]	audīre[1]-potīrī[1]
	2	vetāre[2]	habēre[2]-verērī[2]	* * *
	3	secāre[3u]	docēre[3u]- fatērī[3]	aperīre[3u]- experīrī[3]
		lávāre[3#], iúvāre[3#]	prandēre[3#,] sédēre[3#]	vénīre[3#]
		* * *	augēre[3s], rīdēre[3s]	saepīre[3s], vincīre[3s]

Matrix 1a.

2.4 Profile-4 is unique in that its stem vowel is short, making this the only profile that coincides entirely with a traditional conjugation, namely, the 3rd. That short stem vowel participates in (at least part of) the present system. Before most consonants, it is i-; before r and at the end of the word it is e-, and in all but a dozen stems, that vowel is absent before a vowel for no phonetic reason of classical Latin. The minority group of a dozen stems and their prefixed derivatives does, however, have i- before a vowel. This "minority" group goes by the textbook mnemonic "3iō," designated as Profile-4° with a graphic bow to that traditional nomenclature. In common with Profile-3, no stem vowel participates in the perfect system, and only a few verbs also choose i- before the supine system markers, e.g., gemi-t-um. More

about this in 4.4, below. All these stems experience a range of regular adjustments at the S-T boundary, all explained and demonstrated in 4.0 below.

3.0. The S-T-E Components Up Close

This section looks into each of the three components: the membership and composition of each "slot" and how they naturally flow audibly "forward"—in time through the air—from stem to tense marker to ending. The alphabetic writing system that Latin happens to have adopted represents this flow visually "left-to-right" across the page, which allows examining them in reverse, that is, "backward" or "right-to-left" from "least variable" (the -E slot in 3.1, three small closed sets of endings common to all verbs) to "somewhat variable" (the -T- slot in 3.2, the three closed systems, each with two parallel variants: present system 3.2.1, perfect system 3.2.2, supine system 3.2.3) to "most variable" (the S- slot in 3.3, thousands of stems). (Compare the note at the end of 1.1.) A "lefthand" component may undergo some regular changes or adjustments" when combining with or flowing "rightward" into the next component (S- into -T-, -T- into -E).

3.1.0. Start from the Back: the -E Slot, Personal Endings

Three familiar sets of personal endings (Chart 4) fill the "-E" slot of verbs, and they express grammatical person and number including infinitive and imperative. (Participles and verbal nouns also count as members of the verb system, and they also have an S-T-E structure, filling their -E slot with declensional endings, see

3.1.4.) The 1st sg. ending of each set serves as a convenient "nickname," hence, the "O" set, "R" set, "I" set. The "O" and "R" sets follow from the tense markers of the present system (3.2.1 below) and only partially indicate grammatical voice (see 3.1.1). On the other hand, the "I" set, following only from the markers of the perfect system, is specifically the perfect indicative active (3.2.2). The "O" set clearly has affinities with the "I" set, on the one hand, and the "R" set, on the other. The "R" set 2nd person and imperatives cover a slightly different grammatical territory from the "O" set, as the overlapping cells attempt to represent (see 3.1.2).

	SG.					PL.					
	1st	2nd	imper.		3rd	1st	2nd	imper.		3rd	inf.
			I	II				I	II		
"I"	-ī	-istī	* * *		-it	-imus	-istis	* * *		-ērunt -ēre	-isse
"O"	-ō -m	-s	-#		-t	-mus	-tis	-te		-(u)nt	-re
"R"	-(o)r	-ris	-re	-r	-tur	-mur	-minī		* * *	-(u)ntur	-(r)ī

Chart 4: The -E Slot Personal Endings

3.1.1 Voice and Deponency

Textbooks typically designate the "O" set as "active" voice and the "R" set as "passive/deponent." Learners of classical Latin can advance very far without an explicit notion of *voice* by just accepting from the outset two kinds of verbs: ambulāre-amāre-sedēre-carpere-capere-audīre take the "O" set in the present system, while mīrārī-conārī-verērī-lābī-patī-potīrī take the "R" set on the same set of tense markers. They may be transitive or intransitive; the subject may be a volitional agent or a nonvolitional natural force, and the arcane term "deponent" with its

paradoxical deponent mantra "passive in form, active in meaning" need not enter the picture. Later, when learners encounter the perfect system, they will see that the "O" type forms the perfect system with a marker (see 3.3.3) and the "I" set, while the "R" type uses its perfect participle with gender-number declensional endings (3.3.2) and separately written auxiliary *esse*. Later still, when the manipulations of "subject-X operates on object-Y" to "subject-Y is operated on by agent-X" become an issue, learners can refine their classification: intransitive "O" types ambulāre-sedēre are "O-only" with "I" perfect. (The one possible "R" crossover for intransitives is the impersonal or "omnipersonal" 3rd sg., e.g., ambulātur.) Transitive "O" types amā-, carpi- can use both sets, and only here is "O" active and "R" passive, each with its characteristic perfect system, that is, these are "O-R" verbs. Mīrārī-lābī are "R-only." The historical perspective that such verbs were "once passive but have laid their passive meaning aside" may be interesting for specialists but not particularly useful for learners of synchronic Latin. In any event, "active" and "passive" are only the beginning and end points of a much subtler continuum, including active > middle > reflexive > passive interwoven with such notions as volitional, transitive, causative, and many other considerations, discussion of which goes far beyond the current scope.

Four verbs—solēre, audēre, gaudēre, fīdere—nonetheless mix the sets. Their present systems are "O," but they form their perfect tenses like the "R" verbs. They go by the term "semideponent," designated here as "O/R." One verb—revertī—does the opposite: "R" in the present system and "I" in the perfect, calling for the unique designation "R/I." The designations "O," "R," "O-R," "O/R," "R/I" do not appear in the superscript but can be noted as a vocabulary comment.

3.1.2. Ending Variants

The members of the "O" and "R" sets all begin in or consist entirely of a consonant, and all the verbal present system tense markers (Chart 5 in 3.2, below) end in a vowel, allowing smooth passage from tense marker to ending. In both sets, however, the consonantal endings 1st sg. -m, -r, and 3rd pl. -nt(ur) have parallel vowel-initial variants -ō, -or (assumedly *-ōr [E3] > -or) and -unt(ur). The choice between these variants for a classical Latin speaker is the topic of 3.2.1, below, while the historical source of this bifurcation is a topic for another forum. The infinitive ending -rī follows from the long stem vowel (Profiles-1, 2, 3), but after the short stem vowel of Profile-4 it is, oddly, only -ī, hence the composite notation -(r)ī. Again, this article does not propose to investigate the history of this development.

3.1.3. Mood: Indicative vs. Imperative

The present system markers and not the endings distinguish the indicative mood tenses (present, imperfect, future) from the subjunctive mood tenses (present, imperfect), all examined in 3.2.1. The imperative mood works somewhat differently. The meaning of "imperative" is, to begin with, a kind of future, not merely the speaker's stating or observing a future (with whatever certainty this is possible) but the speaker's instruction to addressee (in their present) to create that future. Latin, in addition, boasts two varieties of imperative called either "present" and "future" imperative (both refer to or invoke a future, and the "future" one has a legalistic tone) or simply "imperative 1 and 2." The 2nd person sg./pl. endings for

indicative and subjunctive are "O" set -s/-tis, and the "R" set sg. has "longer" and "shorter" options for 2sg. -ris, -re and only -minī for plural. (Whether -ris arose as a lengthened -re or -re arose as a shortened -ris is a topic for another forum). Only the imperative mood needs a different treatment. Latin distinguishes present indicative from "Imperative 1" by replacing "O" set -s/-tis in *amā-#-s/*amā-#-tis with shorter endings -#/-te in *amā-#-#/*amā-#-te > *actual* amā/amāte. The parallel "R" set allows either -ris or -re for the indicative and subjunctive tenses, that is, *mīrā-#-ris/*mīrā-#-re but only -re for Imperative 1. The 2nd pl. plural -minī in *mīrā-#-minī serves all three moods.

For Imperative 2, the marker -tō- replaces the marker -#- plus the shorter "O" set endings, namely, *amā-tō-#/*amā-tō-te > *actual* a•mā•tō/a•mā•tō•te. The parallel "R" endings truncate -re to -r, and the long vowel of the marker regularly shortens, that is, *mīrā-tō-r [E3] > *actual* mī•rā•tor. Nothing would prevent the formation of a plural *mīrātōminī, but it does not exist. The singulars amātō, mīrātor, however, have an additional meaning: not only the 2nd person imperative directed at an addressee but also the so-called 3rd person imperative "let her/him do X," called jussive (from *iubeō-iussum*), and it does form a plural: "O" set amantō, "R" set mīrantor. (From an S-T-E standpoint, these formations are highly unusual, more about which in 3.2.1.)

As mentioned in 3.1.1, the "I" endings serve only the perfect tense of "O" verbs. The "I" endings all start with a vowel. As in the "O" and "R" sets, the 1st sg. and 3rd pl. stand out as different from the others, consisting entirely of or beginning in a long vowel, while the other endings begin in short-i. (A different kind of

analysis might even factor out that i as a mere insert vowel to avoid, e.g., *amaustī or *carpsmus). The 3rd pl. has a longer -ērunt and shorter -ēre, the choice between which is not grammatical but differs by author, time period, style, including the fact that they scan differently in poetry. (In historical perspective, the shorter one is older and expands by analogy with the "O" set. Textbooks usually give the impression of longer -ērunt as basic and can sort to -ēre, but no rule of Latin phonetics can shorten "unt" to "e.")

3.1.4. Nominals

Participles and verbal nouns are also members of the verb system, and they also have an S-T-E structure. They fill their -E slot with declensional and not personal endings. The present system houses the present active and future passive participles and the gerund; the supine system houses the future active and perfect participles and several verbal nouns. All those "tense" markers end in a consonant. All their declension endings begin in a vowel, making for smooth T-E borders—except 3rd declension nominative singular in two variants, -s and -#. The consequences for the active participle are in 3.2.1 and for two of the supine nouns in 3.2.3.

3.2.0. Close-Up on the -T- Slot

This section showcases each of the three systems of tense markers—present, perfect, supine—and the ways they flow into their associated endings just described. Stems flowing into tense markers are in 3.3.

3.2.1. The Present System Markers

Chart 5 lays out the eight markers of this system, and all verb stems can use all of them. The overlapping cells of the chart distinguish six verbal markers for seven conflations of tense and mood that take "O" and "R" endings as well as two markers for three nominal categories with their declensional endings:

Verbal			
Tense	*Mood*	*Marker*	*End*
present	*indicative*	-#-	"O" "R"
	imperative	-tō-	
future	*indicative*	-bi-/-ē-	
		-(ē)bā-	
imperfect	*subjunctive*	-rē-	
present		-ē-/-ā	

Nominal			
		Marker	*End*
active	*prtc.*	-(e)nt-	3rd decl.
fut. psv.		-(e)nd-	1st-2nd decl. adj.
gerund			2nd decl. neut.

Chart 5: Present System Markers and Their Endings

Of the six verbal markers, three are common to all verbs: imperfect subjunctive -rē-, future imperative -tō- (imperative-II) and -#- "zero" for both present indicative and present imperative (imperative-I), distinguished by endings, as just discussed in 3.1.2. Five of these verbal markers end in or consist entirely of a long vowel and flow unencumbered into the consonant-initial "O" and "R" endings, including the consonant-initial variants of 1st sg., 3rd pl. Chart 6 with two sample markers shows that long vowels stay long in an open syllable [E1] but shorten in a closed syllable [E2, E3] except before -s. Only future -bi- ends in a short vowel, and its behavior is discussed after Chart 6.

-T-	-E ("O" and "R")	*conflated*
-rē-	-s, -ris, -re, -tur >	-rēs, -rēris, -rērem -rētur
	-mus, -mur, -tis, -minī >	-bāmus, -bāmur, -bātis, -bāminī
-bā-	-m, -r, -t, -nt(ur) >	-rem, -rer, -ret, -rent(ur)
		-bam, -bar, -bat, -bant(ur)

Chart 6: Long Vowels Shorten in Closed Syllable at T-E Boundary

The other present system markers have two variants. Three of the markers have a "simple" consonant-initial version: imperfect indicative -bā-, active participle -nt-, future passive participle -nd- and parallel expanded versions with initial *ē: -ēbā-, that is, -ē•bā- with ē in an open syllable and theoretical *-ēnt-, *-ēnd- with ē shortened in a closed syllable as in gen. sg, -en•tis, -en•dī. The chart notes them together with parentheses as -(ē)bā-, -(e)nt-, -(e)nd-. The future marker has two completely different variants: consonant-initial -bi-, vocalic -ē-, and this -ē- has the automatic variation *-ā- for 1st sg., which always appears as short *-ā-m/-r [E3] > -am, -ar. The present subjunctive marker is a single long vowel, either -ē- or -ā-. How these variations arose historically is a subject for another forum, but the conditions for their choice are in 3.3.

The consonant-intial future marker appears as -b-, -bi- (with a short high vowel [A3]), and -be- (with a short mid vowel) under the following conditions: -bi- before most following consonant-initial endings, namely, -s, -t, -tur, -mus, -mur, -tis, -minī; -be- before the consonant r, namely, 2nd sg. "R" set -ris, -re, that is, -be•ris, -be•re; -b- before the vowel-initial variants of 1st sg., 3rd pl., that is, -bō, -bor, -bunt(ur). One of these is "basic," and the other two, automatic variants. Some analyses consider -be- basic with the vowel "rising" to i under various conditions and

dropping before a vowel. This paper considers that the basic marker is -bi- with the vowel lowering automatically and predictably under only one condition. In contrast to the long final vowels of the other markers this short high vowel chooses the vowel-initial variants -ō, -or, -unt(ur) and then, for no discernible phonetic reason in Latin phonetics, it drops before that vowel. (Just as Thisbē in *Metamorphoses IV:151* declares herself the "causa comesque" of Pyramus's and her own death, Latin grammar seems to declare the i in this marker, the "comes causaque" of its demise, choosing an element before which it then flees.) From a descriptive point of view, the choice of 1st sg. -ō/-m, -(o)r and 3rd pl. -(u)nt(ur), then, has nothing to do with the tense itself, only with the long or short vowel at the end of the -T- slot. The short stem vowel i- exhibits the same behavior in the present system of the 3rd conjugation, which here is classed as Profile-4, below.

The present and future imperative (Imperative-I, -II) have the markers, -#- and -tō-. The sg./pl. "O" endings, as noted in 3.1.3, use the same -#/-te for both. The "R" verbs reduce singular -re to -r and form no plural. Chart 7 highlights the "columnar replacement" of markers and endings in the present and future indicative and imperative.

			"O"	"R"
pres.	*indic.*	2sg.	amā-#-s	mīrā-#-ris, -re
		2pl.	amā-#-tis	mīrā-#-minī
	imper.		amā-#-te	
		2sg.	amā-#-#	mīrā-#-re
			amā-tō-#	mīrā-tō-r [E3] > -tor
		2pl.	amā-tō-te	* * *
fut.	*indic.*	2sg.	amā-bi-s	mīrā-be-ris, -re
		2pl.	amā-bi-tis	mīrā-bi-minī

Chart 7: Present and Future Indicative and Imperative

As noted above, Imperative 2 has the additional denotation of the so-called 3rd person imperative, and it forms a 3rd pl., namely, amantō, mīrantor. Taking the spelling at face value makes their structure look like 3rd pl. present tense plus 1st sg., that is, *amant-ō, *mīrant-or. That would be strange enough, but in S-T-E terms, those quite anomalous forms do appear to build on the full present indicative *amā-#-nt and *mīrā-#-nt (and not ntur!) by adding the imperative-2 marker and its singular ending: *amā-#-nt-tō-# [F3] > amantō; *mīrā-#-nt-tō-r [F3, E3] > mīrantor. This would be a unique structure S-T-E-T-E. The -E is by definition the last element of the word, but apparently the Roman imperial quality control office was on merum break.

As for the participles and the gerund, the marker -(e)nd- serves future passive participle with the full range of 1st-2nd declension endings as well as the gerund with 2nd declension neuter endings, all vowel initial, thus smooth transitions. The active participle takes 3rd declension endings, all of which but one are also vowel-initial, keeping the vowel short in, e.g., gen. sg. -(e)nt-is > actual -en•tis. Nom. sg. -s makes that T-E boundary a busy place: *-(e)nt-s [F2] > *-(e)ns-s [F3, E3] > actual -(ē)ns. Textbooks tend to take nom. sg. as the "base" form, but it is the one that has gone through one or another adjustment, while the rest of the declensional forms are "straightforward T-E flow."

3.2.2. The Perfect System Markers

Four markers form this system: consonantal -v-, -s-, vocalic -u- and also

-#- "zero," all meaning perfect active indicative and all taking the "I" set of endings. While all verbs, "O" and "R" alike, can use all present system markers with their respective meanings, only "O" verbs can form this system, and each stem chooses only one of those equipollent markers (a few instances of variation notwithstanding). Showing that choice of marker is the implicit job of the third principal part. Profiles-1, 2 include that choice in their definitions: Profile-1 with a long stem vowel is guaranteed to take -v-; Profile-2 leads its root-final consonant into -u-. Profiles-3, 4 with a root-final consonant may choose -u-, -s-, -#-, and some instances of -v-. The superscript must specify that choice as 3^{u}, 3^{s}, 3^{v}, $3^{\#}$. The reduplicating stems, e.g., mordē-/momord-, pendē-/pepend- all use the -#- marker and indicate reduplication iconically as $3^{\#\#}$. Chart 8 gives the S-T-E structures of some typical perfects of different conjugations.

S-	-T-	-E
amā- audī- cī- crē- petī-	-v-	"I"
hab- aper-	-u-	
saep- aug- [F1, X] rīd- [F1-F2-F3]	-s-	
reprehend- leg- [E4] > lēg- mord- > momord-	-#-	

Chart 8: Perfect Indicative Active

Stems that choose a long stem vowel for this system choose the marker -v-, e.g., amā-v-, dēlē-v-, audī-v-. Interestingly, that -v- can also drop between vowels in some forms, e.g., 2nd sg. amāvistī/amāstī, infinitive audīvisse/audīsse. Stems that choose no stem vowel, leaving the root-final consonant, can choose -u- with no further change to the stem, e,g., hab-u-. If they choose -s-, the root-final consonant may have to undergo the "adjustments" in section [F], including [X]. The marker -#- adds nothing to a stem but rather instructs the stem, itself, to lengthen, either by lengthening a short root vowel in an open syllable, as in *sed-#-ī [E4] > sē•dī or by "reduplicating" the initial consonant-vowel, creating a new initial syllable and moving the original initial syllable to an internal position [A4]. A stem with a root vowel in a closed syllable, as in pran•dē-, need do nothing further. More about this in 3.3.

The perfect system includes five compound perfect tenses formed by fusing present system forms of auxiliary *esse* (an "O-only" verb) to the perfect system marker. That unique verb deserves its own treatment in another forum, but suffice it to say for the moment that its stem is es- with a unique set of mostly vowel-initial tense markers, triggering rhotacism [D9]. Of the three indicative tenses, the perfect marker plus "I" endings are perfect active indicative. Adding the imperfect indicative *es-ā- > *erā-* to the perfect marker forms the pluperfect, and the future *es-i- > *eri-* forms future perfect. The two subjunctive tenses add present subjunctive *sī-* to form perfect subjunctive with what we have to accept as a connector vowel, thus *-i-sī- > *irī [E3] > *-erī-*. Adding imperfect subjunctive *essē-* in the form *issē-* (no rhotacism) forms pluperfect subjunctive. That means that this -T- slot contains

a secondary S-, namely, *es*- with its own -T-, which then gets "O" endings, a unique cyclical structure S-[T-S-T]-E illustrated in Chart 8a.

S-	-T-		-E		
	-T-	S-T			
amā-	-v-		"I"	*perfect*	*indicative*
hab-	-u-	-es-ā-	"O"	*pluperfect*	
		-es-i-		*future perfect*	
carp-	-s-	-es-ī-		*perfect*	*subjunctive*
respond-	-#-	-is-sē-		*pluperfect*	

Chart 8a: Full Perfect "O/I" System

The perfect system of "R" verbs forms the same perfect tenses with their perfect participle plus the same present system tenses of auxiliary *esse*, written separately, including the present indicative *sum* to form the perfect indicative, more about which in 3.2.3.

3.2.3. The Supine System Markers

The seven nominal forms of this "tense" system—three verbal nouns, two actor nouns, and a future active and a perfect participle—also count as members of the verb system. The stem has a consistent shape (with or without stem vowel) before all five markers in Chart 9 and fills their -E slot with declensional, rather than personal, endings. Following from 3.2.2., the marker -t- with 1st-2nd declension endings is the perfect participle, active voice for "R-only" verbs (deponents) and for a few "O-only" verbs and normally passive for "O-R" verbs. "R" verbs form their perfect system with this participle and all the present system tenses of auxiliary *esse*, written separately, as Chart 8b. illustrates.

S-	-T-	-E	*Aux.*		
amā- mīrā- dēlē- audī- potī- habi- veri- sec- doc- fat- [F2] exper-	-t-	-us/-ī -a/-ae -um/-a	est/sunt erat/erant erit/erunt	*perf.* *plup.* *fut. pef.*	*indic.*
			sit/sint esset/essent	*perf.* *plup.*	*subjnc.*

Chart 8b. Full "R" Perfect System

The overlapping cells of Chart 9 show which markers take which declensional endings. All verbs can, in principle, form all these nominals, but not all verbs exploit all possibilities. Specifying which ones exist is the job of the dictionary.

The markers all begin in or consist entirely of t, raising the question of whether to factor it out as some kind of common connector or to search for the meaning it contributes to the meaning of the whole marker, an important topic in linguistic analysis but far beyond the present scope. In the present context, they are all whole units. All of them, like the two participles in 3.2.1, above, end in a consonant, making a smooth T-E boundary to all the vowel-initial declensional endings. The only exception, as noted there, is 3rd decl. nom. sg., more on which, just below.

-T-	-E	
-t-	4th decl. noun	*verbal noun (acc. and abl. function as the supine)*
	1st-2nd decl. adj.	*perfect participle (active or passive)*
-tūr-		*future active participle*
	1st decl. noun	*abstract or concrete noun (pic-tūr-a, nā-tūr-a, etc.)*
-tiōn-	3rd decl. noun	*verbal noun, fem. (nom. sg. *-tiōn-# > -tiō)*
-tōr-		*actor noun, masc. (nom. sg. *-tōr-#* [E3] > *-tor)*
-trīc		*actor noun, fem. (nom. sg. *-tric-s-* [X] > *-trīx.*

Chart 9: Supine System Markers and Endings

The "same" -t- marker—here again, different linguistic theories have different approaches to this question—with 4th declension endings is a verbal noun of which the acc. and abl. function as the eponymous supine. The future active participle -tūr- in the supine system matches the future passive participle -nd- in the present system, while the present active participle -nt- has no passive counterpart. The 3rd decl. nom. sg. comes in two variants: -s after an obstruent stem [D6] and -# after a resonant stem [D6]. The fem. and masc. actor nouns illustrate these: *āc-trīc-s [X] > actual āc•trīx, *āc-tōr-# [E3] > *actual* āc•tor. A special rule further deletes word-final n when following ō: gen. sg. *āc-tiōn-is > *actual* āc•ti•ō•nis, nom. sg. *āc-tiōn-# > *actual* āc•ti•ō. As with the active participle in 3.2.1, above, textbooks tend to take nom. sg. as the "base" form, but it is the one that has gone through one or another adjustment, while the rest of the declensional forms are "straightforward T-E flow."

Profiles-3, 4 with no stem vowel in the supine system undergo the adjustments in [F], specifically, those with a final consonant t- or d- and the marker -t- sibilate to -ss- [F2], hence, the frequent—and predictable—variation -s-, -sūr-, -siōn-, -sor-.

A few stems of these profiles with another root-final consonant, nonetheless, have supine system marker -s- that is not the result of sibilation, suggesting for classical Latin the awkward term "genuine -s-," e.g., lābī, tergēre, supine *lāb-s- [F1], *ter(g)- > *actual* lāp•sum, ter•sum. The source of this alternative marker is a topic for another forum. The superscript will indicate this at the end of 4.3. below.

3.3.0 Close-Up on the S- Slot: Stems and the S-T Boundary

As discussed in 1.1 above, a stem is a "root plus possible stem vowel, flowing into a following tense marker." The stem vowel(s) that a given root chooses—including none—before one or another group of tense markers is not predictable, that is, given am-, there is no way to know that it takes ā- in all three instances. Oncė that vowel is provided, however, it contains its information on combining it with the present system markers. The "profiles" make explicit what other vowel the stem may choose in the other two systems.

3.3.1. Present System Marker Choice on the S-T Boundary

As discussed in 3.2.1, all four stem vowels ā, ē, ī, i̱ take three present system markers -rē-, -tō- and -#-. The stem vowels then form two pairs: ā-, ē-, that is, first and second conjugation taken together, take the consonant-initial versions of the markers -bā-, -nt-, -nd- and the consonantal future -bi-. They diverge only in the present subjunctive: ē- takes -ā-, shortening as needed [E3] as in *habē-ā-s > *actual* ha•be•ās, while the stem vowel ā- chooses the alternative marker -ē- and drops before it as in *amā-ē-s [E3] > *actual* a•mēs. The markers then proceed to their

"O" and "R" endings as discussed in 3.1.2., 3.2.1. The present indicative marker -#-, however, has a surprise, on which in 3.3.2.

The stem vowels i-, ī-, both long and short—that is, third and fourth conjugations taken together—pick the vowel-initial versions of the present system markers -ēbā-, -ent-, -end, vocalic future -ē- and present subjunctive -ā-. (As noted in 3.2.1, the source of that "expanding-ē" and the other future and present subjunctive markers is a matter for another forum just as the source of the u in the 3rd pl. ending.) Like ē-, long ī- shortens before these vowels, e.g., *audī-ēbā-, *potī-ē- [E3] > *actual* au•di•ē•bā-, po•ti•ē-, etc. Like the future marker -bi-, the Chart 10 series shows two "O-R" (nondeponent) and two "R" (deponent), of which the stem vowels behave exactly alike: 10a.,10b. show i before a range of consonants, that is, it is unpredictable; 10c., 10d. show that the hypothetical stem is i (high vowel), which lowers predictably to e (mid vowel) under two conditions: at the end of the word and before the consonant r." under Chart 10b., underscore i.

S-	-T-	-E	Actual
*carpi-	-tō-	-#	car•pi•tō
*capi-		-te	ca•pi•tō•te
*lābi-		-r [E3] >	lā•bi•tor
*pati-			pa•ti•tor

Chart 10a. Imperative-II with i

S-	-T-	-E	Actual
*carpi-	-#-	-t	car•pit
*capi-		-s	ca•pis
*lābi-		-tur	lā•bi•tur
*pati-		-minī	pa•ti•minī

Chart 10b. Present Indicative with i

S-	-T-	-E	Actual
*carpi-	-rē-	-t	car•pe•ret
*capi-		-s	ca•pe•rēs
*lābi-		-tur	lā•be•rē•tur
*pati-		-mur	pa•te•rē•mur

Chart 10c. Imperfect Subjunctive

S-	-T-	-E	Actual
*carpi-	-#-	-#	car•pe
*capi-			ca•pe
		-re	car•pe•re
			ca•pe•re
*lābi-		-ris	lā•be•ris
*pati-			pa•te•ris

Chart 10d. "O" Imper-I, Infin., "R" 2nd sg.

As for the vowel-initial markers, this i- chooses them all and then faces a fork in the road. In the vast majority of such stems, again like future -bi-, that i- is absent before them. In a small minority of stems, that i remains, hence the mnemonic designation "iō." Charts 10e., 10f. put the "i-drop" (carpi-, lābi-) and the "i-keep" (capi-, pati-) stems together.

S-	-T-	-E	Actual
*carpi-	-ē-	-t	car•pet
*lābi-		-mur	lā•bā•mur
*capi-	-ā-	-tis	ca•pi•ē•tis
*pati-		-mur	pa•ti•ā•mur

Chart 10e. Present System Markers

S-	-T-	-E	Actual
*carpi-	-#-	-ō/-or	car•pō
*lābi-			lā•bun•tur
*capi-		-unt(ur)	ca•pi•ō
*pati-			pa•ti•untur

Chart 10f. Present Indicative

Latin spelling makes, e.g., ca•pi•ēs, au•di•ēs appear to have identical structures, but the latter is the result of a regular adjustment of *audī-ē-s [E3], an adjustment that will not occur in present tense forms where the stem vowel remains long in an open syllable [E1], that is, the majority of present indicative forms: audī-#-s, -#, -ris, -tur, -mus, -mur, -tis, -te, -minī. Ca•pi•ēs requires no adjustment from theoretical *capi-ē-s but does require one in, e.g., "R" 2nd sg. *pati-#-ris > *actual* pa•te•ris. That theoretical i, however, is absent in almost the entire present system of *carp-, *lāb-. From a historical perspective, these may have been consonantal stems with no stem vowel and only inserted an occasional i to prevent such clusters as *carps, *carpt, *carpmus, *carptis, *carpnt as well as *carpbās, *carpbis. If this was true of earlier stages of Latin, the system of classical Latin has recast the relationships.

3.3.2. The Zero Surprise. As discussed in 3.1 above, the 1st sg./3rd pl. endings of the "O" and "R" sets are either consonant-initial -m/-nt, -r/-ntur after marker-final

-ā-, -ē- or vowel-inital -ō/-unt, -or/-untur after marker-final -i-. As the Chart 10 series just illustrated, the present indicative marker -#- brings the stem vowels into direct contact with the "O" and "R" endings. Long and short stem vowels ī-, i- continue to choose the vowel-initial endings namely, 3rd pl., *audī-#-unt, *capi-#-unt, *carpi-#-unt > *actual* au•di•unt, ca•pi•unt, car•punt, and the stem vowels ā-, ē- form expected 3rd pl. *amā-#-nt, *mīrā-#-ntur, *habē-#-nt, *verē-#-ntur [E3] > *actual* a•mant, mī•ran•tur, ha•be-nt, ve•ren•tur.

The real surprise here is the 1st sg. In a grammatically ideal world, one would expect *amā-#-m, *mīrā-#-r, *habē-#-m, *verē-#-r, and indeed, nothing in Latin phonetics or grammar would prevent that, yet no *a•mam, *mī•rar, *ha•bem, *ve•rer are on the horizon. Instead, the vowel-initial version appears in *amā-#-ō, *mīrā-#-or, *habē-#-ō, *verē-#-or [E3] > *actual* a•mō, mī•ror, ha•be•ō, ve•re•or. In the grander scheme of Latin conjugation, then, this asymmetric choice of -ō/-nt, -or/-ntur makes the tried and true "first principal part" that learners encounter on the first day of study an anomaly! (One day, an archeologist or paleographer might dig up a text in just such a renegade Latin dialect that followed its instincts to these logical but nonstandard conclusions, no doubt to the jeers of "standard" Latin speakers.)

Chart 11 gives the full S-T-E of the present system, adding to Chart 5 the four stem vowels and their present system marker variants. The top row gives the moods, and underneath are the overlapping tenses.

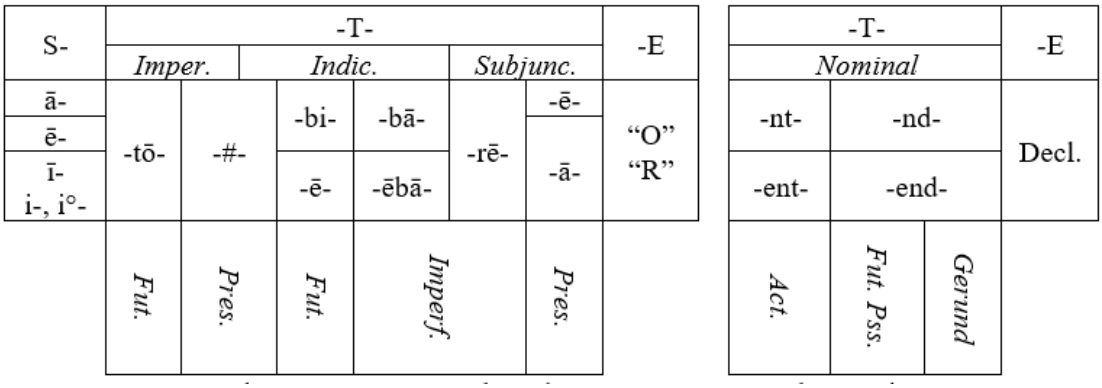

Chart 11: Stem Vowels and Present System Marker Variants

3.3.3. Notes On Root Consonants (more in 4.0)

The absence of a stem vowel in the supines and perfects of Profiles-3, 4 creates consonant clusters on that S-T boundary. A root-final voiced stop [D1, D8] devoices before the voiceless markers, e.g., *scrīb-s- [F1] > *actual* scrīp•sī. A root-final dental t spirantizes or sibilates before s or t: *ts, *tt [F2] > ss; root-final d devoices [F1], and the result sibilates [F2]. A double consonant together after another consonant or a long vowel reduces to a single [F3]. Where the result is the cluster *cs, the X-rule applies [D7]; where the result is the cluster ns, the previous vowel lengthens [E4].

Other root-final consonants behave in particular ways. The roots tors-, haes-, haus-, ges- ques-, curs- vers- experience rhotacism [D9]. The s remains s before the consonantal supine system markers -t-, -s- and the perfect marker -s- (if that is its chosen marker), but throughout the present system and with the perfect marker -u- it falls between the root vowel or r and the following vowel-initial tense marker or "O" or "R" ending. Several roots ending in the consonant cluster "liquid+velar"

[D4], namely, rc, rg, lc, lg, permit the velar only before a vowel, namely in the present system but not before another consonant. Similarly, the few roots ending in the "complex consonants" velar+glide [C4] have the glide only before a vowel. A sizable group of stems ends in u with a particular supine behavior [A4].

3.3.4 Notes On Root Vowels (more in 4.0)

The risings-fallings-lengthenings of root vowels of particular roots are mentioned in [A4], [E3-4]. Initial open-syllable [E1] short a and e rise to i when a prefix moves them to an internal open syllable and to e in a closed syllable [E2]. Already noted in 2.3, above, with the perfect system marker -#- a short root vowel in an open syllable lengthens, e.g., *vid-#-ī > *actual* syllables vī•dī [E4]. In six stems, that root a both rises to e and also lengthens, e.g., *fac-#- *cap-#-, *iac-#- > fē-cī, cē•pī, iē•cī as well as *ag-#-, *fra(n)g-#-, pa(n)g-#- > ē•gī, frē•gī, pē•gī.s Several stems "reduplicate" the initial consonant-vowel syllable, moving the original root vowel to an internal syllable, open in e.g., *: ce-cani-#- > *actual ce•ci•nī*, closed in e.g., fe-falli-# > *actual* fe•fel•lī.

In the supine system the short root vowel of a few roots that end in a voiced consonant [D8] react to devoicing by lengthening, an occasional phenomenon known as Lachmann's Law [E4] adding an L step in the theoretical chain of steps, e.g., *leg-t-[F1] > *lec-t- [L] > *actual* *lēc•tum, *vid-t- [F1] > *vit-t- [L] > *vīt-ti- [F2] > *vīs-s- [F3] > *actual* vī•sum. The superscript notes this simply with a dash after the perfect marker to show "something about the supine," in this case "-L"

means the root vowel lengthens in légere$^{4\#\text{-}L}$, vídēre$^{3\#\text{-}L}$ compared to, e.g., fódere$^{4^{\circ}\#}$, sédēre$^{3\#}$. (The acute accent was introduced in 2.3 and explained in [H1b.].) The group with root-final u always has the stem vowel i, and the two high vowels ui are normally in separate syllables, e.g., pres. acui-#-tis > *actual* a•cu•i•tis. Before the supine markers, however, this sequence of two high vowels ui merges into a single long ū, in *acui-t-um [A5] > *actual* acū•tum.

4.0 The Profiles Within Each Conjugation

While 2.0, above, set out the characteristics of the four Profiles crisscrossing with the conjugations, this section goes the other way to see how each familiar "conjugation" crisscrosses with the Profiles.

4.1 Ā-Verbs.

The standard principal parts of these sample "first conjugation" verbs contain

mīrarī, amāre, vetāre, secāre, lavāre

all the information necessary to determine three of the four "inflectional profiles." They all form the same kind of present system with a long stem vowel (3.2.1) but form three different supines (fourth principal part) and perfects (third principal part). Listing those three tense system stems with their -T- and -E and glancing down the column focuses attention on the stem vowel across the whole system—and that behavior correlates at least in part with the choice among the perfect system markers. Taking the three tense systems as a single coherent system delineates three "first conjugations" with one, two, and three stems based on which stem vowel(s) a

given root chooses in each tense system. Hardly anything is "irregular" if "regular" encompasses the most facts and recognizes the most patterns. The "conjugations" alone do not do this. Chart 12 juxtaposes all these one-stem, two-stem, and three-stem types.

<table>
<tr><td>System</td><td colspan="5">S-</td><td>-T-</td><td>-E</td></tr>
<tr><td>present</td><td rowspan="2">mīrā-</td><td rowspan="3">amā-</td><td>secā-</td><td>vetā-</td><td>lavā-</td><td>-#-</td><td>"O"
"R"</td></tr>
<tr><td>supine</td><td rowspan="2">sec-</td><td>veti-</td><td>lav-</td><td>-t-</td><td>-um (decl.)</td></tr>
<tr><td>perfect</td><td>* * *</td><td>vet-</td><td>lāv-</td><td>-v-
-u-
-#-</td><td>"I"</td></tr>
</table>

Chart 12: Three First Conjugations

Verbs that choose the same long stem vowel in all systems are designated Profile-1 with the corollary that those that can form a perfect system choose the perfect marker -v-. All ā-verbs of the "R-only" type (that is, deponents, 3.1.1) have this profile as do all but a very few "O" types. The familiar infinitive always shows the present system stem vowel, and superscript-1 "enriches" the infinitive by stating the same stem vowel choice in the other systems. In this case, that means "consistently ā, and that fact goes hand in hand with the perfect marker -v-." In other words, the "enriched infinitives" mīrārī[1], amāre[1] function as the single "smart" principal part, but caveat lector! This "1" is not the traditional "1st conj." as will become clear below.

Like vetā-, the verbs crepā-, cubā-, domā-, sonā- choose stem vowel ā- before the present system markers but i before the supine system markers, e.g., veti-t-, soni-t- and no vowel before the perfect system marker, namely, vet-, son-, etc.

The perfect, then, leaves the root-final consonant to flow into the perfect marker, and such verbs choose the perfect marker -u-. This is a grammatical choice of ā and i as a package and not a phonetic change of ā to i. Indeed, nothing in Latin phonetics would change a long low vowel ā to a short high vowel i [A3], much less in an open syllable [E1]. (Perhaps the same renegade dialect of Latin hypothesized in 3.3.2 above, also homogenized these few verbs into the mainstream, e.g., *vetā-t-um, *vetā-v-it, to the further horror of speakers of "proper" Roman Latin. Such travesties, after all, ultimately created the modern Romance languages.) For classical Latin, this pattern is Profile-2, a decided minority pattern for ā-verbs but a majority pattern for ē-verbs. These single, smart principal parts, then, are crepāre^{2}, cubāre^{2}, domāre^{2}, sonāre^{2}, vetāre^{2}. Almost all these S-T boundaries so far are "smooth," that is, vowel-consonant (amā-bā-, etc.) or consonant-vowel (vet-u-) except for present subjunctive *amā-ē-, *mīrā-ē- [E3] > amē-, mīrē- and 1st sg. pres. *amā-#-ō, *mīrā-#-or > a•mō, mī•ror. The relevance of this will be clear in the next paragraph.

The roots sec-, fric- and lav-, iuv- are the only ā-types that choose no stem vowel in either the supine or perfect sec-, lav-. The choice of perfect marker for this pattern is not automatic. Verbs of this profile, designated Profile-3, choose between -u- or -#- (no ā-verbs choose -s-) and the superscript must now indicate that choice (the unspoken job of the traditional 3rd principal part): secāre^{3u}, fricāre^{3u} and lavāre$^{3\#}$, iuvāre$^{3\#}$. The root vowel of lavāre is low and nonround, while the root vowel of iuvāre is high and round. The final rounded glide v- in the supine of lavāre forms a closed syllable and a regular diphthong with that nonrounded vowel, namely, *lav-t-um, spelled *actual* lau•tum [A5], while the same glide of iuvāre merges with that

rounded root vowel into a long rounded vowel in *iuv-t-um [A5] > *actual* iū•tum, opening the syllable. The perfects *lav-#-ī, *iuv-#-ī > lā•vī, iū•vī are examples of a short root vowel lengthening in an open syllable specifically in conjunction with the perfect marker -#- (3.3.3, above and [E4] below). To signal this grammar-specific lengthening in the perfect, as indicated in 2.3 above, the enriched infinitive, the single "smart" principal part, uses a non-Latin accent mark, the ácúte áccent (upturned macron [H2c.]) in lávāre$^{3\#}$, iúvāre$^{3\#}$. No textbook supports this notation, and it is up to individual teachers to decide whether or how to implement these notions in their classrooms. In addition, this means that perfect iūvī and supine iūtum both have a long root vowel for different reasons.

Such verbs as micā- and tonā- are like vetā- and secā- in taking the -u- perfect, but they form no supine system at all, making an assignment to either Profile-2 (*toni-t-) or Profile-3 (*ton-t-) moot. Rather than create a separate profile for this absence, Profile-3 takes them under wing. The dash introduced in 3.3.4 means "something about the supine," and in this case, that dash "leads nowhere," since there is no supine system, hence, micāre^{3u-}, tonāre^{3u-}. The three-part superscript, then, parallels the usual order of the principal parts: 1st-2nd (present system), 3rd (perfect system), 4th (supine system, where available). Discussion of two other first conjugation members—stāre and uniquely short dăre—is delayed for a larger forum.

The future active participle marker -tūr- is a member of the supine system, and Profiles-3, 4 have no stem-vowel before it. Nonetheless, alongside perfect participles *sec-t-um, *iuv-t-um are the future active participles, secā-tūr-us, iuvā-

tūr-us with the stem vowel of the present system. From a functional perspective, this phenomenon unites the active and passive future participles in the present system, namely, *secā-nd-us, *iuvā-nd-us > *actual* se•can•dus, iu•van•dus, but so few verbs do this that it is hardly an advantageous strategy. At any rate, the superscript dash in micāre^{3u-} already signals "something about the supine," and now an additional caret can signal that the future active participle marker follows from the present stem with its stem vowel, namely, secāre$^{3u-\wedge}$, iúvāre$^{3\#-\wedge}$.

Chart 13 gives the enriched infinitives, the single "smart" principal parts, of the three profiles that crisscross with the first conjugation.

amāre^{1} *mīrārī*^{1}	vetāre^{2}	micāre^{3u-} secāre$^{3u-\wedge}$	lávāre$^{3\#}$ iúvāre$^{3\#-\wedge}$

Chart 13: Three Profiles Intersecting the First Conjugation

Chart 13a. is a compressed version of Chart 12, capturing the essence of the Profiles in terms of one-stem (Profile-1), two-stem (Profile-3), and three-stem (Profile-2) with each group of tense markers and their associated endings. (The Profile numbers do not reflect the number of stem variants involved but the straightforwardness of the linkages from S- to -T-.)

<table>
<tr><th colspan="3">S-</th><th>-T-</th><th>-E</th></tr>
<tr><td rowspan="3">amā-</td><td>secā-</td><td>vetā-</td><td>Pres.</td><td>"O"~"R"</td></tr>
<tr><td rowspan="2">sec-</td><td>veti-</td><td>Sup.</td><td rowspan="2">Decl.</td></tr>
<tr><td>vet-</td><td>Pres.</td></tr>
</table>

Chart 13a. Profiles and Stems

This approach does not promise to make conjugation easier, but it does try to account for all the facts that the four "conjugations" and list of principal parts.

4.2. Ē-Verbs. This "second conjugation" differs from ā-verbs in only two small respects: the stem vowel shortens before a vowel and does not drop, and it takes the present subjunctive marker -ā- (3.3.1). This sample exhibits the same three profiles with one, two, and three stems. Some additional adjustments will also be necessary, all explained in the Appendix.

dēlēre, habēre-verērī, docēre-fatērī, augēre, sedēre, mordēre, ciēre

		S-							-T-	-E
System	*pres.*	dēlē-	habē- verē-	docē- fatē-	augē-	sedē-	mordē-	ciē-	-#-	-re -rī
	sup.		habi- veri-	doc- fat-	aug-	sed-	*mord-	ci-	-t-	-um
	perf.		hab-	doc-		sēd-	momord-	cī-	-v- -u- -s- -#-	"I"
	Profile	1	2	3						

Chart 14: Three Profiles in the Second Conjugation

4.2.1. Dēlē- is Profile-1, a decided minority pattern for this stem vowel along with flēre, nēre, and always-prefixed –plēre. Their enriched infinitives, then, are dēlēre[1], flēre[1], nēre[1], –plēre[1].

4.2.2. Like vetāre[2], habē- and verē- are Profile-2 with supines habi-t-, veri-t-. "R"-only (deponent) verē- forms its perfect with this participial form, while habē-,

like vetā-, chooses no stem vowel in the perfect with the guaranteed marker -u- in hab-u-." Their single, smart principal parts, then, are habēre^{2}, verērī^{2}, which does not mean "second conjugation." This is the majority pattern for ē-verbs, thus also exercēre^{2}, iacēre^{2}, monēre^{2}, tacēre^{2}, terrēre^{2}. The "R-only" of this type are merērī^{2}, miserērī^{2}, pollicērī^{2}, tuērī^{2}, verērī^{2}; only fatērī^{3} is different. One of the four "O/R" verbs (semideponent), solēre, soli-t-, also exhibits Profile-2. Its superscript appends an apostrophe in solēre$^{2'}$ to signal its "O" present system and "R" perfect system with the perfect participle.

4.2.3. The rest of these sample verbs are Profile-3 with no stem vowel in the supine and perfect, and the superscript must announce the choice of perfect marker. The consonant clusters that arise at the S-T boundary may require the regular "adjustments" discussed in [F]. Quite a few such verbs form no supine system at all, like micāre^{3u-}, e.g., florēre^{3u-}, horrēre^{3u-}.

First, the supines with the marker -t-, a voiceless dental stop [D8]:

- Docē- and tenē- form admissible consonant clusters doc-t-, ten-t-. Ciēre with a root-final vowel forms the normal supine ci-t-. No adjustments are necessary.
- Theoretical *aug-t- devoices [F1] to *actual* auc•tum.
- The root-final consonant cluster of miscēre experiences metathesis [D11], that is, *misc-t- > *mics-t- [X] > actual mix-t-. The enriched infinitive uses the squiggle ~, suggestive of the proofreader's mark for "switch places" in miscēre$^{3u\sim}$.
- Root-final t, d trigger sibilation. Fatērī forms theoretical *fat-t- [F2] > *actual* fas•sum, and this "R-only" enriched infinitive is simply fatērī^{3} with no perfect marker. "O-only" sedēre goes through two steps: theoretical *sed-t- [F1] > *set-t- [F2] > *actual* ses•sum. The resulting ss after a consonant cluster (mordēre), a long root vowel (rīdēre) or a root diphthong (audēre) reduces to single s:

*mord-t-	[F1] >	*mort-t-	[F2] >	*mors-s-	[F3] > actual	mor•sum
*rīd-t-		*rīt-t-		*rīs-s-		rī•sum
*aud-t-		*aut-t-		*aus-s-		au•sum

The "lefthand" element (the stem) experiences all the adjustments, that is, should the question arise as to which s remains, the stem or the marker, it is the marker. Latin verbs do not want to go forward "markerless."

- Prandēre, tondēre, spondēre, in addition to the above steps, will also lengthen the root vowel before the resulting ns: *prand-t- [F1] > *prant-t- [F2] > *prans-s- [F3] > *pran-s- [E4] > *actual* prān•sum and similarly for tōn•sum, spōn•sum.
- As in lau•tum, above, root-final v in cavēre, favēre forms the expected diphthong in cau•tum, fau•tum. Like iū•tum, above, the rounded root vowel of fovēre, movēre, vovēre forms a long vowel, opening the syllable: *fov-t-um, *mov-t-um, *vov-t-um [A] > *actual* fō•tum, mō-tum, vō•tum.
- Some roots with root-final voiced consonant d or g (there are no examples of b) lengthen the root vowel in reaction to devoicing, dubbed Lachmann's Law (3.3.3, above, [E4] below). Sedēre, above, does not experience this, while vidēre inserts an [L] step in its adjustment chain:

  *sed-t- [F1] > *set-t- [F2] > *actual* ses•sum
  *vid-t- [F1] > *vit-t- [L] > *vīt-t- [F2] > *vīs-s- [F3] > *actual* vī•sum.

  The superscript indicated this above as L after the "supine dash." Present stem gaudēre and perfect participle gavīsus seem irreconcilably far apart, but a touch of historical reconstruction and an awareness of the modern spellings of v/u [A6] help bridge that gap. Historians of Latin propose an original root *gavid-. The present system always has a stem vowel, putting the short high vowel i in an open, internal syllable, susceptible to syncopation (as in poetry [G2]), namely, *ga•vi•dē- > *gav•dē-, spelled gau•dē-. The same short vowel in the perfect participle *gavid-t- is in a closed syllable, and Lachmann's Law applies in *gavid-t- [F1] > *gavit-t- [L] > gavīt-t- [F2] > gavīs-s- [F3] > *actual* ga•vī•sum. Representing this vowel with parentheses in gau(i)dēre indicates "occurs in one system only."

- The stems manē- and cēnsē- introduce the alternative supine marker "genuine -s-" (3.2.3) in man-s- [E4] > *actual* mān•sum, *cēns-s- [F3] > *actual* cēn•sum. The superscript will note this below with the "dash" convention.

- Root-final s undergoes rhotacism [D9] between vowels or between r and a vowel, which is to say the entire present system in haerēre, torrēre. The supine reveals if the stem is rhotic: *tors-t- [F3] > *actual* tos•tum as well as *haes-s- [F3] > *actual* hae•sum. The s of cēnsēre does not qualify for rhotacism.
- The root-final consonant clusters "liquid+velar" [D4] in mulcēre, mulgēre, tergēre and "velar+(labiovelar) glide" [C4] in torquēre show c, g, u before a vowel, that is, throughout the present system. Most of them take the "genuine -s-" supine marker, and most also take the -s- perfect. Before these consonantal markers, that velar as the middle of three consonants is, as it were, squeezed out: *mulc-s-, *terg-s- > *mul-s-, *ter-s-, even though Latin phonetics would permit *mulx-, *terx-. Torquēre enacts this process twice: first *torcv-t- > *torc-t- and then that result yields *actual* tor•tum. The parentheses convention just introduced for gau(i)dēre can now apply to mul(c)ēre, ter(g)ēre, tor(qu)ēre, but docēre^{3u}.
- The enriched infinitives for these "O-R" verbs will come with the discussion of their perfect systems just below, but "R-only" (deponent) fatērī and "O/R" (semideponent) audēre already provide all the information necessary to construct their enriched infinitives: straightforward fatērī^{3} with no perfect marker and an apostrophe in audēre$^{3'}$. Semideponent gaudēre needs three graphic conventions: apostrophe, -L, and the "parentheses convention" to indicate "element occurs in one system only." The result is the regrettably cumbersome but fully informative gau(i)dēre$^{3'-L}$.

The perfect systems with all four perfect markers in play complete the information necessary to construct enriched infinitives:

- -u- in doc-u-, exerc-u-, iac-u-, mon-u-, terr-u-. with no further change in the stem leads to the enriched infinitives exercēre^{2}, iacēre^{2}, monēre^{2}, terrēre^{2}. Torr-u- also takes the -u- marker, hence, torrēre^{3u}, and noting its rhotic character with an optional graphic mnemonic for "special-s" may be helpful to some: $, namely, tor$ēre^{3u} (pronounced r or s as needed). The s in cēnsēre^{3u-s} is always s and does not qualify for rhotacism. Miscēre$^{3u\sim}$ is the only instance of metathesis.
- -s- in theoretical *aug-s- [F1] > *auc-s- [X] > *actual* auxī, obscuring the stem-marker boundary [D7]. Rīdē- goes through the same three-step chain as its supine: *rīd-t- [F1] > *rīt-t- [F2] > *rīs-s- [F3] > *actual* rī•sī. Most supine -s- also have perfect -s: manēre, haerēre

have *man-s- [E4] > *actual* mān•sī, *haes-s- [F3] > *actual* hae•sī, hence manēre^{3s-s}, hae$ēre^{3s-s}. The liquid+velar roots also have -s- in *mul(c)-s-. *ter(g)-s- > mul-s-, ter-s- > *actual* mul•sī, ter•sī as well as *torc-s- > *actual* tor•sī, all represented in mul(c)ēre^{3s-s}, ter(g)ēre^{3s-s} but tor(qu)ēre^{3s} with "standard" supine.

- -#- "zero" requires no change if the initial syllable is closed [E2], as in *prand-#-ī > *actual* pran•dī, hence, prandēre$^{3\#}$. Otherwise, the root lengthens in one of two ways:

  >> The short root vowels in the open syllables of se•dē-, mo•vē-, vi•dē- lengthen in perfect sē•dī, mō•vī (also fō•vī, vō•vī), vī•dī, hence, sédēre$^{3\#}$, móvēre$^{3\#}$, vídēre$^{3\#-L}$. Supine vī•sum, mō•tum, then, also have long root vowels in open syllables but for different reasons, discussed above.

  >> Mord-, tond-, pend-, spond- lengthen the stem by reduplicating the initial consonant-vowel in momord-#-ī > *actual* mo•mor•dī and similar for totond-#-, pepend-#-, spopond-#- (not *spospond-#-). Their superscripts show this doubling by literally doubling the "zero" sign iconically: mordēre$^{3\#\#}$, tondēre$^{3\#\#}$, spondēre$^{3\#\#}$, and with no supine, pendēre$^{3\#\#-}$.
- Ciēre also lengthens its root vowel in cī-, and that long root vowel, just as a long stem vowel, chooses the perfect marker -v- in cī-v-, hence, cíēre^{3v}.
- The DNA metaphor at the base of this study occasionally produces a hybrid. Abolēre has a 1-type perfect abolē-v- and a 2-type supine aboli-t-. The superscript shows this with the dash convention as abolēre$^{1-2}$.

The resulting enriched infinitives, then, are in Chart 15:

1	dēlēre^{1}, flēre^{1}, abolēre$^{1-2}$
2	habēre^{2}, exercēre^{2}, iacēre^{2}, monēre^{2}, terrēre^{2}; verērī^{2}, pollicērī^{2}; solēre$^{2'}$
3	fatērī^{3}; audēre$^{3'}$, gav(i)dēre$^{3'-L}$
	docēre^{3u}, torrēre^{3u} (tor$ēre^{3u}), cēnsēre^{3u-s}, florēre^{3u-}, miscēre$^{3u\sim}$
	augēre^{3s}, rīdēre^{3s}, manēre^{3s-s}, haerēre^{3s-s} (hae$ēre^{3s-s}), mul(c)ēre^{3s-s} ter(g)ēre^{3s-s}, tor(q)uēre^{3s}
	sédēre$^{3\#}$, móvēre$^{3\#}$, vídēre$^{3\#-L}$; mordēre$^{3\#\#}$, tondēre$^{3\#\#}$, spondēre$^{\#\#}$, pendēre$^{3\#\#-}$
	cíēre^{3v}

Chart 15: Second Conjugation Revisited From the Inside Out

The many root types and their border adjustments are starting to push the limits of the announced "practical" side of this endeavor, but the facts are the facts. Language professionals may find this interesting, even useful, and can decide whether or at what stage and in what doses to expose learners to it. Charts 13 and 15 now combine to make Matrix 2. The rows distinguish verbs of the same conjugation at a glance with their differences, while the columns highlight the properties that unite verbs across conjugations. (Deponents of Profile-3 share space with the -u- perfect.)

1	2	3			
amāre[1] mīrārī[1]	vetāre[2]	micāre[3u-] secāre[3u-^]	lávāre[3#] iúvāre[3#-^]		
dēlēre[1] abolēre[1-2]	habēre[2] verērī[2] solēre[2,]	fatērī[3] audēre[3'] gau(i)dēre[3'-L] docēre[3u] tor$ēre[3u] cēnsēre[3u-s]	prandēre[3#] sédēre[3#] móvēre[3#] vídēre[3#-L] mordēre[3##]	augēre[3s] rīdēre[3s] manēre[3s-s] hae$ēre[3s-s] ter(g)ēre[3s-s]	cíēre[3v]

Matrix 2: Two Conjugations, Three Profiles

4.3. Ī-Verbs. These also have a long stem vowel and exemplify Profiles-1 and 3 but not 2. These sample verbs illustrate the same stem adjustments as the ē-verbs.

audīre-potīrī, aperīre-experīrī, saepīre, sentīre-ordīrī, venīre, sepelīre

System	S-							-T-	-E
present	audī-	potī-	aperī-	experī-	saepī-	sentī-	venī-	-#-	-re -rī
supine			aper-	exper-	saep-	*sent-	ven-	-t-	-um
perfect		* * *		* * *			vēn-	-v- -u- -s- -#-	-ī
	1		3						

Chart 16: Ī-verbs

In the present system, these stems share the markers -rē-, -tō-, -#- with all the aforegoing verbs and also present subjunctive -ā- with the ē-type. The only closed syllable [E2] that shortens that vowel is 3rd sg. "O" set present tense *audī-#-t [E3] > *actual* au•dit. This stem vowel, notably, takes the vowel-initial versions of the markers -ēbā-, -ent-, -end-, -ē-, shortening before them, just as it takes the vowel-initial endings in the present tense (3.3.2), thus, 2nd sg. *audī-ēbā-s, active participle, gen. sg. *potī-ent-is > *actual* au•di•ē•bās, po•ti•en•tis.

- Audī- and potī- with supine audī-t-, potī-t- and perfect audī-v- are Profile-1, thus audīre[1], potīrī[1]. No ī-verbs are Profile-2.
- Aperī-, experī-, saepī-, venī- have unproblematic supines with consonant clusters aper-t-, exper-t- (both nonrhotic, "genuine-r"), saep-t-, ven-t-. Perfects aper-u-, saep-s-, vēn-#- choose the other three markers with expected root-vowel lengthening in vē•nī, though it is the only one. Their single smart principal parts are experīrī[3], aperīre[3u], saepīre[3s], vénire[3#].
- Besides saepīre[3s], the -s- perfect with expected boundary adjustments is the choice for vincīre[3s], sentīre[3s]. The x spelling rule operates on perfect *vinc-s- [X] > vinx-. Both supine and perfect *sent-t-,

*sent-s- go through a sibilate-reduce-lengthen chain [F2-F3-E3] to *sens-s- > *sen-s- > *actual* sēn•sum, sēn•sī. The perfect participle of ordīrī[3], like audēre[3'], goes through the three-step chain *ord-t- [F1] > *ort-t- [F2] > *ors-s- [F3] > actual or•sum. One rhotic stem is haurīre, haus-t-, *haus-s- [F3] > *actual* hau•sī, hence, hau$īre[3s].

- Vénīre[3#] is the only ī-verb with a -#- perfect.
- Sepelīre is a hybrid with a 1-type perfect sepelī-v- and a 3-type supine *sepel-t- [A4] > *actual* se•pul•tum, thus, sepelīre[1-3].

Matrix 2 now adds this information as a third row to become Matrix 3:

amāre[1] mīrārī[1]	vetāre[2]	micāre[3u-] secāre[3u-^]	lávāre[3#] iúvāre[3#-^]		
dēlēre[1] abolēre[1-2]	habēre[2] verērī[2] solēre[2']	fatērī[3] audēre[3'] gav(i)dēre[3'-L] docēre[3u] tor$ēre[3u] cēnsēre[3u-s]	prandēre[3#] sédēre[3#] vídēre[3#-L] mordēre[3##]	augēre[3s] rīdēre[3s] hae$ēre[3s-s] ter(g)ēre[3s-s]	cíēre[3v]
audīre[1] potīrī[1] sepelīre[1-3]	* * *	experīrī[3] ordīrī[3] aperīre[3u]	vénīre[3#]	saepīre[3s] vincīre[3s] sentīre[3s] hau$īre[3s]	

Matrix 3: Three Conjugations vs. Three Profiles

4.4. I-verbs, the notoriously troublesome and mercurial 3rd conjugation, have in common with Profile-3 the lack of a stem vowel in perfect and supine systems, inviting all the same boundary adjustments as just explored in 4.3. The difference, of course, is the short stem vowel in the present system—and even there, that vowel is more absent than present. Some textbooks represent such verbs a little differently from the long-vowel types, that is, using the infinitive as a base, they divide amā-re, habē-re, audī-re with the long vowel as part of the stem but carp-ere, cap-ere with the short vowel as part of the ending. Like the ī-types, this i also chooses all the vowel-initial versions of the present system markers and "O" and "R" endings—and that is just where these two sample groups differ.

serere, gemere, colere, carpere, scrībere, mergere, legere, agere, emere, sūmere, vertere, pectere, pendere, reprehendere, rādere, canere, cadere, petere; ūtī, amplectī

capere, cupere, ēlicere, facere, fodere, fugere iacere (in)spicere, parere, quatere, rapere; patī, gradī, morī

4.4.1. First, the supines. They are indistinguishable from Profile-3, undergoing the same stem adjustments.

- None: ser-t-, par-t- (both nonrhotic), can-t-. carp-t-, cap-t-, rap-t-, fac-t-, iac-t-; the other serere (sēvī-satum) must await another forum; minor vowel shifts in a closed syllable: *inspic-t- > inspec-t- and before l̲: *col-t- [A4] > *actual* cul•tum, cf. *sepel-t- > *actual* se•pul•tum);
- Devoicing [D9, F1]: *scrīb-t-, *nūb-t- > scrīp•tum, nūp•tum; with Lachmann: *leg-t- > *lec-t- [L] > lēc•tum, *ag-t- > *ac-t- [L] > āc•tum; *em-t- > *emp-t- [L] > *ēmp-t- > actual ēmp•tum;
- Sibilation [F2]: *pat-t-, *quat-t- > *actual* pas•sum, quas•sum;
- "genuine -s-" supine (not from sibilation) in fīgere, *fīg-s- [F1] > *fīc-s- [X] > *actual* fīxum; mergere, *mer(g)-s- > *actual* mer•sum; parcere, *par(c)-s- > *actual* par•sum, deponent lāb-s-[F1] > lāp•sum;
- Rhotic gerere, ges-t-; verrere, *vers-s- [F3] > *actual* ver•sum; currere, *curs-s- [F3] > *actual* cur•sum; deponent querī, ques-t-;
- Two- and Three-Step Chains
  >> [F1, F2]: *fod-t- > *fot-t- > actual fos•sum, *grad-t- > *grat-t- > *gras-s, with an unexpected vowel change in *actual* gres•sum, perhaps influenced by prefixed ingredī, ingres-s- (which is already somewhat odd given A4, below);
  >> [F2, F3]: *ūt-t- > *ūs-s- > *actual* ū•sum, *vert-t- > *vers-s- > *actual* ver•sum; *pect-t- > *pecs-s- > *pec-s- [X] > *actual* pexum, blurring the S-T boundary, and similarly for *amplect-t- > *actual* amplexum;
  >> [F1, F2, F3]: *rād-t- > *rāt-t- > *rās-s- > rā•sum and the fourth and final semideponent fīdere, *fīd-t- > *fīt-t- > *fīs-s- > *actual* fī•sum.
  >> with lengthening: *pend-t- > *pent-t- > *pens-s-> *pen-s- [E4] > *actual* pēn•sum and the same for *reprehend-t- > *actual* re•pre•hēn•sum.;*cad-t- > *cat-t- [L] > *cāt-t- > *cās-s- > *actual* cā•sum.

- Other: a few verbs do acquire a short stem vowel in the supine system as well, e.g., ēlici-t-, gemi-t- > *actual* ē•li•ci•tum, ge•mi•tum. In the absence of a phonetic or grammatical reason for this i, it is best to consider these as hybrids of Profile-4 with a 2-like supine. One consistency is that verbs of this subtype generally take perfect -u-. Their superscripts capture this as 4u-2. That said, the group of root-final u, e.g., acui-, tribui- keeps the two high vowels in separate syllables in the present system *acui-#-t > *actual* a•cu•it but keeps them in the same syllable in the supine, allowing them to merge as ū in *acui-t-um > *actual* a•cū•tum, and they take the -#- perfect. This includes the two "R-only" verbs *loqui-#-tur, *sequi-#-tur > *actual* lo•qui•tur se•qui•tur but *loqui-t-um, *secui-t-ium > *actual* lo•cū•tum, se•cū•tum. A few of these form only a future active participle in the supine system, e.g., fugi-tūr-, mori-tūr-, making it moot whether the stem vowel i is like gemi-t-um or a connection to the present system in the manner of secā-tūr-. (The perfect participle mortu-um is a separate adjective altogether.) A few others with a long vowel in both supine and perfect are difficult to characterize except as i-ī hybrids: present peti-#-t, cupi-#-t; supine petī-t-, cupī-t-.

4.4.2. Choice of perfect marker:

- -u-: ser-u-, gem-u-, col-u-, rap-u-, ēlic-u-;
- -s-: carp-s-, *scrīb-s- (F1) > scrīp-s-; *inspec-s- [X] > inspex-; *pect-s- [F2] > *pecs-s- [F3] > *pec-s- [X] > pexum-; *sūm-s- [F1] > sūmp-s-; *mer(g)-s- > mer•sī, rhotic ges-s-. (No *quat-s- > *quas-s- is attested, but interpolating it is safe on the basis of prefixed *percut-s- > percus-s-, itself a unique permutation of [A4]);
- -#-: closed syllable, no change vert-#-, ver$-#-, reprehend-#- > *actual* ver•tī, ver•rī, re•pre•hen•dī; root vowel lengthening in open syllable: leg-#-, em-#-, fug-#-, fod-#- > *actual* lē•-gī, ē•mī, fū•gī, fō•dī ; lengthening with shift a > ē : ag-#-, cap-#-, fac-#-, iac-#- > *actual* ē•gī, cē•pī, fē•cī, iē•cī; with reduplication: *ce-can-#- [A4] > ce•ci•nī, *ce-cad-#-[A4] > *actual* ce•ci•dī, pe-pend-#- > pe•pen•dī, *pe-par-> (*pepir?) > peper-#- > *actual* pe•pe•rī, *pepar(c)-#- [A4] > *actual* pe•per•cī, cucur$-#- > *actual* cu•cur•rī; the acuere type is *acu-#- > a•cu•ī;
- -v-: the hybrids cupī-v-, petī-v-; their enriched infinitives place an acute accent not on the root vowel but instead on the stem vowel, e.g., petére^{4v}, cupére$^{4°v}$.

The short stem vowel "i alternating with e" was sketched in 3.3.1 above. As far as classical Latin is concerned, the stem vowel is i that adjusts to e under specific conditions and not the other way around. That goes together with the choice of vowel-initial tense markers and endings. (The infinitive -ere gives the misleading impression that the stem vowel is basically e that rises to i under various conditions.) The minority capere type usually gets the textbook designation "3iō" as a mnemonic for "i before a vowel," or "mixed conjugation," resembling 3rd in some forms and 4th in others. A few authors even grant this group the distinct status of "5th conjugation," emphasizing the difference rather than underscoring the bond. Here the superscript bows to the 3iō tradition by appending a degree sign to 4°.

4.4.3. Three Faces of root N and three graphic mnemonics: (n), ñ, ń.

- "stable-n" in all systems: unguere-ūnxī-*unc-t- > ūnc•tum, no special mark in enriched infinitive unguere[4s];
- n in present system only, root-internal, that is, before the root-final consonant—and almost all take the -#- perfect:
  findere, *fid-#-, *fid-t- > fī•dī, fis•sum
  fundere, *fud-#-, *fud-t- > fū•dī, fū•sum
  vincere, *vic-#-, *vic-t- > vī•cī, vic•tum
  scindere, *scid-#-, *scid-t- > sci•dī (no length!), scis•sum.
  The parentheses convention shows this in fí(n)dere[4#], fú(n)dere[4#-L], ví(n)cere[4#] and a rare lack of accent mark in sci(n)dere[4#]; the small âgere[4#-L] group is now joined by frâ(n)gere[4#] (frē•gī, frāc•tum) and one of the options for pâ(n)gere[4#]; like canere[4###] is ta(n)gere[4###] (te•ti•gī-tac•tum). Two roots with a root-final labial [D1] naturally represent the preceding nasal as a labial as well: ru(m)pere[4#] and the unusual combination of features in accu(m)bere[4#-2] (compare cubāre[2]).
- Root-internal n absent only in supine: pingere-pinxī but pic•tum, stringere-strinxī but stric•tum, pangere-panxī but pac•tum (another of the options for this latter); the acute accent ń indicates this pattern in, e.g., pińgere[4s], strińgere[4s].
- Three stems with root-final n—specifically rn—experience metathesis [D11] in the supine and perfect: cernere, crē•vī, crē•tum;

> spernere-sprē•vī-sprē•tum; sternere-strā•vī-strā•tum. The now-long root vowel, like cíēre, above, takes the perfect marker -v-. The tilde convention in miscēre$^{3u\sim}$, above, suggested the proofreading mark for "switch places," and it applies here to both the supine and perfect: cerñere^{4v}, sperñere^{4v}, sterñere$^{4v\text{-}a}$.

Here, then, are the single smart principal parts of Profile-4. An acute accent on the root vowel means "long in the perfect." A circumflex accent on the root vowel, specifically â means "shift to ē in perfect." The acute accent on the stem vowel means "long in supine and perfect."

lābī$^{4\text{-}s}$, ūtī^{4}, amplectī^{4}, que$ī^{4}; loquī$^{4\text{-}2}$ patī$^{4°}$, gradī$^{4°\text{-}e}$, morī$^{4°\text{-}\wedge *}$; fīdere$^{4'}$
serere^{4u}, gemere$^{4u\text{-}2}$, colere^{4u}; rapere$^{4°u}$, ēlicere$^{4°u\text{-}2}$, accu(m)bere$^{4u\text{-}2}$
carpere^{4s}, scrībere^{4s}, pectere^{4s}, sūmere^{4s}, ge$ere^{4s}, mer(g)ere$^{4s\text{-}s}$, piṅgere^{4s}; inspicere$^{4°s}$, percutere$^{4°s}$
vertere$^{4\#}$, verere^{4\#\text{-}s}$, reprehendere$^{4\#}$, fúgere$^{4°\text{-}\wedge}$ légere$^{4\#\text{-}L}$, émere$^{4\#\text{-}L}$, fīgere$^{4\#\text{-}s}$; fí(n)dere$^{4\#}$, fú(n)dere$^{4\#\text{-}L}$, cerñere^{4v} âgere$^{4\#\text{-}L}$, frâ(n)gere$^{4\#\text{-}L}$, acuere$^{4\#\text{-}2}$ canere$^{4\#\#}$, cadere$^{4\#\#\text{-}L}$, pendere$^{4\#\#}$, par(c)ere$^{4\#\#}$, ta(n)gere$^{4\#\#}$, fallere$^{4\#\#\text{-}s}$, curere^{4\#\#\text{-}s}$ câpere$^{4°\#}$, fâcere$^{4°\#}$, iâcere$^{4°\#}$, fódere$^{4°\#}$, fúgere$^{4°\#\text{-}\wedge}$, parere$^{4°\#\#}$.
petére^{4v}, cupére$^{4°v}$

Chart 17

Matrix 3 grows by two rows into Matrix 4 with Profiles-4, 4° in separate rows (for manageability) under Profile-3 to underscore the commonality of the perfect and supine and the relatively minor difference in the present system.

abolēre[1-2]	verērī[2] solēre[2']	audēre3' gav(i)dēre[3'-L] docēre[3u] miscēre[3u~] florēre[3u-]	vídēre[3#-L] mordēre[3##]	rīdēre[3s] ter(g)ēre[3s-s]	
audīre[1] potīrī[1] sepelīre[1-3]	* * *	experīrī[3] ordīrī[3] aperīre[3u]	vénīre[3#]	saepīre[3s]	
		ūtī[4] amplectī[4] lābī[4-s] fīdere[4'] serere[4u] gemere[4u-2]	vertere[4#] légere[4#-L] âgere[4#-L] acúere[4#] canere[4##] pendere[4##] cadere[4##-L]	carpere[4s] scrībere[4s] pectere[4s] sūmere[4s]	petére[4v]
		patī[4°] morī[4°-^*] rapere[4°u] ēlicere[4°u-2]	fódere[4#] fúgere[4°#-^] câpere[4°#] parere[4°##]	inspicere[4°s]	cupére[4°v]

Matrix 4: Four Conjugations and Four Profiles

4.5. Finally, stems of all profiles can append -sc- to its stem vowel, a postfix that comes equipped with its own "secondary" stem vowel i~e and, therefore, a Profile-4 present system. Consistent with that meaning, such verbs usually have an inchoative meaning and form a present system only. Without sc, the other two tense systems leave the "original" stem vowel to behave as Profile-1, 2, 3, 4. All the perfect system markers are, in principle, available, though all the items in this sample take -v-. The present system -sci- speaks for itself, thus the superscript only indicates the other two systems, as Chart 18 demonstrates.

īrāscere, crēscere, adolēscere, nāscī, proficīscī, apiscī

System	S-						-T-	-E
present	īrāsci-	nāsci-	crēsci-	adolēsci-	proficīsci-	apisci-	-#-	-re -ī
supine	irā-	nā-	crē-	*adol-	*profic-	ap-	-t-	-um
perfect	īrā-	* * *	crē-	adolē-	* * *	* * *	-v-	-ī
	(1)			(1-3)	(3)	(4)		

Chart 18: -sci verbs

The enriched infinitives apply the parentheses convention to (sc) in īrā(sc)ere[1], nā(sc)ī[1], crē(sc)ere[1]. Adolēscere is a hybrid with a 1-type perfect and a 3-type supine, namely, *adol-t- [A4] > *actual* a•dul•tum like *col-t- > cul•t-. Its enriched infinitive is, then, adolē(sc)ere[1-3] like sepelīre[1-3]. Proficī(sc)ī[3] from fac- with perfect participle *profic-t- [E3] > profec-t- is Profile-3; apiscī[4] is Profile-4. The parentheses in ul(c)ī(sc)ī[3] encapsulates both present system ulcīscor and perfect participle ul•tum. The perfects of both crē(sc)ere[1] and cerñere[4v] arrive at crēvī by different routes.

Matrix 4a. includes the -sci- types under the profile of their supine and perfect:

amāre[1] mīrārī[1] īrāscere[1] nāscī[1]	vetāre[2]	secāre3u-^	lávāre[3#]		
dēlēre[1] abolēre[1-2] crē(sc)ere[1] adolēscere[1-3]	habēre[2] verērī[2] solēre[2']	fatērī[3] audēre[3'] gav(i)dēre[3'-L] docēre[3u] miscēre[3u!~] florēre[3u-]	prandēre[3#] sédēre[3#] vídēre[3#-L] mordēre[3##]	augēre[3s] rīdēre[3s] ter(g)ēre[3s-s]	cíēre[3v]
audīre[1] potīrī[1] sepelīre[1-3]	* * *	experīrī[3] ordīrī[3] proficī(sc)ī[3] ul(c)ī(sc)ī[3] aperīre[3u]	vénīre[3#]	saepīre[3s] sentīre[3s]	
		ūtī[4] amplectī[4] api(sc)ī[4] fīdere[4'] serere[4u] gemere[4u-2]	vertere[4#] fí(n)dere[4#] légere[4#-L,] émere[4#-L] fú(n)dere[4#-L] âgere[4#-L] frâ(n)gere[4#-L] canere[4##] pendere[4##] cadere[4##-L]	carpere[4s] scrībere[4s] pectere[4s] sūmere[4s]	petére[4v] cerńere[4v]
		patī[4°'] rapere[4°u] ēlicere[4°u-2]	fúgere[4°] câpere[4°#] parere[4°##]	inspicere[4°s]	cupére[4°v]

Matrix 4a.: Final Tally

Several more small groups of stems remain for another occasion. At least it is clear that Latin conjugation is both more complicated than the four-conjugations-with-exceptions scheme can capture but also simpler: a few "ingredients" combine and recombine, and all the apparent chaos and irregularity of Latin conjugation

has to do with particular stem types. All the grammatical action happens at the S-T boundary in the middle of the word. Alphabetical verb lists reduce their usefulness by focusing on individual items and diluting or bypassing a larger sense of pattern with predictable processes and results. If the observations and techniques suggested here help dispel some of the mystery surrounding Latin grammar and show how apparently unrelated things are connected, so much the better for the profession. If they only serve to confuse, frustrate, infuriate, then may they find their way to the proper receptacle.

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