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To *v* or not to *v*? Theme vowels, verbalizers, and the structure of the Ancient Greek verb

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This paper offers a Distributed Morphology analysis of verbal theme vowels and primary verbal stem-forming morphology in Ancient Greek (AG). While verbal stem-forming morphemes are standardly analyzed as realizing Aspect in AG, I propose that both the inherited simple thematic and the athematic verbal stem-forming morphology of AG patterns as verbalizing morphology (*v*) according to a variety of diagnostics proposed in the literature, in particular idiosyncratic selectional properties of roots and the ability to form denominal and deadjectival verbs. Complex thematic suffixes moreover have the same distribution as simple thematic suffixes. These three classes of verbs (simple thematic, complex thematic, athematic) differ from synchronically denominal and deadjectival verbs, whose nominal stem-forming morphemes later became verbalizers in Modern Greek. This paper thus provides clear diagnostics for distinguishing between synchronically denominal, root-derived, and verbal-stem derived verbs in AG and morphologically similar languages. It also provides further evidence that verbal theme vowels occupy the same structural position and have broadly the same Aktionsart properties as other types of verbalizing morphology, contributing to the debate on the functional/semantic content of theme vowels in general.

1 Introduction

The goal of this article is to discuss the status of verbal theme vowels and other verbal stem-forming morphology in Ancient Greek (AG), specifically Archaic Greek (ca. 800–500 BCE), with a focus on Homeric Greek (8th century BCE).[1] Theme vowels are a type of conjugational class marker that have recently received a fair amount of attention in the theoretical literature, where they are variously treated as (semantically vacuous or underspecified) adjuncts to functional projections (Oltra-Massuet 1999; Oltra-Massuet & Arregi 2005), as verbalizers (e.g., Spyropoulos et al. 2015; Panagiotidis et al. 2017), or as equivalent to light verbs or roots (Lowenstamm 2014; Fábregas 2017). Independent of the formal analysis, another pertinent question is that of the semantic content or function of theme vowels—that is, is the choice of the thematic formant determined solely by root-specific lexical information, or do theme vowels (and their associated projections) contribute meaning, however abstractly? This paper tackles this question from a diachronic perspective and provides arguments from the history of Greek theme vowels for a connection between verbalizing "theme" morphology and Aktionsart/*v* in the framework of Distributed Morphology (DM). Specifically, I argue that both thematic and athematic verbal stem-forming morphemes in AG pattern as verbalizers, and that the reanalysis of stem-forming morphology in *denominal* and *deadjectival* verbal derivation gave rise to new types of vocalic (and other) "themes" that interacted with older, inherited conjugational morphology. I identify several diagnostics for distinguishing between *synchronically* denominal and deadjectival verbs and verbs in which a nominal or adjectival formant has been reanalyzed as a verbal "theme".

Crucially, we will see that a diachronic perspective is essential for understanding the paths of reanalysis that lead to the development and synchronic distribution of verbal "themes". This is all the more important as the diachrony of verbalizers and other categorizers is somewhat understudied from a formal perspective, especially with respect to a possible connection with aspect and argument structure alternations.

The paper is structured as follows. Section 2 discusses the theoretical background and status of theme vowels in DM, as well as the relevant concepts for the diachronic background, such as reanalysis. Section 3 discusses the structure of the Ancient Greek verb and the status of its "primary" (root-selecting), inherited theme vowels and verbalizers, including the problematic "complex thematic suffixes". This section also discusses diagnostics for identifying verbalizing morphology synchronically and for distinguishing it from morphology related to Voice and (syntactic) Aspect. Section 4 focuses on synchronically denominal verbs and diagnostics for distinguishing their "theme formants" from inherited (vocalic) themes. Section 5 concludes.

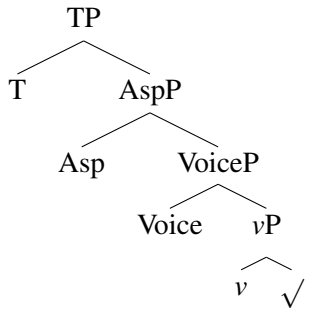
[1] The standard periodization of Ancient Greek is ca. 1500–300 BCE, divided into Mycenaean Greek (ca. 1500–1100 BCE), Dark Ages (1100–800 BCE), Archaic Greek (800–500 BCE), and Classical Greek (500–300 BCE), followed by Hellenistic/Koine Greek (ca. 300 BCE–300 CE), cf. Joseph 1992; Ralli 2012.

2 Background: Theme vowels in DM

2.1 Verbalizers

In Distributed Morphology (DM), verbal stem-forming morphology is usually equated with the verbalizing projection *v*, which may be associated with different (Aktionsart-related) "flavors", e.g., BECOME, DO, CAUSE (Folli & Harley 2005; 2007; Harley 2005; 2009; Alexiadou & Lohndal 2017; Panagiotidis et al. 2017; etc.). Like other categorizers, *v* mediates between the root and higher functional projections. In the verbal domain, alternations relating to argument and event structure, such as the causative alternation, passivization, etc., are thought to result from the interaction of *v* with the higher, external argument-introducing projection Voice and other argument structure-related functional projections (Alexiadou & Anagnostopoulou 2004; Schäfer 2008; 2017; Alexiadou & Doron 2012; Alexiadou 2013; Harley 2013; 2017; Alexiadou et al. 2015; Kastner 2020; etc.). The standardly assumed "verbal spine" with its functional projections is given in (1).

(1) The verbal spine



Elements like the vocalic conjugational class markers in Spanish, (2), which categorize roots as (different inflectional classes of) verbs, look like good candidates for overt markers of the verbalizing projection *v* in (1): They "verbalize" roots without contributing argument structure-, Voice- or Tense-related information; and the choice of inflectional class marker (e.g., first, second, or third conjugation) is lexically determined by the root.

(2) Spanish conjugational class markers
   a. *cant-**a**-r* 'to sing' (1st conjugation)
   b. *tem-**e**-r* 'to fear' (2nd conjugation)
   c. *part-**i**-r* 'to leave' (3rd conjugation)

However, Oltra-Massuet (1999) and Oltra-Massuet & Arregi (2005) argue that forms like (3) show that the Spanish verbal spine actually has several positions that are spelled out as vocalic "themes".

(3) 1Pl ipfv. ind., 1st conj. (*cantábamos* 'we sang'; Oltra-Massuet & Arregi 2005: 47)
   [√ [v **Th**]] [[T **Th**] Agr]
   cant Ø **á** b **a** mos

According to them, the vocalic themes in (3) do not spell out the functional heads *v* and T but *adjoin* to them postsyntactically/at MS ("a Morphological Structure level (...) between Spell-Out and Phonology", Oltra-Massuet & Arregi 2005: 44) due to a morphological well-formedness condition, given in (4).

(4) Morphological well-formedness condition on Spanish nouns & verbs (Oltra-Massuet & Arregi 2005: 46; on Catalan Oltra-Massuet 1999: 12)

a. At MS, all syntactic functional heads require a theme position.

b. $F \rightarrow F$

$F \quad Th$

The evidence for this analysis comes from suffixes that are argued to be segmentable into a functional head plus a theme vowel, such as the ones in (5).

(5) Morphologically complex verbalizers in Spanish (Fábregas 2017: 7)

a. *-iz-a-* (*autor-iz-a-r* 'to authorize')
b. *-ific-a-* (*clas-ific-a-r* 'to classify')
c. *-it-a-* (*debil-it-a-r* 'debilitate')
d. *-ec-e-* (*palid-ec-e-r* 'to become pale')
e. *-e-a-* (*tont-e-a-r* 'to act silly')

In the following, these will be referred to as "complex thematic suffixes", as opposed to "simple thematic suffixes" that consist only of the theme vowel, as in (2). Fábregas (2017) actually takes a different approach than Oltra-Massuet & Arregi (2005) and argues that complex thematic suffixes as those in (5) are allomorphs of the simple theme vowels in (2) and, like them, spell out *v*. Fábregas provides three arguments in favor of this analysis: 1) Suffixes like those in (5) never occur without the suffix-final theme vowel (e.g., *-ific-* never occurs without *-a-*, etc.), 2) they never attach to light verbs, which is expected if they are light verbs/*v*'s themselves, and 3) complex thematic suffixes never vary in the theme vowel they select, i.e., *-ific-* always inflects with the theme vowel of the first conjugation, *-ec-* with that of the second conjugation, etc. Deciding between these two analyses is not the goal of this article, so complex thematic suffixes will be cited with a bracketed hyphen in the following (e.g., Span. *-ific*(-)*a-*). However, apart from the formal question (are theme vowels heads of or adjuncts to functional projections?) there is also the question of whether theme vowels have specific functions or "meaning" (however abstract), or whether they are "ornamental", semantically vacuous elements—"pure morphology, form without meaning" (Aronoff 1994: 47), as generally argued in the DM literature (e.g., Oltra-Massuet 1999; Oltra-Massuet & Arregi 2005; Embick 2010; Calabrese 2015a; 2020). In the following, we will approach this problem from a diachronic perspective, based on data from the history of Greek.

2.2 Diachrony of verbal "themes"

The study of the diachrony of verbal stem-forming morphology is relatively well represented in the grammaticalization literature, especially where morphology expressing tense, aspect, and mood is concerned (e.g., the Germanic "weak preterite" dental suffix, the Latin imperfect suffix *-bă̆-*, the Romance synthetic future from infinitive + HAVE, etc.). However, the diachrony of purely categorizing or "first phase" synthetic, derivational morphology (including theme vowels) has received less attention, especially from a theoretical perspective. Some relevant examples of diachronic reanalysis and resegmentation (e.g., "affix telescoping") are discussed in Haspelmath (1995); (cf. also Rainer 2015) from a descriptive, functionalist perspective, but without explicitly treating the diachrony of theme vowels. And while some verbal themes are generally acknowledged to be diachronically related to, or even descended from, nominal morphology (for example, the Latin 1st conjugation marker (*)-*ā-*, Leumann 1977: 545; Bertocci 2017; Weiss 2020: 423), the exact circumstances of their reanalysis from nominal to verbal (and, in an Oltra-Massuet-style approach, from syntactic head to postsyntactic adjunct) are rarely explicitly stated, and the synchronic analysis is complicated by the fact that these morphemes are usually used in primary and in derived environments at the same synchronic stage of the language (cf. de Vaan 2012 on deverbal *ā*-verbs in Latin).

In this paper I will assume that one way of creating new synthetic verbalizing morphology is via reanalysis of originally nominal or adjectival morphology in the context of denominal and deadjectival verb formation (see Grestenberger Forthcoming for a more detailed discussion of the theoretical assumptions behind this approach). An example is given in **Table 1**, illustrating the development of the Modern Greek (MG) verbalizer *-ev-* from Ancient Greek verbs in *-eú-ō*. These AG verbs were originally denominal verbs derived from agent nouns in *-eú-*. In this context, the originally nominal suffix was reanalyzed as part of the verbal domain and subsequently became a productive verbalizer in MG, where it can select nouns, adjectives, adverbs and loanwords.[2]

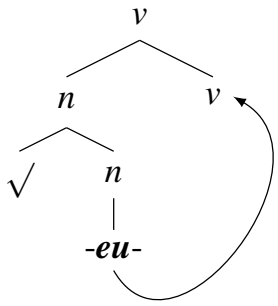
(a) Ancient Greek *-eú(-ō)*	**(b) Modern Gk. *-ev-***
basil-**eú**-ō 'am king; rule' (basil-**eú**-s 'king')	stox-**év**-o 'aim at' (stóx-os 'target')
khalk-**eú**-ō 'am a coppersmith' (khalk-**eú**-s 'coppersmith')	kont-**év**-o 'approach' (kontá 'near')
hipp-**eú**-ō 'am a horserider' (hipp-**eú**-s 'horserider')	xak-**év**-o 'I hack' (Engl. *hack*)

Table 1: AG *-eú-ō* > MG *-ev-o*, (MG ex. from Panagiotidis et al. 2017).

[2] For typographical convenience, I transliterate AG forms rather than using a phonetic transcription, hence ει = *ei*, *ου* = ou (including spurious diphthongs) and *η* = *ē*, *ω* = *ō*.

This reanalysis is descriptively "upwards" in that an element of the lower nominal domain was reanalyzed as part of the higher verbal domain in this particular context (i.e., denominal verb formation), as illustrated in (6).

(6) "Upwards reanalysis" of AG nominal *-eu-*



This is reminiscent of other types of "Upwards Reanalysis" (UR, Roberts & Roussou 2003) that have been discussed in the literature, such as the reanalysis of lexical verbs as modal verbs (e.g., Roberts & Roussou 2003; Fischer 2003; Cournane 2014), or, more broadly and not restricted to the verbal domain, changes that fall under the "Late Merge Principle" (LMP, van Gelderen 2004; 2008; 2011; etc.) by which an element in a lower domain becomes reanalyzed as base-generated higher up in the structure (essentially an updated version of "Merge-over-Move"). Economy principles such as these have long had their place in the formal literature on syntactic change (cf. also Biberauer 2019; Biberauer & Roberts 2017), and from the perspective of a non-lexicalist framework like DM, it is not surprising that we should see the same principles at work in the diachronic reanalysis of synthetic derivational morphemes, as the difference between "words" and "morphemes" is epiphenomenal in DM. As argued in Grestenberger Forthcoming, such cycles seem to include an $n > v$ cycle, in which nominal morphology gives rise to (different types of) verbalizers, and an $a > v$ cycle, in which adjectival morphology gives rise to (different types of) verbalizers, especially those associated with the causative/factitive alternation. By the same mechanism, verbalizers themselves can also move "upwards" and become reanalyzed as Voice, Aspect, or Tense morphology. Possible examples include the **-ske/o-*verbalizer in Greek discussed in Section 3.3, which has turned into an aspectual or maybe a tense marker in Ionic Greek (cf. Ittzés 2008; Ringe & Eska 2013: 168–170) and the Greek suffix *-th(ē)-* which seems to have been reanalyzed from an inchoative/stative verbalizing suffix in AG (García Ramón 2014; Grestenberger 2021) to a Voice and/or Aspect marker in MG (Christopoulos & Petrosino 2018; Alexiadou 2021).

In fact, the same type of reanalysis gave rise to a number of other MG verbalizers that Panagiotidis et al. (2017) discuss, such as *-iz-, -(i)az-, -on-, -ar-, -en-*. However, it is unclear whether "vocalic elements" or theme vowels can be treated parallel to these. Spyropoulos et al. (2015) and Panagiotidis et al. (2017) argue that the vocalic themes of the MG second

conjugation (*-a-*, *-i-*) are indeed reflexes of the same *v*-position as *-ev-*, specifically, that they spell out an abstract vocalic "slot" -□$_v$ which "in second-conjugation verbs is the morphological exponent of a categorizing verbal head *v*" (Panagiotidis et al. 2017: 34). Assuming, then, that at least some theme vowels *are* verb(alizer)s, we hence expect them to 1) have the same diachronic development as other verbalizers and 2) to behave synchronically like other verbalizers. Concerning 1), this means that nominal and adjectival stem-forming morphology is a possible diachronic source of theme vowels. Concerning 2), we need clear diagnostics for distinguishing verbalizers from other elements in the "verbal spine" in order to compare theme vowels to other types of (primary) verbal stem-forming morphology. We return to a discussion of these diagnostics in section 3.2.

In the following, we are going to compare thematic and athematic verbs in Ancient Greek from this perspective and examine the synchronic distribution and function of the different kinds of AG theme vowels and verbalizers, arguing that AG verbal stem-forming morphology inherited from Proto-Indo-European (PIE) spells out *v*, not Asp, and that new verbalizers are grammaticalizing in AG through $a \rightarrow v$ and $n \rightarrow v$ reanalysis.

3 "Primary" theme vowels and verbalizers in Ancient Greek

3.1 Thematic vs. athematic verbs

AG roots combine with stem-forming affixes to form different types of *verbal stems*: The present stem, usually characterized as [-pfv], which can occur with past tense endings (imperfect) or nonpast tense endings (present), the aorist stem, which is [+pfv] and only takes the past endings (except for the aorist subjunctive, which takes the present/nonpast endings), the future stem, which takes the nonpast endings and is underspecified for perfectivity, and the perfect stem, whose aspectual properties are notoriously difficult to pin down and which takes nonpast (perfect) and past endings (pluperfect). The synthetic perfect is analyzed as Asp[-aor, +perf] by Reed (2014) and as Asp[perfect] by Schreiner 2021. I follow the latter here, but note that the analysis of the feature(s) of the perfect does not affect the following discussion.[3] What is important is that the stem-forming morphology of the perfect, whatever its featural content, is in complementary distribution with that of the present and the aorist.

[3] The Greek synthetic perfect underwent a change from an inherited resultative/resultant state perfect to a perfective past tense (on the semantics of the Greek perfect cf., e.g., Chantraine 1926; Schwyzer 1939: 768; Haspelmath 1992; Bentein 2012a; 2012b; 2013), while the resultant state meaning was taken over by the newer analytic perfect forms consisting of the perfect participle plus the copula *eimí* 'be'. The feature that underwent the reanalysis is therefore characterized as Asp[RES] (for resultative) in Grestenberger (2022), but a compositional solution that derives the semantics of the perfect from a combination of a specific "flavor" of *v* plus its aspectual specification is preferable in any case and could explain the different semantic subclasses such as the stative perfects.

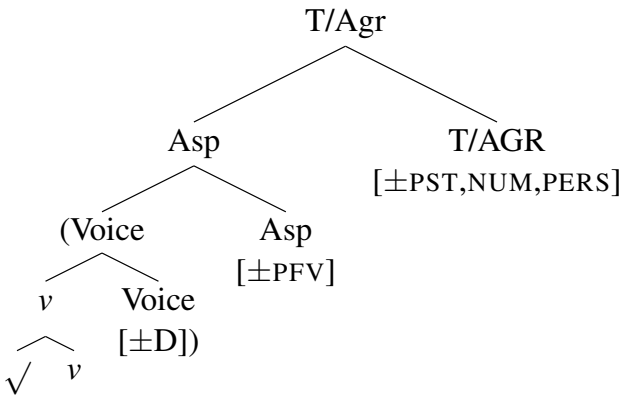
These stems can moreover combine with different moods, namely subjunctive (present, aorist, perfect), optative (present, future, aorist, perfect), and imperative (present, aorist).

Voice (active/nonactive) is expressed on the finite verbal endings together with Person, Number, and Tense. Specifically, the *active* and *nonactive* ("middle") sets of endings are analyzed here as allomorphs conditioned by the feature [±D] (i.e., presence/absence of an external argument DP) on Voice (Grestenberger 2016; 2018; 2021, following, e.g., Alexiadou 2013; Alexiadou et al. 2015; Schäfer 2017 for MG; Kastner & Zu 2017 for Latin; Kastner 2020 for Hebrew; etc.).

The perfective "passive aorist" suffix *-thĕ-* (older allomorph *-ĕ-*) was originally a verbalizer that formed stative and inchoative verbs (Jasanoff 2004; Tronci 2005; García Ramón 2014), but seems to have been reanalyzed as a Voice/Asp[pfv] marker on the way to Modern Greek (Christopoulos & Petrosino 2018; Alexiadou 2021). This suffix will not be important to the following discussion. I will also ignore the "augment", a prefix *e-* analyzed as T[+past] by Reed (2014), but still optional as a marker of the [past] tenses (imperfect, aorist, pluperfect) in Archaic Greek.

The following tree summarizes the structure of AG verbs and its features, leaving aside the projections pertaining to Mood for now. Note that Voice is missing in certain verbs (unaccusative *activa tantum* and the passive aorist, Grestenberger 2021) and is therefore given in brackets.

(7) Summary: structure of AG verbs (cf. Grestenberger 2018; Schreiner 2021)



The question that arises now is where in this structure verbal theme vowels are spelled out and what their relationship to other types of verbal stem-forming morphology is. Consider a (synchronically) simple thematic verb like *lúō* 'I release' (tr.), whose partial paradigm for the imperfective (present) stem is given in **Table 2**. The partial paradigm of the aorist active (indicative, subjunctive, and optative) and perfect active (indicative) are given in **Table 3**. The bolded elements are those that can and will be considered "theme vowels" in the following. For expository reasons I use the Classical Greek forms in the following tables.

	(a) Pres.	(b) Ipf.	(c) Pres.subj.	(d) Pres.opt.
1sg	lū́-ō /-**o**-ō/	é-lū-**o**-n	lū́-ō /-**o**-o-ō/	lū́-**o**-i-mi
2sg	lū́-**e**-is	é-lū-**e**-s	lū́-**ē**is /-**e**-e-is/	lū́-**o**-i-s
3sg	lū́-**e**-i	é-lū-**e**-Ø	lū́-**ē**i /-**e**-e-i/	lū́-**o**-i-Ø
1pl	lū́-**o**-men	e-lū́-**o**-men	lū́-**ō**-men /-**o**-o-/	lū́-**o**-i-men
2pl	lū́-**e**-te	e-lū́-**e**-te	lū́-**ē**-te /-**e**-e-/	lū́-**o**-i-te
3pl	lū́-ousi (< *-**o**-nti)	é-lū-**o**-n	lū́-**ō**si (< *-**o**-o-nti)	lū́-**o**-i-en

Table 2: AG active present and imperfect indicative, present subjunctive and optative of *lū́ō* ‘release’ (dual, imperative, and non-finite forms excluded).

	(a) Aor.	(b) Aor.subj.	(c) Aor.opt.	(d) Perf.
1sg	é-lū-s-a	lū́-s-ō /s-o-ō/	lū́-s-**a**i-mi	lé-lu-k-a
2sg	é-lū-s**a**-s	lū́-s-**ē**-is	lū́-s-**a**i-s	lé-lu-k**a**-s
3sg	é-lū-s-e	lū́-s-**ē**-i	lū́-s-**a**i-Ø	lé-lu-k-e
1pl	e-lū́-s**a**-men	lū́-s-**ō**-men	lū́-s-**a**i-men	le-lú-k**a**-men
2pl	e-lū́-s**a**-te	lū́-s-**ē**-te	lū́-s-**a**i-te	le-lú-k**a**-te
3pl	é-lū-s**a**-n	lū́-s-**ō**-si	lū́-s-**a**i-en	le-lú-k**ā**-si (< *-k**a**-nti)

Table 3: AG aorist indicative, subjunctive, and optative; perfect indicative of *lū́ō* ‘release’ (dual, imperative, and non-finite forms excluded).

Columns (a)–(b) in **Table 2** show the imperfective indicative forms of a simple thematic verb, in which the theme vowel alternates between *-o-* in the first person and third person plural, and *-e-* everywhere else (including the dual); the same distribution holds in the nonactive indicative forms (not illustrated here for reasons of space). However, this is not the only thematic element we can identify. For example, the theme vowel seems to be invariant *-o-* in the present optative (column d), and *-a-* in the so-called “alphathematic” inflection of the sigmatic aorist indicative (column a) of **Table 3**) and the the perfect indicative (column d) of **Table 3**), as well as in certain reduplicated aorists, the “kappa-aorist”, and the pluperfect. The “long-vowel subjunctive” in column c. of **Table 2** is originally composed of theme vowel + subjunctive marker, which happens to be identical to the theme vowel,[4] resulting in the corresponding long vowels. The

[4] And in fact the “short vowel subjunctive” theme vowel and the indicative theme vowel are presumably diachronically related, though there is some debate which use is older: The *communis opinio* represented by Rix (1986) is that the simple thematic indicative arose from reanalyzed subjunctives (to perfective/bounded stems; cf. also Jasanoff 2003, appendix I), whereas Bozzone (2012) makes a case for the development of the subjunctive function from erstwhile present indicatives.

long-vowel subjunctive was extended to athematic formations as well, in which the modal suffix was originally a short vowel *-*e/o*- (again, identical to the simple indicative theme vowel), so I will treat it as simplex morpheme in the following.

While the stem forms seen so far all contain elements that are usually considered theme vowels, AG also has "athematic" verb classes without any theme vowels. **Table 4** gives the partial paradigm of an athematic present with the suffix *-nŭ̆-*, **Table 5** its aorist and perfect forms (corresponding to the thematic ones in **Table 3**). Verbalizing/stem-forming morphemes are given in bold.

For the *s(a)*-aorist and kappa-perfect in **Tables 3** and **5**, I assume that the distribution of the allomorphs is *-sa-/-ka-* before consonants and *-s-/-k-* before vowels,[5] and hence treat these classes as "athematic" in the following, in the sense that they lack the alternating theme-vowel *-e/o-* of, e.g., simple thematic verbs as in **Tables 2** and **7** (though recall that this type of aorist/perfect inflection is traditionally called "alphathematic"). This means that the segmentation of the aorist optativ allomorph is *-ai-*, parallel to the reanalyzed imperfective optative suffix *-oi-*, which was extended from the thematic conjugation to athematic verbs where it replaced the older athematic optative.[6] For reasons of space, the following discussion will focus on the comparison of the present and aorist indicative forms (see Zukoff 2017 and Schreiner 2021 for recent analyses of the Greek perfect), while further motivation of the segmentation of the modal markers (and their changes between Homeric and Classical Greek, which are significantly more pronounced than in the indicative) will have to be deferred.

	(a) Pres.	**(b) Ipf.**	**(c) Pres.subj.**	**(d) Pres.opt.**
1sg	deík-**nū**-mi	e-deík-**nū**-n	deik-**nú**-ō	deik-**nú**-oi-mi
2sg	deík-**nū**-s	e-deík-**nū**-s	deik-**nú**-ē-is	deik-**nú**-oi-s
3sg	deík-**nū**-si	e-deík-**nū**-Ø	deik-**nú**-ē-i	deik-**nú**-oi-Ø
1pl	deík-**nu**-men	e-deík-**nu**-men	deik-**nú**-ō-men	deik-**nú**-oi-men
2pl	deík-**nu**-te	e-deík-**nu**-te	deik-**nú**-ē-te	deik-**nú**-oi-te
3pl	deik-**nú**-āsi	e-deík-**nu**-san	deik-**nú**-ō-si	deik-**nú**-oi-en

Table 4: Present and imperfect indicative, subjunctive, optative (active) of *deíknūmi* 'show'.

[5] Alternatively, one could treat the *-a-* of the sigmatic aorist and the kappa-perfect as another type of theme vowel, e.g., conditioned by perfective aspect in the environment /_C. I see no particular advantage or disadvantage of this analysis over the one proposed in the main text.

[6] See Willi 2018: 9ff. for a recent synopsis of the development of the mood markers in Greek.

	(a) Aor.	(b) Aor.subj.	(c) Aor.opt.	(d) Perf.[7]
1sg	é-deik-**s**-a	deík-**s**-ō	deík-**s**-ai-mi	dé-deikh-a
2sg	é-deik-**sa**-s	deík-**s**-ē-is	deík-**s**-ai-s	dé-deikh-**a**-s
3sg	é-deik-**s**-e	deík-**s**-ē-i	deík-**s**-ai-Ø	dé-deikh-e
1pl	e-deík-**sa**-men	deík-**s**-ō-men	deík-**s**-ai-men	de-deíkh-**a**-men
2pl	e-deík-**sa**-te	deík-**s**-ē-te	deík-**s**-ai-te	de-deíkh-**a**-te
3pl	é-deik-**sa**-n	deík-**s**-ō-si	deík-**s**-ai-en	de-deíkh-**ā**-si

Table 5: Aorist indicative, subjunctive, and optative active; perfect indicative active of *deíknūmi* 'show'.

In the classes seen so far, the stem-forming suffixes *-nŭ-* and *-s(a)-* in **Tables 3–5** seem to be in complementary distribution with the theme vowel in **Table 2**: both are linearly immediately adjacent to the root (**Table 6**) and both can cause *root allomorphy*, specifically ablaut alternations and *suppletion* (**Table 7**). In the following, I use the 1st person plural as citation form, since this tends to be the most transparent form of the paradigm in terms of morphophonology. For the athematic root present (*eĩ-mi* 'I go', 1pl. *i-men*) and the reduplicated athematic present (*tí-thē-mi* 'I place', 1pl. *tí-the-men*) in **Table 6**, column a., I assume that the verbal stem-forming morpheme is (linearly) zero, but that it triggers reduplication in the latter type which is then expressed as a prefix to the root (with reduplicating vowel *-i-*). This is compatible with Schreiner (2021)'s analysis of the perfect reduplicant, namely that "the phonological instantiation of an Aspect node specified for [perfect] has the shape RED/e/-" (Schreiner 2021: 12), except that I analyze the node in question as *v* (more below). However, adding "Ø" in the (linear) representation of these reduplicated forms will be useful for comparing athematic reduplicated verb stems with thematic reduplicated ones (such as reduplicated *-ske/o-* presents or reduplicated aorists), where by assumption the node that triggers reduplication is spelled out overtly (or: receives a theme-vowel adjunct in the sense of Oltra-Massuet 1999 etc.). That is, reduplicated athematic *tí-the-**Ø**-men* 'set, place' in **Table 6** is the athematic equivalent of reduplicated thematic forms such as *mí-mn-**o**-men* 'stay, remain' in column b., as *deík-nu-men* is the athematic equivalent of its later thematic replacement *deik-nú-**o**-men*, etc.[8]

[7] Perfects from roots ending in a velar or labial stop occur with root-final aspiration (instead of the expected *-k-* of the perfect suffix) in Attic-Ionic from the 5th century onwards. The distribution of the *-a-*"theme" is the same as in the regular kappa-perfect in **Table 3**.

[8] Note that having "Ø" in the gloss of the reduplicated present is merely a representational decision that follows from the DM-analysis of reduplicants (and other non-concatenative morphology such as infixes) as underlyingly suffixal. If this were wrong and the reduplicant were underlyingly a prefix, nothing about the analysis would have to change — we would still have to account for the fact that reduplicating present stem-forming morphology and other types of present- and aorist-stem forming morphology are in complementary distribution, and hence argue that they compete for the same position. We would also still have to account for the fact that reduplicated presents and *nŭ*-presents seem to have thematic and athematic variants.

a. Athematic verbs				
Ø/“root”	*-nŭ̆-*	pres.RED	perf.	*-s(a)*-aor.
√í-Ø-men	√deík-**nu**-men	tí$_{RED}$-√the-Ø-men	le$_{RED}$-√lú-**ka**-men	(e-)√lū́-**sa**-men
‘go’	‘show’	‘set, place’	‘release’	‘release’
b. Thematic verbs				
simple (pres.)	complex (pres.)	redupl. them. (pres.)	simple (aor.)	
√lū́-**o**-men	√deik-**nú(-)o**-men	mí$_{RED}$-√mn-**o**-men	(e-)√drák-**o**-men	
‘release’	‘show’	‘stay’	‘see’	

Table 6: Theme vowels vs. verbalizers (1pl. forms).

	Pres.	**Aor.**	**Perf.**	
a.	**stéll**-o̲-men	**steíl**-a̲-men	**stál**-ka̲-men	‘send’
b.	**derk**-ó̲-metha	**drák**-o̲-men	de$_{RED}$-**dórk**-a̲-men	‘see’
c.	**peith**-ó̲-metha	**pith**-ó̲-metha	pé$_{red}$-**pith**-Ø-men	‘trust’
d.	**pheúg**-o̲-men	**phúg**-o̲-men	(pe$_{RED}$-**pheug/phug**-)	‘flee’
e.	**theín**-o̲-men	pé$_{RED}$-**phn**-o̲-men	pe$_{RED}$-**phás**-Ø-metha	‘slay’
f.	**manth**-án̲(-)o̲-men	**máth**-o̲-men	me$_{RED}$-**math(-)ḗ**-ka̲-men	‘lean’

Table 7: Theme vowels and root allomorphy/suppletion, 1pl. (act./mid.) forms, augment excl.; root = **bold**, theme vowel/verbal stem-forming suffix = underlined.

Table 7 illustrates root allomorphy in different types of thematic stems. Most commonly, root allomorphy in AG manifests as *ablaut* alternation in which the root vowel changes in terms of quality (place of articulation, as in rows b–c) or quantity (as in row a) depending on the morphosyntactic environment (e.g., “present” vs. “aorist” stem). This allomorphy is locally conditioned, outward-looking, and morphosyntactically conditioned in the sense of, e.g., Embick 2010; 2012; 2015. It is local in the sense that it requires strict adjacency: Morphemes to the right of the theme cannot condition any changes in the root, as shown in the presents in rows b. vs. d: middle ***derk****-ó-metha* in b. and active ***pheúg****-o-men* in d. have the same root ablaut (so-called “*e*-grade”). That is, neither the phonology nor the morphosyntactic features of Voice (active vs. middle/nonactive) can influence the shape of the root across the intervening theme, and the same is true for even higher projections such as Mood or Tense/Agr.[9] That the allomorphy

[9] Though number on T/Agr can trigger *suffix* ablaut when nothing else intervenes, as in the present and imperfect indicative of the *nŭ̆*-presents illustrated in Table 4, but crucially *not* root ablaut. It *can* moreover trigger root ablaut if the stem-forming suffix is Ø, i.e., in root presents and aorists and in reduplicated presents like *tí-****thē****-Ø-mi* ‘place, set’

is outward-looking and morphosyntactically conditioned is illustrated by the present vs. aorist forms in rows b.–d.: Both are "simple thematic" forms, but the present stem-forming theme triggers *e*-grade of the root, while the aorist theme triggers so-called zero grade of the root. This shows that the conditioning factor is the morphosyntactic feature of the functional head spelled out by the theme rather than its phonology.[10] The same holds for themes that cause quantitative modifications of the root (vowel), as in row a: In the present, the theme vowel diachronically reflects a complex thematic suffix **-j(-)e/o-*, with the glide assimilating to give a geminate, and the aorist is diachronically an *s*-aorist formed with the same suffix *-s(a)-* as in **Table 5**, with the loss of *-s-* causing compensatory lengthening of the root vowel (written <ei>).[11] Finally, row e. and possibly also row f. show instances of root suppletion: The root that means 'slay' in row e. has the allomorphs *then* (/tʰɛn/), *thein* (/tʰeːn/; with compensatory lengthening of the root vowel in, e.g., the present stem) vs. *pha(n)/phn* (in, e.g., the reduplicated aorist and the verbal adjective). Historically, both allomorphs go back to the same root (**g$^{\underline{u}h}$en*), but synchronically they may as well be treated as suppletive pairs (cf. Kölligan 2007: 360–1).[12] The root variants *manth/math* in row f. could likewise be treated as suppletive allomorphs or via a morphologically conditioned infixation rule (see section 3.5 on "complex thematic" suffixes, including "nasal-infixing" *-an(-)e/o-*).

Synchronically, some or all of these root alternations could be implemented as morphonological readjustment rules or as root suppletion (i.e., as "late insertion" of different root shapes depending on the morphosyntactic environment, cf. Haugen & Siddiqi 2013)—I will remain agnostic on the exact implementation in the following. The important point is that this allomorphy is strictly local, outward-looking, and morphosyntactically (rather than phonologically) conditioned. Moreover, both thematic elements such as the *e/o*-theme vowel and athematic elements such as the stem-forming morphemes *-nŭ-*, *-s(a)-*, *-(k)a-*, etc., condition these particular ablaut grades on the adjacent roots (cf. row b for an example of archaic "*o*-grade" of the root in the perfect).

To summarize, in comparing the basic averbos of selected thematic and athematic verb classes, we have arrived at a preliminary segmentation of AG verbs as spelling out √-*v*/Asp-Mod-T/Agr. As mentioned above, (active/nonactive) Voice is expressed together with T/Agr

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(1sg.), 1pl. *tí-**the**-Ø-men* in Table 6, which makes a pruning account of *v* along the lines of Christopoulos & Petrosino 2018 an attractive option for these cases; see also Calabrese 2015a; 2015b for a discussion of the connection between overt verbalizers and locally-conditioned root allormorphy.

[10] The distribution of the *e-* vs. the *o*-variant is the same in the thematic present and the thematic aorist, namely *o* in the first person (singular & plural) and the third person plural, and *e* elsewhere.

[11] In Attic-Ionic; but Aeolic dialects have gemination in this environment.

[12] Instances of suppletion from historically distinct roots also exist, of course, e.g., 1pl.pres. ***phér**-o-men* 'bring' vs. 1pl. aor. *en-**énk**-o-men* (reduplicated thematic aorist); 1pl.pres. ***erkh**-ó-metha* 'go' vs. 1pl. aor. ***élth**-o-men*, etc. See Kölligan 2007.

on the endings—there are several ways in which this can be formally implemented, which will not concern us here.[13] The important take-away is the observation that thematic and athematic suffixes (including complex thematic suffixes; see section 3.5 for a more detailed discussion of these) are in complementary distribution in the sense that they compete for the same position and cause the same types of locally conditioned root allomorphy. We can now turn to the question of whether *-nŭ̆-*, *-s(a)-*, *-o-*, *-an(-)e/o-* etc. spell out *v*, Asp, or a "span" consisting (minimally) of both.

3.2 Diagnostics for *v*-status

The forms discussed in the previous section suggest that thematic present and aorist suffixes occupy the same structural position as the inherited athematic verbal stem-forming suffixes *-nŭ̆-*, *-s(a)-*, etc., but it is less clear what that position is, exactly. Do these affixes spell out *v* or Asp, or do they adjoin to one of these projections? Answering these questions is related to a general problem of the older Indo-European (IE) languages, but specifically relevant to Ancient Greek and (Vedic) Sanskrit, namely the fact that their verbal stem-forming morphemes seem to combine properties of inner ("lexical") aspect/"*Aktionsart*"[14] markers (for example, related to transitivity or boundedness) and of "outer"/syntactic aspect, i.e., perfectivity. The standard analysis is that these stem-forming elements (including the theme vowels of the simple thematic present and aorist) were originally (in pre-Proto-Indo-European, that is, before the reconstructable ancestor stage of the attested Indo-European languages) Aktionsart/lexical aspect markers that were reanalyzed as temporal-aspectual markers. They are therefore usually termed "tense-aspect stems" (and "present" vs. "aorist" stem instead of the more accurate "imperfective" and "perfective" stem), cf., e.g., Hoffmann 1970; Rix 1986; Strunk 1994; and standard textbooks and handbooks such as LIV[2]; Fortson 2010; Meier-Brügger 2010; etc. (though see Hollenbaugh 2018; 2021 for a more recent analysis of aspect in Vedic, Greek, and Proto-Indo-European that

[13] As amply discussed in the literature, the fact that the nonactive voice marker in Greek, Sanskrit, and Latin is realized on the endings together with Person and Number seems to be in violation of the Mirror Principle (Baker 1985): Given the order of functional projections in ex. (7), Voice should surface closer to the root, between the verbal stem-forming morphemes and the inflectional endings. The fact that it seems to "skip" Asp on its way to T/Agr can be modeled in different ways, for example using Spanning (e.g., Merchant 2015 for MG; Grestenberger 2016; 2019; Schreiner 2021 for AG; Bertocci & Pinzin 2021 for Latin), some form of phrasal movement (e.g., Kastner & Zu 2017; Zyman & Kalivoda 2020 for Latin), clitic adjunction to VoiceP/"FP" followed by morphological merger of the Voice clitic to Agr (Calabrese 2019 for Latin and Sanskrit), or Fission plus M-Merger (Embick 2000). It would be dishonest to claim that one of these proposals is more parsimonious or more interesting from a theoretical perspective than any of the others.

[14] "Inner aspect/*Aktionsart*" are here used to refer to different types of argument and event structure (alternations) in the *v*/Voice domain, and thus more broadly than the usual Vendlerian classification into states, activities, accomplishments, and achievements (Vendler 1957).

departs from the traditional view[15]). Formal accounts that adopt this analysis and treat verbal stem-forming morphemes explicitly as realizations of Asp include Reed 2014; Calabrese 2019; 2020; and Schreiner 2021. Diachronically, this development would be an instance of UR as described in section 2.2, with *v*-elements becoming reanalyzed as ±PFV elements and a "more functional" (semantically bleached, strictly "synsem") meaning. But this is not quite how these affixes behave in AG (or Sanskrit, for that matter), where they have properties that indicate that they are positioned adjacent to the root (cf. again **Tables 6–7**) and are semantically and morphonologically idiosyncratic in ways that are generally associated with "inner", categorizing, rather than "outer", functional projections in the DM-tradition of, e.g., Marantz 2001; 2007; Arad 2003; Anagnostopoulou & Samioti 2014. The goal of the following sections is therefore to provide more specific arguments in favor of analyzing these elements as *v*- rather than Asp-morphemes. For reasons of space, this is not the place for an in-depth engagement with previous formal Asp-accounts (especially Calabrese 2019 and Schreiner 2021), though I plan to return to this elsewhere. Rather, the goal is to provide arguments that have not received much attention so far and that favor the *v*-analysis of these Greek verbal stem-forming elements, including (simple and complex) thematic stems.

Besides these two formal options (realization of *v* vs. Asp), there are other analytical options that have been proposed in the literature. For example, it is possible that the verbal stem-forming elements discussed in the previous section actually spell out a *span* ("a contiguous sequence of heads in a head-complement relation", Svenonius 2016: 205) consisting of *v*-(Voice-)Asp (see Merchant 2015 for a Spanning account of the MG verb) or a "rebracketed" *v*/(Voice/)/Asp head (Christopoulos & Petrosino 2018 propose that MG has a rebracketed [Voice,Asp] head), rather than just (contextually conditioned allomorphs of) *v* or Asp. These four possibilities are summarized in (8).

(8) a. *-nŭ̆-*, *-s(a)-*, *-e/o-*, etc., realize Asp
b. *-nŭ̆-*, *-s(a)-*, *-e/o-*, etc., realize a span consisting of (at least) *v* + Asp
c. *-nŭ̆-*, *-s(a)-*, *-e/o-*, etc., realize a rebracketed head consisting of [*v*, (Voice?),Asp]
d. *-nŭ̆-*, *-s(a)-*, *-e/o-*, etc., realize *v*

In the following I will provide arguments in favor of the latter analysis, fully aware that some of them are compatible with more than one option in (8), or even with all four. First, we need

[15] For reasons of space (and personal sanity) I cannot discuss this literature in detail here and instead focus on lexical aspect. Hollenbaugh essentially argues against the traditional characterization of the imperfect (in Greek and Vedic) as expressing imperfective syntactic aspect and the aorist as expressing perfective syntactic aspect. He does not discuss the implications for the morphological analysis of the associated stem-forming suffixes, but his discussion of e.g., durative vs. completive readings of Homeric imperfect forms in Hollenbaugh 2018 seems at least compatible with the view proposed here—though his own analysis of the Homeric aorist as "old anterior" and the imperfect as "simple past" (e.g., Hollenbaugh 2018: 62) is in line with the traditional view of these stems as "tense-aspect" stems.

clear diagnostics for identifying verbalizing morphology. The following diagnostics are based on the discussion in Spyropoulos et al. 2015 and Panagiotidis et al. 2017 on identifying MG verbalizers and the diagnostics in Harley 2017 for distinguishing between "Voice-bundling" and "Voice-splitting" languages—that is, languages that "bundle" the properties of *v* and the agent-introducing projection Voice, and languages in which these are two separate projections.

(9) Diagnostics for *v*-morphology, after Spyropoulos et al. 2015: 301f.; Panagiotidis et al. 2017: 35ff.
   a. *v*-related morphology is independent of morphology relating to Voice, Tense, Aspect, and Agreement; and this morphology cannot occur without *v*-related morphology
   b. *v*-morphology does not systematically encode Aktionsart, valency or Voice; it may be associated with more than one type of argument structure (e.g., unergatives, unaccusatives, psych-verbs, etc.)
   c. The choice of the verbalizer depends on the root (cf. "conjugational classes"); at the same time one and the same root can combine with different verbalizers to produce different lexical-aspectual semantics
   d. The semantic relationship between root and verbalizer may be lexically idiosyncratic and/or opaque[16]
   e. Verbalizers are used in category-changing (cross-categorial) derivation, i.e., the formation of deadjectival and denominal verbs

According to Panagiotidis et al. (2017), these diagnostics pick out the MG verbalizers that are historically reanalyzed from nominal suffixes + verbalizer (i.e., *-ev-, -iz-, -(i)az-, -on-, -ar-, -en-*) as well as the "theme vowels" of second conjugation verbs like *αγαpó* 'love' (*-a-*, *-i-* <η>, pres. ind. *αγαpά**o***, pfv. past *αγά**pi**sa*, etc.), which as we will see in section 4 are also diachronically denominal.

Applying these now to the Ancient Greek situation, (9a) is not particularly controversial and easily verified for AG: Voice and Tense morphology are realized separately from verbal stem-forming morphology, as we saw in the previous section. Moreover, there is no close relationship between agent introduction and verbal stem-forming morphology, suggesting that agents are introduced separately by Voice (thus fulfilling one of Harley 2017's criteria for a Voice-splitting language). Whether *v* and Asp are also separate projections still remains to be seen.

(9b) is more controversial because it depends on whether one conceives of categorizing morphology as purely syntactically categorizing (thus essentially doing what ±N, ±V and similar categorial features were doing in classical G&B approaches), without being associated with

[16] "We therefore conclude that verbalizing morphology in Greek exhibits certain degrees of idiosyncraticity and lexicalization in the sense that it may not only affect but also define the meaning of the verb formation.", Panagiotidis et al. 2017: 47.

Aktionsart or valency semantics such as causative, factitive, inchoative, etc., as Oltra-Massuet (1999) and Oltra-Massuet & Arregi (2005) argue. Panagiotidis et al. (2017) seem to reach the same conclusion ("…the verbalizing suffixes do not encode Aktionsart in the sense that they are neutral with respect to inner aspect", Panagiotidis et al. 2017: 37), but then also state that "the same verbalizing suffix can create verbs with a variety of argument structures" (Panagiotidis et al. 2017: 39), presumably meant to indicate that there is no one-to-one correlation between a particular verbalizing morpheme and a particular argument structure type, unlike with "high" (syntactic) causatives (*v*-selecting causative morphology, Harley 2017) and 'high" passives (i.e., Voice-selecting passive morphology in the sense of Bruening 2013; Alexiadou et al. 2015; Schäfer 2017, etc.). But this still does not exclude the possibility that there are subregularities and correlations with specific Aktionsart types: There is mounting evidence that such correlations can predict the distribution of thematic vowels and other conjugational class markers in, e.g., French (Kastner & Martin 2020; 2021) and Serbo-Croatian (Kovačević et al. 2021; Mišmaš & Simonović 2021; Milosavljević & Arsenijević 2022) to some extent.

This is true for AG verbal stem-forming morphology as well, at least at the oldest stage. Among the generalizations that have been noted in the literature concerning the function of the verbalizers discussed here are, among others, that *-nŭ-* and *-s(a)-* tend to form alternating transitive verbs (cf. Bertocci 2013 on Greek nasal presents in general), *-ane/o-* is found with verbs of perception and psych verbs and is characterized as transitive/terminative by van de Laar (2000: 345), *-ske/o-* is found with verbs of motion (van de Laar 2000: 364), etc.,[17] though there are naturally exceptions to such generalizations. Moreover, roots with seemingly similar meaning may use different verbalizers to express the same argument structure, and one and the same root may use different verbalizers for different (alternating) contexts, e.g., √*pag/pēg* 'thick, fixed, solid' forms both an inchoative *-ē-* (*-η-*) aorist ('became fixed, solid') and a transitive-causative sigmatic aorist ('cause to be fixed, solidify') in Homeric Greek. These examples can be multiplied (see again van de Laar 2000 for a detailed study of such "individual verbal systems" in Greek). The AG verbal stem-forming morphemes therefore fulfill both (9b) and (9c), as well as (9d) because the selectional relationship seems to be root-specific: Thus alternating √*pag/pēg* uses the *ē*-aorist to form its perfective inchoative, while alternating √*or* 'rise' uses a middle root aorist (3sg. *õrto*) to express the same meaning. This close relationship between root and verbal stem-forming morpheme holds for the morphophonological side as well: As we already saw in **Table 7**, verbal stem-forming morphology in turn determines the shape and ablaut grade of the root.

[17] Such generalizations can also be made for the PIE ancestors of these suffixes, cf. the literature on nasal infix presents and transitivity (Strunk 1967; Meiser 1993; Steer 2013/2014; etc.), and in general the handbook descriptions of these suffixes in, e.g., Tichy 2004; Fortson 2010; Meier-Brügger 2010; LIV^2; among others.

Finally, certain AG verbal stem-forming morphemes productively derive denominal and deadjectival verbs, and this is crucially the case both for the ones associated with the present system ((*)-*je/o*-) and those associated with the aorist system (-*s(a)*-; -*(th)ē*-). This argument has so far been neglected in the discussion of their status, and we will therefore return to it in section 4.

Taken together, these diagnostics point towards *v*-status of the Greek verbal stem-forming suffixes, both the athematic and the simple thematic ones (section 3.5 provides arguments that complex thematic suffixes also pattern the same way). Nevertheless they do not unambiguously tease apart *v* and Asp—a Spanning or Rebracketing account is thus still in the picture.

However, if the order of functional projections given in (1) is indeed cross-linguistically invariant, then evidence for a separate *v* and Voice should also imply a separate *v* and Asp, since Voice would intervene. At least in some versions of Spanning, the intervening alternating features of Voice would then exclude the possibility of treating *v*-Voice-Asp as a span.[18] Harley (2017) provides the following criteria for Voice-splitting languages, in which *v* and Voice are separate functional projections:

(10) A Voice-splitting language (Harley 2017: 16)
   a. has agglutinating ("stacking") passive morphology
   b. can have high applicatives
   c. can show causative morphology in the absence of a syntactic Causer argument

(10a) is difficult to apply to AG, which has been argued to have the same type of syncretic "middle" Voice head that is realized with nonactive morphology in anticausative, reflexive, reciprocal, and passive contexts as MG does (Alexiadou & Doron 2012; Alexiadou 2013; Alexiadou et al. 2015; Schäfer 2017; on AG Grestenberger 2016; 2021). A designated passive suffix -*(th)ē*- does develop eventually, but behaves synchronically like a verbalizer rather than a Voice marker in (archaic) AG (Tronci 2005; García Ramón 2014; Grestenberger 2021) and thus cannot be argued to be a "high", Voice-selecting Pass head (in the sense of Bruening 2013). On the other hand, alternating causative and agentive-transitive verbs as in **Table 8**, which share the same verbal stem-forming morpheme, but take active endings in the causative/transitive and nonactive endings in the inchoative/passive alternants show that the introduction of the external argument takes place independently from verbal stem-forming morphology, unlike in Voice-bundling languages. These verb classes could then be taken as evidence for the criteria in (10a) and (10c).

[18] Cf. the statement by Merchant (2015: 295, fn. 22) that a node cannot be allowed to condition the allomorph of a span across an intermediate node, since otherwise "the Span Adjacency Hypothesis could easily be vacuously satisfied by the inclusion of multiple intervening nodes that play no role at all in conditioning the allomorphy. The constraint must be that no otiose nodes are included, that every node in the conditioning span is required, and that no conditioning environment can be stated that includes less information."

Caus. (act.)	Anticaus. (nonact.)	Meaning	Agent. tr. (act.)	Passive (nonact.)	Meaning
rhḗgnū-mi	rhḗgnu-mai	‘break’ (tr./itr.)	dídō-mi	dído-mai	‘give/be given’
khé-ō	khéo-mai	‘pour out/flow’	zeúgnū-mi	zeúgnu-mai	‘yoke/be yoked’
thermaín-ō	thermaíno-mai	‘make/turn hot’	témn-ō	témno-mai	‘cut/be cut’
melaín-ō	melaíno-mai	‘make/turn black’	kakó-ō	kakóo-mai	‘mistreat/be mistreated’
pakhű́n-ō	pakhű́no-mai	‘make/turn thick’	túpt-ō	túpto-mai	‘beat/be beaten’

Table 8: Voice alternations in AG causative/agentive transitive verbs; segmentation into stem vs. endings.

(10b) could also apply to AG, provided that the *dativus (in)commodi* is to be interpreted as a high applicative. While there is no designated applicative verbal suffix in AG, animate datives of convenience/inconvenience (benefactives/malefactives) like in (11), which can modify transitive and intransitive unergative predicates, could be interpreted in this way and thus fulfill (10b). However, further study of these constructions is needed to confirm this analysis.

(11) **tṍide** d’ egὸn autòs thōrḗk-so-mai
DEM.PRON.DAT.SG.M PTCL I.NOM.SG self.NOM.SG armor-FUT-1SG.NONACT
“Against this one I myself will put on armor” (Hom. *Il.* 7.101)

To summarize, the AG verbal stem-forming suffixes fulfill all of the criteria for *v*-status in (9) (with a question mark over their relationship with Aktionsart, 9b), and Harley’s diagnostics for Voice-bundling vs. Voice-splitting languages suggest that AG belongs to the latter, though this is based on a preliminary assessment. However, in order to make a stronger case for *v*-status of these elements, we need additional, ideally unambiguous evidence of their co-occurrence with genuine aspectual morphology relating to outer/syntactic aspect. The implicit assumption so far is that Asp is in fact not expressed overtly in most contexts in AG, effectively the opposite of approaches in which Asp is overt and *v* is covert and/or “pruned” (e.g., Calabrese 2019). But if it were possible to find contexts in which Asp can be independently shown to be realized overtly and in which it combines with verbal-stem forming morphemes, this would make a stronger case for the latter’s status as verbalizers. This aspectual morphology would be expected to be morphophonologically and semantically more regular than “inner” morphology as it expresses a limited set of morphosyntactic features (presumably only ±PFV *vel sim.*) and to be compatible with many, if not all of the putative *v*-elements discussed in this section.

There are two environments that have hithero been neglected in this discussion and that could potentially fulfill these criteria: the epic/Ionic "iterative preterit" and the participles and verbal adjectives of the stems discussed above.

3.3 Additional arguments for *v*, I: the Ionic iterative preterit

The so-called "Ionic iterative preterit" (cf. Brugmann 1902–03; Schwyzer 1939: 710ff.; Chantraine 1984: 226f.; Ittzés 2008; Kimball 2014) is particularly productive in (epic) Ionic Greek and is formed with a complex thematic suffix *-sk(-)e/o-* which selects *verbal stems* and does not co-occur with the augment. That is, unlike all the other verbalizers discussed so far, which select and are linearly adjacent to the root and restricted to either the present or the aorist (or the perfect) stem, the iterative preterit suffix *-sk(-)e/o-* can select present and aorist *stems* (no forms from the perfect stem are attested), rather than just the root. Together with its semantics, which can be characterized as progressive or iterative, this makes it a plausible candidate for actually spelling out Asp unlike the verbal stem-forming suffixes discussed so far. **Table 9** gives some examples of Ionic iteratives and their respective bases.

	Iterative		**Base**	
a.	hi-**stá**-Ø-*sk(-)o*-men	'continually placed sth.'	hí-**sta**-Ø-men (pres.)	'place'
b.	**rhēg**-nú-*sk(-)o*-men	'continually broke, smashed'	**rhḗg**-nu-men (pres.)	'break, smash'
c.	**pheug**-é-*sk(-)o*-men	'kept fleeing'	**pheúg**-o-men (pres.)	'flee, escape'
d.	**phug**-é-*sk(-)o*-men	'kept escaping'	e-**phúg**-o-men (aor.)	'escaped'
e.	**spei**-sá-*sk(-)o*-men	'kept pouring (drinks)'	e-**speí**-sa-men (aor.)	'pour (drinks)'

Table 9: Ion. iterative preterits (Kimball 2014: 163), 1pl. act.; root = **bold**, primary stem = underlined, iterative suffix = *italics*.

These examples show that iterative *-sk(-)e/o-* selects verbal *stems* rather than roots,[19] independent of whether the stem is athematic (rows a–b) or thematic (rows c-d). Rows a. and b. illustrate iterative preterits from an athematic reduplicated and a *nŭ*-present, respectively. Rows c. and d. illustrate iterative preterits from a simplex thematic present and a simple thematic aorist, respectively (crucially from one and the same root; see Kimball 2014 for a discussion of

[19] Whether this is an inherited property of this suffix is controversial, as there is comparative evidence for both the primary stem-forming uses discussed in section 3.5 and fn. 23 below (cf. LIV^2: 19, type (1p)) and for the stem-selecting uses of the cognate suffixes in, e.g., Latin (*-scō*, *-ē-scō*, Watkins 1971) and Hittite (*-šḫke/o*-imperfective, Melchert 2017). See also Ringe & Eska (2013: 168–70) for a formal analysis of the diachrony of this suffix in Greek.

the semantics of iterative preterits from present vs. aorist stems). All in all, this suffix is therefore a good candidate for a genuine aspectual suffix.[20]

3.4 Additional arguments for *v*, II: nonfinite forms

So far we have concentrated on theme vowels and verbalizers in finite verb forms. But in nonfinite "deverbal" forms we see quite clearly that some suffixes select *stems* (minimally √-*v*), while others select *roots*. The "verbal adjective" in *-t-* (*-t-ó-* m./n., *t-ḗ* f.) selects roots and forms state-denoting adjectives, as illustrated in **Table 10**.

	a. Redupl. pres.	**b. *nŭ*-pres.**	**c. Them. present**	**d. *s(a)*-aor.**
1pl.	<u>tí-**the**-Ø</u>-men	eks-<u>**ai**-nú</u>-metha	<u>**eukh**-ó</u>-metha	<u>**euk**-sá</u>-metha
	RED-place-V-1PL.ACT	PRVB-choose-V-1PL.MID	pray-V-1PL.MID	pray-V-1PL.MID
verbal	**the**-tós	éks-**ai**-tos	**euk**-tós	
adj.	'placed, put'	'chosen; choice'	'prayed for, desired'	

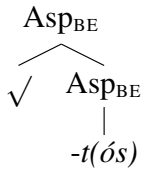
Table 10: Finite verbs (augment excluded) vs. verbal adjectives; <u>underlined</u> = verbal stem, **bold** = root.

As these examples show, *-t-* treats thematic and athematic verbs alike in attaching to the root and ignoring any verbal stem-forming material, including theme vowels as in column c. Assuming that this stem-forming material realizes *v*, this affix can therefore be used as a diagnostic for the presence vs. absence of *v*—more precisely, it seems to be in complementary distribution with verbalizers. (13a) gives the proposed structure of *-t-*verbal adjectives, based on the analysis of their Modern Greek descendants by Alexiadou et al. (2015), who argue that *-t-* selects (event-denoting) roots and spells out stative aspect (thus also Anagnostopoulou 2003; Anagnostopoulou & Samioti 2014; Grestenberger 2018; Calabrese 2020; etc.). Given that it only selects the root to the exclusion of any verbal stem-forming morphology, the examples in **Table 10** suggest the same structure for AG verbal adjectives in *-t-*. In addition, AG *-t-* is also able to form possessive adjectives from nouns (cf. Schwyzer 1939: 503), as in the examples in (12). The presumed structure for these is given in (13b).

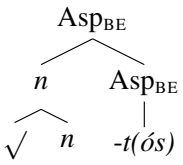
[20] Rix (1986) analyzes *-sk(-)e/o-* as a modal affix, but as Ittzés (2008: 19) points out this is semantically unlikely and seems primarily motivated by a desire to explain its ability to co-occur with verbal stem-forming morphology, parallel to the subjunctive and optative mood markers. Ittzés' own explanation of 1sg. *-skon*, etc., as allomorphs of the inflectional endings (effectively T/Agr) also fails to convince, as *-skon* is clearly segmentable into complex thematic *-sk(-)o-* + 1sg. past ending *n*, and the same goes for the other person/number combinations throughout the paradigm. The comparison with the 3pl.act. of the root aorist of *dō-/do-* 'give', *édosan*, in which the 3pl. ending *-san* was introduced from the *-s(a)*-aorist through missegmentation of *-sa-n* as *-san* is unconvincing, as this allomorph is restricted to the 3pl., unlike the iterative preterit suffix.

(12) a. *lépas, lépad-* 'limpet, snail' → *lepas-tḗ* (< **lepad-tó/ḗ-*) 'limpet-shaped drinking vessel'[21]
b. *thaũma* 'marvel' → *thauma-tós* 'marvelous'
c. *thúsanos* 'tassel' → *thusanō-tós* 'tasseled, with tassels'

(13) a.



b.



The verbal adjectives in *-t-* differ from the participial suffixes *-nt-* (pres./aor. active participle), *-(w)ŏs/-uia* (m.-n./f. perf.act. participle) and *-men-o/ē-* (nonactive/"middle" participle): These always select the verbal *stem*—contrast the participial forms in **Table 11** with the "verbal adjectives" in **Table 10**.

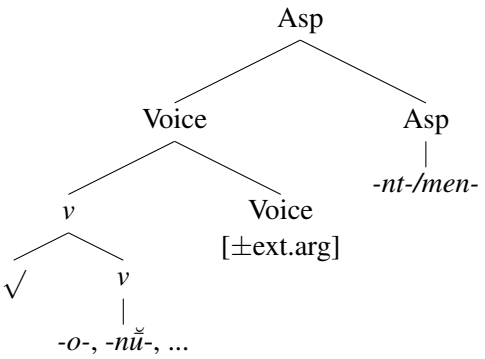
		Redupl. pres.	***nŭ*-pres.**	**Them. present**	***s(a)*-aor.**
Finite	1pl.act.	tí-**the**-Ø-men	**deík**-nu-men	**lű**-o-men	**deík**-sa-men
	1pl.mid.	ti-**thé**-Ø-metha	**deik**-nú-metha	**lū**-ó-metha	**deik**-sá-metha
Ptcp.	act. ptcp.	ti-**thé**-Ø-nt-	**deik**-nú-nt-	**lű**-o-nt-	**deík**-sa-nt-
	mid. ptcp.	ti-**thé**-Ø-men-o-	**deik**-nú-men-o-	**lū**-ó-men-o-	**deik**-sá-men-o-

Table 11: (1pl) finite verbs vs. participles, underlined = verbal stem, **bold** = root.

The fact that these participles contain verbal stem-forming and Voice (act./mid.) morphology and can be construed transitively with direct objects (if the corresponding finite forms are transitive, that is) suggest that these participial suffixes contain more structure than the *-t-*forms, as illustrated in (14) (following Grestenberger 2018; 2020, as well as Alexiadou et al. 2015 on Modern Greek and Embick 2000 on Latin participles).

[21] If your kitchen cabinet lacks such extravagances, here's an example of one: https://www.britishmuseum.org/collection/object/G_1978-0401-1.

(14) Structure of AG participles



Crucially, just like in (13), the participial suffixes are analyzed as overt allomorphs of the aspectual head Asp, with the Spell-Out conditions on the active and nonactive participle suffixes given in (15).[22]

(15) Spell-Out conditions for AG participles (Grestenberger 2018; 2020, based on Embick 2000):
   a. Asp ↔ *-men-*/ Voice[-ext.arg] _
   b. Asp ↔ *-nt-*: elsewhere

If this is the correct synchronic analysis, it means in effect that Asp is realized as zero (and/or is "pruned", Embick 2010; 2015, etc.) in all finite forms (with the exception of iterative/progressive "Ionic" Asp, section 3.3), and only surfaces overtly in the participial system. More precisely, the Spell-Out rule for Asp in finite forms must be as in (16), to ensure that the participial allomorphs do not surface in the infinitival forms (assuming the latter spell out nonfinite T).

(16) Asp ↔ Ø /_⁀ T

An anonymous reviewer has criticized that this seems incompatible with the handbook view that present participles (used as adjuncts, or "circumstantially", that is) express simultaneity with respect to the event described by the main verb, while aorist participles express anteriority of the event with respect to that of the main verb (e.g., Rijksbaron 2002: 117; though not uniformly, cf. Napoli 2017: 116). But as long as the participles in these contexts are not specified for *Tense* independently of the main verb (on which there is widespread agreement, e.g., Smyth & Messing 1956: 457; Napoli 2006; 2017; Pompei 2012; Buijs 2013), the analysis above holds assuming that the Spell-Out of Asp is syncretic—that is, there are no separate allomorphs for Asp[+pfv] and Asp[-pfv] (or however one wants to characterize syntactic aspect in Greek at this stage, cf. footnote 8 above), either in finite or in non-finite contexts (again with the exception of

[22] Excluding the allomorph of the perfect active participle, which must be more highly specified than the vocabulary items in (15).

the particular "flavor" of Asp spelled out by the Ionic iterative preterit suffix). This parallels the analysis by Embick (2000) of the Latin participial suffixes *-nt-* and *-t-*(*-s-*) as unspecified for the features of Voice, despite their traditional labels as "active" and "passive" participles, respectively, and hence as compatible with both "active" and "passive" syntactic contexts (as in the widely referenced active, transitive deponent participles in *-t(us)*, cf. Grestenberger 2017; 2018). Similarly, the realization of Asp as *-nt-* vs. *-men-* in (15) would be sensitive to the adjacent Voice head, but *not* to the features of Asp itself (with the exception of the perfect active allomorph, which is more highly specified than active/Elsewhere *-nt-*; cf. Grestenberger 2022 for a more detailed discussion).

To summarize, assuming that the Ionic iterative preterit suffix *-sk(-)e/o-* and the participial suffixes *-nt-* and *-men-* are overt allomorphs of Asp, and given that these co-occur with verbal stem-forming morphology, we conclude that the latter must spell out something lower in the structure. This, together with its adjacency to the root, its root-specific/lexical selection-based distribution and its ability to trigger root ablaut, points towards verbalizing *v*.

Note that an interesting prediction follows from the discussion of the two overt Asp morphemes in this section: If both of them compete for the same structural position, we do not actually expect Ionic iterative preterits to form participles, i.e., we do not expect **-sk(-)o-nt-* and **-sk(-)o-men*-participles to be formed to these preterits. This is indeed the case: No participle is attested for any of the iterative preterits in Homer and Herodotus (the main sources of attestation of this type).[23]

Before turning to denominal verbs, we will briefly look at complex thematic suffixes in the next section.

3.5 Complex thematic suffixes

To recapitulate briefly, "complex thematic" suffixes appear to consist of a verbalizing affix + a theme vowel and thus structurally pose the same problem as the complex Spanish verbalizers

[23] Confirmed by a search of both authors in the *Thesaurus Linguae Graecae* (http://stephanus.tlg.uci.edu/index.php). Note that there are various *primary* present stem-forming suffixes containing a complex thematic element *-sk(-)e/o-* in Greek as well, for example, the reduplicating *-sk(-)e/o*-presents (*didáskō* 'I teach, instruct', *gignṓskō* 'I recognize', *mimnḗskō* 'I remind', etc.) and the simple *-sk(-)e/o*-presents (*thnḗiskō* 'I die', *báskō* 'I feed', etc.); cf. section 3.5. These are not semantically iterative and also differ from the Ionic iterative presents in a number of other ways (they are compatible with the augment and can occur in the present indicative, for example). They clearly pattern with the primary stem-forming suffixes as summarized in Table 6 and are thus expected to form participles, which they do. These were of course excluded from the search.

Two borderline cases which have been interpreted as iterative preterits or as primary stems form participles in Herodotus: *pháskon* 'assert, say' (*phaskóntōn* 3.58.9) could be an iterative preterit to *phēmí* 'say' and *sterískō* 'deprive' (*steriskómenai* 2.66.7; *steriskómenoi* 4.159.13), which could be an iterative preterit to *steréō* 'deprive'—but in both cases the evidence weighs more heavily in favor of the interpretation as a synchronic primary present (van de Laar 2000 treats *sterískō* as a primary *-isk(-)e/o*-present but remains agnostic on *pháskon*; on the latter see also Ittzés 2008: 14, fn. 4).

in ex. (5), e.g., *clas-ific(-)a-* ‘to classify’. The point of this section is not to weigh in on whether these are (essentially monomorphemic) allomorphs of *v* (as proposed by Fábregas 2017) or *v* + thematic adjuncts (Oltra-Massuet 1999; Oltra-Massuet & Arregi 2005, followed by much of the DM literature), as the diagnostics introduced in the previous section, in particular verbal adjective and participle formation, do not help distinguish between these two analyses. They do show, however, that complex thematic suffixes are treated like simple thematic suffixes and athematic affixes in being able to co-occur with Asp morphology (the participial suffixes and the Ionic iterative preterit), but not with morphology that selects the root, like the verbal adjective-forming suffix *-t-*. The following tables illustrate this for the complex thematic present stem suffixes *-n(-)e/o-*, *-an(-)e/o-*, and *-(i)sk(-)e/o-* (on which see also footnote 23). The first two classes actually form simple thematic aorists, whose stem-forming suffix has the same distribution as its complex thematic counterpart, as shown in **Tables 12–13**. **Table 14** exemplifies two *-(i)sk(-)e/o*-verbs without and one with reduplication in the present stem. The finite aorist forms are given as unaugmented.

1pl.pres.	**Ptcp.act.**	**1pl.aor.**	**Ptcp.act.**	**Verbal adj.**
tém-n(-)o-men	**tém**-n(-)o-nt-	**tám**-o-men	**tám**-o-nt-	**tmē**-tó- ‘cut’
cut-V-1PL.ACT	cut-V-PTCP-	cut-V-1PL.ACT	cut-V-PTCP-	cut-VA-
kám-n(-)o-men	**kám**-n(-)o-nt-	**kám**-o-men	**kám**-o-nt-	-**kmē**-to- ‘wrought’
toil-V-1PL.ACT	toil-V-PTCP-	toil-V-1PL.ACT	toil-V-PTCP-	toil-VA-
pí-n(-)o-men	**pí**-n(-)o-nt-	**pí**-o-men	**pí**-o-nt-	**po**-tó- ‘what one drinks’
drink-V-1PL.ACT	drink-V-PTCP-	drink-V-1PL.ACT	drink-V-PTCP-	drink-VA-

Table 12: *-n(-)e/o*-verbs, 1pl.pres.act. & 1pl.aor.act. (augment excluded), active participles, verbal adjective (VA); root = **bold**, stem = underlined.

1pl.pres.	**Ptcp.**	**1pl.aor.**	**Ptcp.**	**Verbal adj.**
punth-an(-)ó-metha	**punth**-an(-)ó-men-	**puth**-ó-metha	**puth**-ó-men-	á-**pus**-to-
learn-V-1PL.MID	learn-V-PTCP-	learn-V-1PL.MID	learn-V-PTCP-	NEG-learn-VA-
lanth-án(-)o-men	**lanth**-án(-)o-nt-	**láth**-o-men	**láth**-o-nt-	á-**las**-to-
forget-V-1PL.ACT	forget-V-PTCP-	forget-V-1PL.ACT	forget-V-PTCP-	NEG-forget-VA-
lamb-án(-)o-men	**lamb**-án(-)o-nt-	**láb**-o-men	**láb**-o-nt-	(*-**lap**-tó-)
seize-V-1PL.ACT	seize-V-PTCP-	seize-V-1PL.ACT	seize-V-PTCP-	

Table 13: *-an(-)e/o*-verbs, 1pl.pres.act./mid. & 1pl.aor.act./mid. (augment excluded), act./mid. participles, verbal adjective (VA); root = **bold**, stem = underlined.

1pl.pres.act.	Ptcp.act.	1pl.aor.act	Ptcp.act.	Verbal adj.
thnḗ-isk(-)o-men	**thnḗ**-isk(-)o-nt-	**thán**-o-men	**thán**-o-nt-	**thnē**-tó- ‘mortal’
die-V-1PL	die-V-PTCP-	die-V-1PL	die-V-PTCP-	die-VA-
bó-sk(-)o-men	**bó**-sk(-)o-nt-	—	—	á-**bo**-to- ‘without pasture’[24]
feed-V-1PL	feed-V-PTCP-			NEG-feed-VA-
ki-**klḗ**-sk(-)o-men	ki-**klḗ**-sk(-)o-nt-	**kalé**-s(s)a-men	**kalé**-s(s)a-nt-	**klē**-tó- ‘summoned’
RED-call-V-1PL	RED-call-V-PTCP-	call-V-1PL	call-V-PTCP-	call-VA-

Table 14: *-(i)sk(-)e/o*-verbs, 1pl.pres.act. & 1pl.aor.act. (augment excluded), active participles, verbal adjective (VA); root = **bold**, stem = underlined.

Stems with complex thematic suffixes (including the ones in **Table 14**) are also able to form Ionic iterative preterits, as illustrated in **Table 15**.

	Iterative		Base	
a.	**bo**-sk(-)é-*sk(-)o*-men[25]	‘kept feeding’	**bó**-sk(-)o-men	‘feed’
b.	**pī**-n(-)é-*sk(-)o*-men[26]	‘kept drinking’	**pī́**-n(-)o-men	‘drink’

Table 15: Ion. iterative preterits from complex thematic present stems, 1pl. act.; root = **bold**, primary stem = underlined, iterative suffix = *italics*.

3.6 Interim summary

The main point of this section was to show that the distribution of the theme vowel *-e/o-* of simple thematic verbs corresponds to that of primary athematic verbalizers, and that both spell out the verbalizing head *v* (or an adjunct to it, in the case of the theme vowel), rather than Asp. Evidence for this comes from their semantics (i.e., their association with particular verb classes such as motion verbs or verbs of perception, or with telic/terminative inner aspect, cf. section 3.2), their adjacency to the root, their idiosyncratic root-selection, their ability to trigger root-specific alternations, and their ability to co-occur with elements that have been independently argued to spell out Asp (participial suffixes, the Ionic iterative preterite suffix). Moreover, complex thematic suffixes have the same distribution as simple thematic suffixes, in that they show up in

[24] Hsch. ἄβοτοι· αἱ μὴ κατανεμόμεναι βοτάναι ἢ οὐ φέρουσαι καρπόν (Latte & Cunningham 2018: 10); “*ábotoi*: (those) pastures/fields which are not used for grazing or which do not bear fruit”.

[25] 3pl.mid. βοσκέσκονθ’ *boskéskonth’*, Hom. *Od.* 12.355.

[26] 3sg.act. πίνεσκεν *pínesken*, Hom. *Il.* 16.226.

all finite forms and participles, but not in the verbal adjective (i.e., in root-selecting formations), and in the iterative preterit.

Having established these properties of primary verbalizers and verbal theme vowels, the next section compares the behavior of synchronic denominal verbs. Some of these, too, contain elements that could be interpreted as theme vowels. However, we will see that these do not pattern with the primary verbalizers/theme vowels according to the diagnostics established in this section, and should hence not be analyzed as verbalizing morphemes synchronically.

4 Denominal verbs

AG productively forms denominal and deadjectival verbs with the inherited present stem-forming complex thematic suffix **-j(-)e/o-* (other affixes are used as well, but this is by far the most common one in the present stem), as well as with aorist and perfect stem-forming suffixes (especially *-s(a)-* and *-(th)ē-* in the aorist; more on this below). The initial glide of the **-j(-)e/o-* suffix was lost well before the composition of the Homeric epics, but affected the final consonant or vowel of the nominal/adjectival base in specific ways. These sound changes gave rise to characteristic stem-final alternations of the different denominal and deadjectival verb classes. (17) summarizes the most important developments:

(17) a. Labial stop + *j* > *pt*
b. Voiced dental or velar stop + *j* > *z* (/dᶻ/ or /zd/)
c. Voiceless dental or velar stop + *j*: *-tt-* (Attic, Boeot.), *-ss-* (other dialects)
d. Liquid (*r, l*) or nasal (*m, n*) + *j*: Loss of *j* with gemination of preceeding consonant (i.e., *Vrj* > *Vrr*), or with compensatory lengthening of vowel preceeding liquid/nasal (i.e., *Vrj* > *V̄r*), depending on the dialect.
e. Intervocalic *j* is lost, initially creating a hiatus which is later followed by contraction (*VjV* > *VV* > *V̄*; outcome again depending on the dialect and the vowel sequence involved)

This very condensed summary will suffice for our purposes.[27] (17e) is especially important for denominal and deadjectival verbs from stems ending in a vowel, namely verbs in *-e-e/o-* (< ****-e-j(-)e/o-***), *-a-e/o-* (< ****-ă-j(-)e/o-***), and *-o-e/o-* (< ****-ŏ-j(-)e/o-***), the so-called contract verbs (*verba contracta*). Diachronically, these suffixes consist of the stem vowel of the nominal base (*-e-*, *-o-*, *-ā-*) + the theme vowel of the verbalizing suffix *-(j-)e/o-*. But the loss of the glide and subsequent contraction of the two vowels eventually gave rise to a new class of verbal theme vowels in the ancestors of the MG second conjugation verbs, whose vocalic themes are argued

[27] For a more detailed discussion of the morphophonology of the palatal glide in Greek, see, e.g., Schwyzer 1939: 712ff.; Rix 1992: 60ff., 90ff., 212f.; Barber 2013, ch. 7.

to be equivalent to *v* in Modern Greek (Alexiadou 2009; Spyropoulos et al. 2015; Panagiotidis et al. 2017). (18) summarizes the relevant vowel contractions and their development into MG.

(18) a. *-a-o-* > *ɔ:* (<ō>/ω) > MG *o*
b. *-a-e-* > *-ā-* > MG *a*
c. *-e-o-*, *-o-o-* > *o:* (<ou>/ *ov*) > MG *u*
e. *-ā-* > *-ē-* (*η*) > MG *i*

However, in Ancient Greek, especially in Homeric/epic Greek, the stem-final vowel of the nominal/adjectival base and the vowel of the verbalizing suffix are still clearly distinct affixes. **Table 16** gives some examples of presents and aorists (without the augment) in 1sg. a.) *-éō* (-έω), b.) *-áō* (-άω), and c.) *-óō* (-όω).

	Pres.	**Aor.**	**Meaning**	**Base**	
a.	**phil-é**-o-men	**phil-ḗ**-sa-men	'to love'	**phíl-o**-s	'dear'
	turann-é-o-men	**turann-ḗ**-sa-men	'to be a tyrant'	**túrann-o**-s	'tyrant'
b.	**nīk-á**-o-men	**nīk-ḗ**-sa-men[28]	'to be victorious'	**nī́kē, nī́kā**	'victory'
	tīm-á-o-men	**tīm-ḗ**-sa-men[29]	'to respect'	**tīmḗ, tīmā́**	'respect'
c.	**stephan-ó**-o-men	**stephan-ṓ**-sa-men	'to crown'	**stéphan-o**-s	'crown'
	orth-ó-o-men	**ōrth-ṓ**-sa-men	'to straighten'	**orth-ó**-s	'straight'

Table 16: Denominal verbs from vocalic bases (Tucker 1990), 1pl.act.; nominal/adjectival stem = **bold**, verbal stem = underlined.

Some comments on the phonology of these classes are in order before proceeding: Concerning the *-eō* class (a.), the nominal theme vowel of the base originally alternated between *-e-* and *-o-*, like in the verbal system (cf. the simple thematic verbs in **Table 2**). The original distribution of *-e-* and *-o-* is a bit more difficult to reconstruct than in the verbal system, but is synchronically still visible in the vocative singular of thematic nouns (e.g., voc.sg. ***túranne*** 'oh tyrant!'), and also reconstructable for the locative singular (which merged with the dative in Greek). It is also the alternant of the nominal theme vowel that surfaces in secondary formations (Schindler 1976), and therefore fully expected in denominal verbs like the ones in (a.). Within Greek, however, a more recent rule developed by which denominal and deadjectival verbs were derived from the *o*-alternant of the nominal theme vowel, giving rise to the *-oō* class in c. (see Tucker 1990 for a more detailed discussion of the development of these two classes).

In all three classes, there is a regular, morphologically conditioned alternation of the nominal/adjectival stem vowel, which is a short vowel in the present stem and a long vowel in the aorist

[28] Cf. aorist ptcp.act. **nīk-ā́**-sa-nt-, Pindar, *I.* 5.10, etc.
[29] Cf. **tīm-ā**-s-e (3sg.act), Pindar, *N.* 6.41, etc.

(and, where it exists, the perfect) stem. But because *ā* was raised to *ē* in Attic-Ionic, its nominal "theme vowel" in the aorist became *-ē-* in Classical (Attic) Greek, like in class a. (it remained *-ā-* in other dialects; some examples of such forms are given in the footnotes to **Table 16**).

With these facts in place, let us now compare how these verbs behave with respect to the diagnostics discussed in section 3. As expected, all three classes form present and aorist participles in *-nt-* and *-men-* of the structure √-N-V-PTCP (that is, containing both the nominal suffix of the base and the verbal stem-forming suffix).

In section 3.4, we saw that the verbal adjective suffix *-t-* selects roots or nominal stems (cf. ex. (12)). The verbal adjective forms in **Table 17** thus suggest that the vocalic stem elements of the denominal (and deadjectival) contract verbs were still interpreted as *nominal* suffixes, and therefore licensed to surface in the *-t-*verbal adjective, whereas synchronic verbalizers such as *-(j-)e/o-* and *-s(a)-* are not.

	Pres.act.	**Ptcp.act.**	**Aor.act.**	**Ptcp.act**	**Verbal adj.**
a.	**philé**-o-men	**philé**-o-nt-	**philḗ**-sa-men	**philḗ**-sa-nt-	**philē**-tó- 'loved, loveable'
b.	**tīmá**-o-men	**tīmá**-o-nt-	**tīmḗ**-sa-men	**tīmḗ**-sa-nt-	**tīmē**-tó- 'respected'
c.	**kholó**-o-men	**kholó**-o-nt-	**kholṓ**-sa-men	**kholṓ**-sa-nt-	**kholō**-tó- 'angered'

Table 17: Denominal verbs in *-éō* (a.), *-áō* (b.), *-óō* (c.), 1pl.pres. & aor.act., active participles, verbal adjectives; nominal/adjectival stem = **bold**, verbal stem = underlined.

Denominal and deadjectival verbs can moreover form Ionic iterative preterits, selecting the verbal stem (as expected) rather than the nominal or adjectival base, cf. **Table 18**.

Iterative	**Verbal base**		**Adj./nominal base**	
phile-é-*sk(-)o*-men	**philé**-o-men (pres.)	'love'	**phíl-o**-s	'dear'
sō-é-*sk(-)o*-men	**sṓ**-o-men (pres.)	'save, rescue'	**sṑ**-s (**sáo**-s)	'safe'
agnō-sá-*sk(-)o*-men	**agnṓ**-sa-men (aor.)	'fail to recognize'	***á-gnō**-s[30]	'not recognizing'
homo-klē-sá-*sk(-)o*-men	**homo-klḗ**-sa-men (aor.)	'call out, rebuke'	**homo-klḗ**	'rebuke'

Table 18: Ionic iterative preterits to denominal presents & aorists (1pl.act.), adj./nominal base = **bold**, denominal verbal stem = underlined, iterative suffix = *italics*.

[30] < **á-gno(i)o-s*, cf. Att. *ágnoia* 'ignorance'. The aorist stem *agnōsa-* is regularly contracted from *agno(i)ēsa-* (in, e.g., Hom. *Il.* 2.807); cf. Tucker 1990: 84.

Denominal and deadjectival verbs from stems that end in a consonant, illustrated in **Table 19** show exactly the same pattern: They form participles from the derived verbal stem, but verbal adjectives in *-t-* from the nominal base (to the exclusion of the verbalizing suffixes), cf. **Table 20**, and their iterative preterits mirror those of the vocalic stems as well, cf. **Table 21**.

Present	**Aorist**		**Base**	
sēmaín-o-men (< *-**mán**-j(-)o-)	**sēmḗn**-a-men (< *-**mán**-sa-)	'to indicate'	**sḗma(n)**-	'sign'
phulátt-o-men (< *-**ak**-j(-)o-)	**phulák**-sa-men	'to guard'	**phúlak**-s	'guard'
kharíz-o-men (< *-**id**-j(-)o-)	**kharís**-a-men (< *-**id**-sa-)	'to oblige'	**khárid/t**-	'kindness'

Table 19: Denominal verbs from consonantal bases (1pl.act.); nominal stem = **bold**, verbal stem = underlined.

Pres.ptcp.	**Aor.ptcp.**	**Verbal adj.**	**Base**	
sēmaín-o-nt-	**sēmḗn**-a-nt-	a- **sḗman**-to- 'leaderless'	**sḗma(n)**-	'sign'
phulátt-o-nt-	**phulák**-sa-nt-	a-**phúlak**-to- 'unguarded'	**phúlak**-s	'guard'
kharíz-o-nt	**karís**-a-nt-	a-**khárис**-to- 'ungracious'	**khárid/t**-	'kindness'

Table 20: Active participles & verbal adjectives of denominal verbs from consonantal bases; nominal stem = **bold**, verbal stem = underlined.

Iterative	**Verbal base**		**Nominal base**
poimain-é-*sk(-)o*-men	**poimaín**-o-men	'to (shep)herd'	**poimḗn** (*-**má(n)**-) 'shepherd'
eriz-é-*sk(-)o*-men	**eríz**-o-men (< *-**íd-j(-)o**-)	'to seek strife'	**érid**- 'strife'

Table 21: Ionic iterative preterits to denominal verbs from consonantal bases (1pl.act); nominal base = **bold**, denominal verbal stem = underlined, iterative suffix = *italics*.

Note that whether or not the verbal adjectives in **Table 20** are "part of the verbal paradigm" of these verbs or not is not at issue here[31]—for some or even all of these, it could be argued that they are synchronically denominal, like the forms in ex. (12). The point is that these forms allow us to distinguish clearly between root- and *n*-derived adjectives on the one hand, and *v*-derived adjectives ("participles") on the other. Moreover, these forms show that there is no difference in

[31] Schwyzer (1939: 501–2), for example, argues that *-t*-adjectives in general are not integrated into the verbal system ("nicht ins Verbalparadigma einbezogen") at the oldest stage of Greek.

the distribution of vocalic themes/bases and consonantal themes/bases (compare **Tables 17** and **20**): both pattern as *n* according to this diagnostic.

To conclude, denominal verbs provide crucial evidence that primary verbal stem-forming suffixes like *-j(-)e/o-* and *-s(a)-* realize *v* rather than Asp: Denominal and deadjectival verb formation is generally agreed to be one of the core properties of *v*. Crucially, both "imperfective" *-j(-)e/o-* and "perfective" *-s(a)-* productively form new denominal and deadjectival verbs at the oldest stage of Greek: As Tucker (1990) points out, there are several classes of denominal/deadjectival verbs in which the aorist stem is older or occurs more often than the present stem, such as the denominal *-áō*-class, in which "sigmatic stem forms are slightly more common than those based on the present stem, and other tense stems, particularly the aorist passive are quite well-attested." (Tucker 1990: 268) or the deadjectival factitive *-óō*-class, in which the sigmatic and passive aorist forms prevail at the oldest stage of the language (including in Mycenaean; Tucker 1990: 294–6). This suggests that "perfective" *-s(a)-*, "imperfective" *-j(-)e/o-*, and "passive" *-(th)ē-* could all be used to verbalize nouns and adjectives at this stage, and thus should be analyzed as verbalizers (rather than as Aspect or Voice markers as suggested by the traditional terminology), all the more so given that at least *-s(a)-* and *-(th)ē-* are associated with particular Aktionsart "flavors" at the earliest stage (transitive/factitive and inchoative, respectively). The traditional use of the *present* stem as citation form thus obscures the fact that this may not actually be the oldest or best-attested stem form of any given verb.

Finally, we have seen that at this stage the vocalic themes *-ĕ-*, *-ă-*, and *-ŏ-* of the denominal and deadjectival contract verbs still behave like nominal/adjectival affixes with respect to their distribution, and not like verbalizers or verbal themes, unlike their MG descendants. The details of when and how exactly they were reanalyzed as part of the verbal domain through UR (cf. section 2.2) on the way to MG still need to be further elucidated, however.

5 Conclusion: old and new "themes"

The main findings of this paper are twofold: First, we have seen arguments in favor of analyzing AG primary verbal stem-forming suffixes (athematic, simple thematic, and complex thematic ones) as realizing the verbalizing head *v*, rather than (perfective/imperfective) Asp. This was based on morphophonological and semantic criteria discussed in the literature (primarily on Modern Greek) on identifying verbalizers, as well as on two additional diagnostics, i.e., the ability of these verbal stem-forming suffixes to co-occur with morphology that can independently be argued to realize Asp, namely the participial morphemes and the Ionic iterative preterit in *-sk(-)e/o-*. The second finding is that the nonfinite forms of the verb can also be used to distinguish between verbal and nominal bases in secondary derivation, especially the formation of denominal and deadjectival verbs. Participles and verbal adjectives in AG select different "heights" of functional structure and can therefore be used as a diagnostic for the presence and

absence of *v* (as well as Voice, cf. Grestenberger 2018). Since the participial morphemes are synchronically *v*/Voice-selecting, while the verbal adjective-forming suffix *-t-* selects roots or nominal stems, this diagnostic shows that the AG "secondary" vocalic themes of the contract verbs in *-ĕ̄-o-*, *-ă̄-o-*, and *-ŏ̄-o-* have the same distribution as secondary consonantal themes and still pattern synchronically as nominal (/adjectival) morphemes. Given that these are argued to be verbalizers in Modern Greek, this suggests that these new "themes" (vocalic and otherwise) have arisen through the type of Upwards Reanalysis discussed in section 2.2. This confirms that at least one diachronic pathway for creating new theme vowels and other verbalizers is through the reanalysis of nominal and adjectival morphology in the context of derived verbs.

Naturally, there are still many open issues. The diagnostics presented here cannot distinguish between an analysis in which theme vowels are adjuncts to functional projections and one in which they are heads thereof. In fact, the distributional arguments for simplex vs. complex thematic suffixes are almost exactly the same as for, e.g., Spanish *-a-* vs. *-ific(-)a-* (Fábregas 2017). Moreover, additional evidence for the analysis of primary verbal stem-forming suffixes as *v* rather than Asp could come from a more detailed scrutiny of other deverbal forms (e.g., agent nouns and the formation of verbal abstracts). The account presented here could moreover have implications for understanding the nature of thematic formants such as the Latin first conjugation marker *-ā-* and second conjugation *-ē-* and their diachronic development in the Romance languages (cf. recent work on this topic such as, e.g., Calabrese 2015a; 2019; 2020; Bertocci & Pinzin 2020; 2021; Zyman & Kalivoda 2020; Pomino & Remberger 2022), as well as for the development of the Greek verb into Classical and eventually Modern Greek (e.g., Alexiadou 2021; Grestenberger Forthcoming).

Finally, the status of the inherited theme vowel *-e/o-* needs to be elucidated further. This element is so widespread that any meaningful generalization as to its semantics seems impossible, and it is moreover the only element that is able to adjoin to more than one functional position in a complex verb form in AG, reminiscent of the wellformedness condition in (4) by Oltra-Massuet & Arregi (2005). It thus differs from the distribution of the "new" MG verbalizers/verbal theme vowels which arose from a diachronic $n \rightarrow v$ reanalysis. The cause of this differing behavior is still to be determined, as is the ultimate origin of the verbal theme vowel.[32]

[32] No *communis opinio* exists on this matter, see Willi (2018: 185f.) and Villanueva Svensson (2021) for recent surveys. The latter actually proposes a denominal origin of the thematic conjugation (an idea that goes back at least to Vaillant 1937), which would then represent another instance of the $n \rightarrow v$ reanalysis discussed in section 2.2. Another standard explanation takes the thematic conjugation to be ultimately related to the PIE 3sg. ending **-e*, traditionally reconstructed as the 3sg. perfect active ending but more recently also in other contexts. This view is represented by Watkins 1969; Jasanoff 1998; 2003; 2017; among others, and essentially derives the verbal theme vowel from a reanalyzed inflectional ending. There is, however, also widespread agreement that there are different types and diachronic layers of thematic verb classes across the older IE languages which most likely arose in different manners.

Crucially, the analysis of AG primary verbal stem-forming suffixes as verbalizers could pave the way for a closer study and formalization of their Aktionsart properties, as well as of those of the newly developing, originally denominal and deadjectival suffixes. We have only hinted at these connections (e.g., *-(th)ē-*: inchoative (→ passive), *-nŭ̆-*: transitive-agentive, *-ŏ̆-e/o-*: factitive; *-eu-e/o-*: state/activity; *-sa-*: boundedness(?), etc.), but in the light of recent studies on the flavors of verbalizers and theme vowels, including the contributions to this special issue, a fresh look at the diachronic development of the Aktionsart and argument structure properties of these elements and their interaction with different types of roots and nominal/adjectival bases seems like a promising avenue for further research.

Abbreviations

ACC = accusative, ACT = active, AG = Ancient Greek, DAT = dative, DEM = demonstrative, FUT = future, M = masculine, MG = Modern Greek, MID = middle, NOM = nominative, NONACT = nonactive, PERF = perfect, PERS = person, PFV = perfective, PL = plural, PRON = pronoun, PRVB = preverb, PTCL = particle, PTCP = participle, SG = singular, V = verbalizer, VA = verbal adjective.

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Competing interests

The author has no competing interests to declare.

References

Alexiadou, Artemis. 2009. On the role of syntactic locality in morphological processes: The case of (Greek) derived nominals. In Giannakidou, Anastasia & Rathert, Monika (eds.), *Quantification, definiteness and nominalization,* 253–280. Oxford: Oxford University Press.

Alexiadou, Artemis. 2013. Where is non-active morphology? In Müller, Stefan (ed.), *Proceedings of the 20th International Conference on Head-Driven Phrase Structure Grammar*, 244–262. Stanford: CSLI publications. DOI: https://doi.org/10.21248/hpsg.2013.13

Alexiadou, Artemis. 2021. Reanalysis of morphological exponence: A cross-linguistic perspective. *Journal of Historical Syntax* 5(37). 1–27. DOI: https://doi.org/10.18148/hs/2021.v5i32-39.146

Alexiadou, Artemis & Anagnostopoulou, Elena. 2004. Voice morphology in the causative-inchoative alternation: Evidence for a non-unified structural analysis of unaccusatives. In Alexiadou, Artemis & Anagnostopoulou, Elena & Everaert, Martin (eds.), *The unaccusativity puzzle*, 114–136. Oxford: Oxford University Press. DOI: https://doi.org/10.1093/acprof:oso/9780199257652.003.0005

Alexiadou, Artemis & Anagnostopoulou, Elena & Schäfer, Florian. 2015. *External arguments in transitivity alternations: A layering approach.* Oxford: Oxford University Press. DOI: https://doi.org/10.1093/acprof:oso/9780199571949.001.0001

Alexiadou, Artemis & Doron, Edit. 2012. The syntactic construction of two non-active voices: Passive and middle. *Journal of Linguistics* 48. 1–34. DOI: https://doi.org/10.1017/S0022226711000338

Alexiadou, Artemis & Lohndal, Terje. 2017. On the division of labor between roots and functional structure. In D'Alessandro, Roberta & Franco, Irene & Gallego, Ángel J. (eds.), *The verbal domain,* 85–102. Oxford: Oxford University Press. DOI: https://doi.org/10.1093/oso/9780198767886.003.0004

Anagnostopoulou, Elena. 2003. Participles and voice. In Alexiadou, Artemis & Rathert, Monika & von Stechow, Arnim (eds.), *Perfect explorations,* 1–36. Berlin: de Gruyter. DOI: https://doi.org/10.1515/9783110902358.1

Anagnostopoulou, Elena & Samioti, Yota. 2014. Domains within words and their meanings: A case study. In Alexiadou, Artemis & Borer, Hagit & Schäfer, Florian (eds.), *The syntax of roots and the roots of syntax,* 81–111. Oxford: Oxford University Press. DOI: https://doi.org/10.1093/acprof:oso/9780199665266.003.0005

Arad, Maya. 2003. Locality constraints on the interpretation of roots: The case of Hebrew denominal verbs. *Natural Language and Linguistic Theory* 21. 737–778. DOI: https://doi.org/10.1023/A:1025533719905

Aronoff, Mark. 1994. *Morphology by itself: Stems and inflectional classes.* Cambridge, MA: MIT Press.

Baker, Mark. 1985. The Mirror Principle and morphosyntactic explanation. *Linguistic Inquiry* 16(3). 373–415.

Barber, Peter J. 2013. *Sievers' Law and the history of semivowel syllabicity in Indo-European and Ancient Greek.* Oxford: Oxford University Press. DOI: https://doi.org/10.1093/acprof:oso/9780199680504.001.0001

Bentein, Klaas. 2012a. Perfect periphrases in Post-Classical and early Byzantine Greek: An ecological-evolutionary account. *Journal of Greek Linguistics* 12. 205–275. DOI: https://doi.org/10.1163/15699846-00000002

Bentein, Klaas. 2012b. The periphrastic perfect in Ancient Greek: A diachronic mental space analysis. *Transactions of the Philological Society* 110(2). 171–211. DOI: https://doi.org/10.1111/j.1467-968X.2012.01289.x

Bentein, Klaas. 2013. Perfect. In Giannakis, Georgios K. (ed.), *Encyclopedia of Ancient Greek language and linguistics,* Leiden: Brill. DOI: https://doi.org/10.1163/2214-448X_eagll_COM_00000274

Bertocci, Davide. 2013. Nasal presents. In Giannakis, Georgios K. (ed.), *Encyclopedia of Ancient Greek language and linguistics,* Leiden: Brill. DOI: https://doi.org/10.1163/2214-448X_eagll_COM_00000244

Bertocci, Davide. 2017. Latin 1st class *-ā-* verbs as thematic formations: On the deficiency of IE roots. *Pallas* 103. 45–52. DOI: https://doi.org/10.4000/pallas.4047

Bertocci, Davide & Pinzin, Francesco. 2020. Two kinds of verbal roots in Latin: Evidence from thematic vowels and word-formation processes. *Lingue antiche e moderne* 9. 23–56.

Bertocci, Davide & Pinzin, Francesco. 2021. Morphology in action: Some issues in the formation of the Latin perfect. In Rodríguez, Antonio María Martín (ed.), *Linguisticae dissertationes. Current perspectives on Latin grammar, lexicon and pragmatics. Selected papers from the 20th International Colloquium on Latin linguistics (Las Palmas de Gran Canaria, Spain, June 17–21, 2019)*, 13–32. Madrid: Ediciones Clasicas.

Biberauer, Theresa. 2019. Children always go beyond the input: The Maximise Minimal Means perspective. *Theoretical Linguistics* 45(3–4). 211–224. DOI: https://doi.org/10.1515/tl-2019-0013

Biberauer, Theresa & Roberts, Ian. 2017. Parameter setting. In Ledgeway, Adam & Roberts, Ian (eds.), *The Cambridge handbook of historical syntax,* 134–162. Cambridge: Cambridge University Press. DOI: https://doi.org/10.1017/9781107279070.008

Bozzone, Chiara. 2012. The PIE subjunctive: Function and development. In Melchert, H. Craig (ed.), *The Indo-European verb. Proceedings of the Conference of the Society for Indo-European Studies, Los Angeles, 13–15 September 2010*. 7–18. Wiesbaden: Reichert.

Bruening, Benjamin. 2013. *By* phrases in passives and nominals. *Syntax* 16. 1–41. DOI: https://doi.org/10.1111/j.1467-9612.2012.00171.x

Brugmann, Karl. 1902–03. Die ionischen Iterativpräterita auf *-σκον*. *Indogermanische Forschungen* 13. 267–277.

Buijs, Michel. 2013. Participle. In Giannakis, Georgios K. (ed.), *Encyclopedia of Ancient Greek language and linguistics,* Leiden: Brill. DOI: https://doi.org/10.1163/2214-448X_eagll_COM_00000270

Calabrese, Andrea. 2015a. Irregular morphology and athematic verbs in Italo-Romance. *Isogloss* 2(1). 61–93. DOI: https://doi.org/10.5565/rev/isogloss.17

Calabrese, Andrea. 2015b. Locality effects in Italian verbal morphology. In Di Domenico, Elisa & Hamann, Cornelia & Matteini, Simona (eds.), *Structures, strategies and beyond: Studies in honor of Adriana Belletti,* 97–132. Amsterdam: Benjamins. DOI: https://doi.org/10.1075/la.223.06cal

Calabrese, Andrea. 2019. Morpho-phonological investigations: A theory of PF. From syntax to phonology in Sanskrit and Italian verbal systems. Manuscript, University of Connecticut. Available at https://andrea-calabrese.uconn.edu/publications/.

Calabrese, Andrea. 2020. Remarks on the role of the perfect participle in Italian morphology and on its history. *Probus* 32(2). 209–269. DOI: https://doi.org/10.1515/probus-2020-0006

Chantraine, Pierre. 1926. *Histoire du parfait grec.* Paris: Champion.

Chantraine, Pierre. 1984. *Morphologie historique du grec.* Paris: Klincksieck. 2nd ed., revised and enlarged.

Christopoulos, Christos & Petrosino, Roberto. 2018. Greek root-allomorphy without spans. In Bennett, William G. & Hracs, Lindsay & Storoshenko, Dennis Ryan (eds.), *Proceedings of the 35th West Coast Conference on Formal Linguistics,* 151–160. Somerville, MA: Cascadilla.

Cournane, Ailís. 2014. In search of L1 evidence for diachronic reanalysis: Mapping modal verbs. *Language Acquisition* 21(1). 103–117. DOI: https://doi.org/10.1080/10489223.2013.855218

de Vaan, Michiel. 2012. Latin deverbal presents in *-ā-*. In Melchert, H. Craig (ed.), *The Indo-European verb. Proceedings of the conference of the Society for Indo-European Studies, Los Angeles, 13–15 September 2010*, 315–332. Wiesbaden: Reichert.

Embick, David. 2000. Features, syntax, and categories in the Latin perfect. *Linguistic Inquiry* 31(2). 185–230. DOI: https://doi.org/10.1162/002438900554343

Embick, David. 2010. *Localism versus globalism in morphology and phonology*. Cambridge, MA: MIT Press. DOI: https://doi.org/10.7551/mitpress/9780262014229.001.0001

Embick, David. 2012. Contextual conditions on stem alternations: Illustrations from the Spanish conjugation. In Franco, Irene & Lusini, Sara & Saab, Andres (eds.), *Romance Languages and Linguistic Theory 2010. Selected papers from 'Going Romance', Leiden 2010,* 21–40. Amsterdam: Benjamins. DOI: https://doi.org/10.1075/rllt.4.02emb

Embick, David. 2015. *The Morpheme.* Berlin: de Gruyter. DOI: https://doi.org/10.1515/9781501502569

Fábregas, Antonio. 2017. Theme vowels are verbs. *Rivista di Grammatica Generativa* 39. 79–89.

Fischer, Olga. 2003. The development of the modals in English. In Hart, David (ed.), *English modality in context,* 17–32. Bern: Lang.

Folli, Raffaella & Harley, Heidi. 2005. Flavours of *v*: Consuming results in Italian and English. In Kempchinsky, Paula & Slabakova, Roumyana (eds.), *Aspectual inquiries*, 1–25. Dordrecht: Springer. DOI: https://doi.org/10.1007/1-4020-3033-9_5

Folli, Raffaella & Harley, Heidi. 2007. Causation, obligation, and argument structure: On the nature of little *v*. *Linguistic Inquiry* 38(2). 197–238. DOI: https://doi.org/10.1162/ling.2007.38.2.197

Fortson, Benjamin W. IV. 2010. *Indo-European language and culture: An introduction*. Malden, MA: Wiley-Blackwell, 2nd edn.

García Ramón, José Luis. 2014. From Aktionsart to aspect and voice: On the morphosyntax of the Greek aorists with -η- and -θη-. In Bartolotta, Annamaria (ed.), *The Greek verb: Morphology, syntax, and semantics. Proceedings of the 8th International Meeting on Greek Linguistics.* 149–182. Louvain-la-Neuve: Peeters.

Grestenberger, Laura. 2016. More span-conditioned allomorphy: Voice morphology in Classical Greek. In Hammerly, Christopher & Prickett, Brandon (eds.), *NELS 46: Proceedings of the Forty-Sixth Annual Meeting of the North East Linguistic Society,* vol. 2. 1–10. Amherst, MA: GLSA.

Grestenberger, Laura. 2017. On the syntax of the participles of Indo-European deponent verbs. In Le Feuvre, Claire & Petit, Daniel & Pinault, Georges-Jean (eds.), *Verbal adjectives and participles in Indo-European languages. Proceedings of the conference of the Society for Indo-European Studies, Paris, 24th to 26th September 2014*, 105–117. Bremen: Hempen.

Grestenberger, Laura. 2018. Deponency in finite and nonfinite contexts. *Language* 94(3). 487–526. DOI: https://doi.org/10.1353/lan.2018.0034

Grestenberger, Laura. 2019. Voice allomorphy and voice syncretism in Ancient and Modern Greek passives. Paper given at BCGL 12: Suppletion, allomorphy, and syncretism, Brussels, Dec. 16–17, 2019.

Grestenberger, Laura. 2020. The diachrony of participles in the (pre)history of Greek and Hittite: Losing and gaining functional structure. *Diachronica* 37(2). 215–263. DOI: https://doi.org/10.1075/dia.18040.gre

Grestenberger, Laura. 2021. Two types of passive? Voice morphology and "low passives" in Vedic Sanskrit and Ancient Greek. In Grohmann, Kleanthes K. & Matsuya, Akemi & Remberger, Eva-Maria (eds.), *Passives cross-linguistically: Theoretical and experimental approaches,* 210–245. Leiden: Brill. DOI: https://doi.org/10.1163/9789004433427_008

Grestenberger, Laura. 2022. Periphrastic perfects in Greek and Sanskrit. In Grestenberger, Laura & Reiss, Charles & Fellner, Hannes A. & Pantillon, Gabriel Z. (eds.), *Ha! Linguistic Studies in Honor of Mark R. Hale,* 93–115. Wiesbaden: Reichert. DOI: https://doi.org/10.29091/9783752000856

Grestenberger, Laura. Forthcoming. The diachrony of verbalizers in Indo-European: Where does *v* come from? In *Journal of Historical Syntax*.

Harley, Heidi. 2005. How do verbs get their names? Denominal verbs, manner incorporation, and the ontology of verb roots in English. In Erteschik-Shir, Nomi & Rapoport, Tova (eds.), *The syntax of aspect: Deriving thematic and aspectual interpretation*, 42–64. Oxford: Oxford University Press. DOI: https://doi.org/10.1093/acprof:oso/9780199280445.003.0003

Harley, Heidi. 2009. The morphology of nominalizations and the syntax of *v*P. In Giannakidou, Anastasia & Rathert, Monika (eds.), *Quantification, definiteness and nominalization*, 320–342. Oxford: Oxford University Press.

Harley, Heidi. 2013. External arguments and the Mirror Principle: On the distinctness of Voice and *v*. *Lingua* 125(1). 34–57. DOI: https://doi.org/10.1016/j.lingua.2012.09.010

Harley, Heidi. 2017. The "bundling" hypothesis and the disparate functions of little *v*. In D'Alessandro, Roberta & Franco, Irene & Gallego, Ángel J. (eds.), *The verbal domain,* 3–28. Oxford: Oxford University Press. DOI: https://doi.org/10.1093/oso/9780198767886.003.0001

Haspelmath, Martin. 1992. From resultative to perfect in Ancient Greek. In Iturrioz Leza, José Luis (ed.), *Nuevos estudios sobre construcciones resultativos,* 187–224. Universidad de Guadalajara: Centro de Investigación de Lenguas Indígenas.

Haspelmath, Martin. 1995. The growth of affixes in morphological reanalysis. In Booij, Geert & van Marle, Jaap (eds.), *Yearbook of Morphology 1994*, 1–29. Dordrecht: Kluwer. DOI: https://doi.org/10.1007/978-94-017-3714-2_1

Haugen, Jason D. & Siddiqi, Daniel. 2013. Roots and the derivation. *Linguistic Inquiry* 44(3). 493–517. DOI: https://doi.org/10.1162/LING_a_00136

Hoffmann, Karl. 1970. Das Kategoriensystem des urindogermanischen Verbums. *Münchener Studien zur Sprachwissenschaft* 28. 19–41.

Hollenbaugh, Ian. 2018. Aspects of the Indo-European aorist and imperfect: Re-evaluating the evidence of the Ṛgveda and Homer and its implications for PIE. *Indo-European Linguistics* 6. 1–68. DOI: https://doi.org/10.1163/22125892-00601002

Hollenbaugh, Ian. 2021. The development of the imperfect in Ancient Greek from simple past to imperfective as a blocking phenomenon. *Journal of Greek Linguistics* 21. 58–150. DOI: https://doi.org/10.1163/15699846-02101003

Ittzés, Máté. 2008. Morphologie und Ursprung der ionischen Iterativpräterita. *Acta Classica Univ. Scient. Debrecen.* 44. 13–34.

Jasanoff, Jay H. 1998. The thematic conjugation revisited. In Jasanoff, Jay & Melchert, H. Craig & Oliver, Lisi (eds.), *Mír Curad: Studies in Honor of Calvert Watkins,* 301–316. Innsbruck: Institut für Sprachwissenschaft der Universität Innsbruck.

Jasanoff, Jay H. 2003. *Hittite and the Indo-European verb.* Oxford: Oxford University Press. DOI: https://doi.org/10.1093/acprof:oso/9780199249053.001.0001

Jasanoff, Jay H. 2004. "Stative" *-*ē*- revisited. *Die Sprache* 43 (2002–03 [2004]). 127–170.

Jasanoff, Jay H. 2017. PIE *u̯ei̯d*- 'notice' and the origin of the thematic aorist. In Hansen, Bjarne Simmelkjar & Whitehead, Benedicte Nielsen & Olander, Thomas & Olsen, Birgit Anette (eds.), *Etymology and the European Lexicon. Proceedings of the 14th Fachtagung der Indogermanischen Gesellschaft, 17–22 September 2012, Copenhagen.* 197–208. Wiesbaden: Reichert.

Joseph, Brian D. 1992. The Greek language. In Bright, William (ed.), *International Encyclopedia of Linguistics. 6 vols,* vol. 2, 86–93. Oxford: Oxford University Press.

Kastner, Itamar. 2020. *Voice at the interfaces: The syntax, semantics and morphology of the Hebrew verb* (Open Generative Syntax 8). Berlin: Language Science Press. DOI: https://doi.org/10.5281/zenodo.3865067

Kastner, Itamar & Martin, Fabienne. 2020. Dissolving the French conjugation classes. Paper presented at *Going Romance* 34, Paris 8, Nov. 27, 2020.

Kastner, Itamar & Martin, Fabienne. 2021. Requiem for a theme. Paper presented at *Theme vowels in V(P) Structure and beyond,* Online Workshop, Unversity of Graz, April 22–23, 2021.

Kastner, Itamar & Zu, Vera. 2017. Blocking and paradigm gaps. *Morphology* 27. 643–684. DOI: https://doi.org/10.1007/s11525-017-9309-8

Kimball, Sara. E. 2014. Homeric κρύπτασκε, ῥίπτασκε, and ἰσάσκετο. *Glotta* 90. 163–173. DOI: https://doi.org/10.13109/glot.2014.90.14.163

Kölligan, Daniel. 2007. *Suppletion und Defektivität im griechischen Verbum* (Münchner Forschungen zur historischen Sprachwissenschaft 6). Bremen: Hempen.

Kovačević, Predrag & Milosavljević, Stefan & Simonović, Marko. 2021. Theme-vowel minimal pairs show argument structure alternations. Paper presented at *Theme vowels in V(P) Structure and beyond,* Online Workshop, Unversity of Graz, April 22–23, 2021.

Latte, Kurt & Cunningham, Ian Campbell (eds.). 2018. *Hesychii Alexandrini Lexicon. Volumen I:* Α-Δ. Berlin: de Gruyter.

Leumann, Manu. 1977. *Lateinische Laut- und Formenlehre* (Lateinische Grammatik, vol. I). München: Beck.

LIV^2 = Rix, Helmut. 2001. *Lexikon der indogermanischen Verben. Bearbeitet von Martin Kümmel, Thomas Zehnder, Reiner Lipp und Brigitte Schirmer.* Wiesbaden: Reichert, 2nd edn.

Lowenstamm, Jean. 2014. Derivational affixes as roots. In Alexiadou, Artemis & Borer, Hagit & Schafer, Florian (eds.), *The syntax of roots and the roots of syntax,* 230–259. Oxford: Oxford University Press. DOI: https://doi.org/10.1093/acprof:oso/9780199665266.003.0011

Marantz, Alec. 2001. Words. Manuscript, Massachusetts Institute of Technology.

Marantz, Alec. 2007. Phases and words. In Choe, Sook-Hee & Yang, Dong-Wee & Kim, Yang-Soon & Kim, Sung-Hun & Marantz, Alec (eds.), *Phases in the theory of grammar,* 191–222. Seoul: Dong-In Publishing Company.

Meier-Brügger, Michael. 2010. *Indogermanische Sprachwissenschaft.* Berlin: de Gruyter, 9th edn. DOI: https://doi.org/10.1515/9783110251449

Meiser, Gerhard. 1993. Zur Funktion des Nasalpräsens im Urindogermanischen. In Meiser, Gerhard (ed.), *Indogermanica et Italica. Festschrift für Helmut Rix zum 65. Geburtstag,* 280–313. Innsbruck: Institut für Sprachwissenschaft der Universität Innsbruck.

Melchert, H. Craig. 2017. Mediopassives in **-ske/o-* to active intransitives. In Hajnal, Ivo & Kölligan, Daniel & Zipser, Katharina (eds.), *Miscellanea Indogermanica: Festschrift für José Luis García Ramón,* 477–486. Innsbruck: Institut für Sprachen und Literaturen der Universität Innsbruck.

Merchant, Jason. 2015. How much context is enough? Two cases of span-conditioned stem allomorphy. *Linguistic Inquiry* 46(2). 273–303. DOI: https://doi.org/10.1162/LING_a_00182

Milosavljević, Stefan & Arsenijević, Boban. 2022. What differentiates Serbo-Croatian verbal theme vowels: content or markedness? *Glossa: a journal of general linguistics* 7(1). DOI: https://doi.org/10.16995/glossa.8535

Mišmaš, Petra & Simonović, Marko. 2021. Roots pretending to be theme vowels: *e/i* in Slovenian. Paper presented at *Theme vowels in V(P) Structure and beyond,* Online Workshop, Unversity of Graz, April 22–23, 2021.

Napoli, Maria. 2006. *Aspect and actionality in Homeric Greek: A contrastive analysis.* Milano: Angeli.

Napoli, Maria. 2017. To what extent does the Greek participle participate in the passive voice system? In Cotticelli-Kurras, Paola & Sadovski, Velizar (eds.), *"In Participle We Predicate": Contributions of the Comparative and Historical Linguistics to Grammar and Semantics of Participle,* 109–127. Wien: Holzhausen.

Oltra-Massuet, Isabel & Arregi, Karlos. 2005. Stress-by-Structure in Spanish. *Linguistic Inquiry* 36(1). 43–84. DOI: https://doi.org/10.1162/0024389052993637

Oltra-Massuet, Maria Isabel. 1999. *On the notion of theme vowel: A new approach to Catalan verbal morphology*. Cambridge, MA: Massachusetts Institute of Technology MA thesis.

Panagiotidis, Phoevos & Spyropoulos, Vassilios & Revithiadou, Anthi. 2017. Little v as a categorizing verbal head: Evidence from Greek. In D'Alessandro, Roberta & Franco, Irene & Gallego, Ángel J. (eds.), *The verbal domain,* 29–48. Oxford: Oxford University Press. DOI: https://doi.org/10.1093/oso/9780198767886.003.0002

Pomino, Natascha & Remberger, Eva-Maria. 2022. Romance root suppletion and cumulative exponence: Fusion, pruning, spanning. *Languages* 7. 161. DOI: https://doi.org/10.3390/languages7030161

Pompei, Anna. 2012. Participio greco e converbi. *Archivio Glottologico Italiano* 97. 160–204.

Rainer, Franz. 2015. Mechanisms and motives of change in word-formation. In Müller, Peter O. & Ohnheiser, Ingeborg & Olsen, Susan & Rainer, Franz (eds.), *Word-formation.*

An international handbook of the languages of Europe, vol. 3. (Handbücher zur Sprach- und Kommunikationswissenschaft 40/3), 1761–1780. Berlin: de Gruyter.

Ralli, Angela. 2012. Greek. *Revue belge de Philologie et d'Histoire* 90(3). 939–966. https://www.persee.fr/doc/rbph_0035-0818_2012_num_90_3_8269. DOI: https://doi.org/10.3406/rbph.2012.8269

Reed, Sylvia. 2014. A Distributed Morphology analysis of tense and aspect in Greek. In Bartolotta, Annamaria (ed.), *The Greek verb: Morphology, syntax, and semantics. Proceedings of the 8th International Meeting of Greek linguistics,* 277–290. Louvain-la-Neuve: Peeters.

Rijksbaron, Albert. 2002. *The syntax and semantics of the verb in Classical Greek*. Chicago: The University of Chicago Press, 3rd edn.

Ringe, Don & Eska, Joseph F. 2013. *Historical linguistics: Toward a twenty-first century reintegration.* Cambridge: Cambridge University Press. DOI: https://doi.org/10.1017/CBO9780511980183

Rix, Helmut. 1986. *Zur Entstehung des urindogermanischen Modussystems* (Innsbrucker Beiträge zur Sprachwissenschaft 36). Innsbruck: Institut für Sprachwissenschaft der Universität Innsbruck.

Rix, Helmut. 1992. *Historische Grammatik des Griechischen. Laut- und Formenlehre.* Darmstadt: Wissenschaftliche Buchgesellschaft, 2nd edn.

Roberts, Ian & Roussou, Anna. 2003. *Syntactic change: A minimalist approach to grammaticalization.* Cambridge: Cambridge University Press. DOI: https://doi.org/10.1017/CBO9780511486326

Schäfer, Florian. 2008. *The syntax of (anti-)causatives.* Amsterdam: Benjamins. DOI: https://doi.org/10.1075/la.126

Schäfer, Florian. 2017. Romance and Greek medio-passives and the typology of Voice. In D'Alessandro, Roberta & Franco, Irene & Gallego, Ángel J. (eds.), *The verbal domain,* 129–152. Oxford: Oxford University Press. DOI: https://doi.org/10.1093/oso/9780198767886.003.0006

Schindler, Jochem. 1976. On the Greek type ἱππεύς. In Morpurgo Davies, Anna & Meid, Wolfgang (eds.), *Studies in Greek, Italic and Indo-European linguistics offered to Leonard R. Palmer on the occasion of his seventieth birthday,* 349–352. Innsbruck: Institut für Sprachwissenschaft der Universität Innsbruck.

Schreiner, Sylvia L. R. 2021. Span–conditioned allomorphy and late linearization: Evidence from the Classical Greek perfect. *Glossa* 6(1).64. 1–28. DOI: https://doi.org/10.5334/gjgl.1400

Schwyzer, Eduard. 1939. *Griechische Grammatik.* 1. Bd.: *Allgemeiner Teil, Lautlehre, Wortbildung, Flexion.* München: Beck.

Smyth, Herbert W. & Messing, Gordon M. 1956. *Greek Grammar*. Cambridge, MA: Harvard University Press.

Spyropoulos, Vassilios & Revithiadou, Anthi & Panagiotidis, Phoevos. 2015. Verbalizers leave marks: Evidence from Greek. *Morphology* 25. 299–325. DOI: https://doi.org/10.1007/s11525-015-9260-5

Steer, Thomas. 2013/2014. Die Entstehung der indogermanischen Nasal-Infix-Präsentien. *Münchener Studien zur Sprachwissenschaft* 67(2). 197–222.

Strunk, Klaus. 1967. *Nasalpräsentien und Aoriste. Ein Beitrag zur Morphologie des Verbums im Indo-Iranischen und Griechischen.* Heidelberg: Winter.

Strunk, Klaus. 1994. Relative chronology and Indo-European verb-system: The case of present- and aorist-stems. *Journal of Indo-European Studies* 22. 417–434.

Svenonius, Peter. 2016. Words and spans. In Siddiqi, Daniel & Harley, Heidi (eds.), *Morphological metatheory,* 201–222. Amsterdam: Benjamins. DOI: https://doi.org/10.1075/la.229.07sve

Tichy, Eva. 2004. *Indogermanistisches Grundwissen.* Bremen: Hempen, 3rd edn.

Tronci, Liana. 2005. *Gli aoristi con -(θ)η-: uno studio sulla morfosintassi verbale del greco antico.* Perugia: Guerra.

Tucker, Elizabeth. 1990. *The creation of morphological regularity: Early Greek verbs in -éō, -áō, -óō, -úō* and *-íō*. Gottingen: Vandenhoeck & Ruprecht.

Vaillant, André. 1937. L'origine des présents thématiques en *-e/o-*. *Bulletin de la Société de Linguistique de Paris* 38. 89–101.

van de Laar, Henri M.F.M. 2000. *Description of the Greek individual verbal systems.* Amsterdam: Rodopi. DOI: https://doi.org/10.1163/9789004485143

van Gelderen, Elly. 2004. *Grammaticalization as economy*. Amsterdam: Benjamins. DOI: https://doi.org/10.1075/la.71

van Gelderen, Elly. 2008. Where did Late Merge go? Grammaticalization as feature economy. *Studia Linguistica* 62(3). 287–300. DOI: https://doi.org/10.1111/j.1467-9582.2008.00150.x

van Gelderen, Elly. 2011. *The linguistic cycle: Language change and the language faculty*. Oxford: Oxford University Press. DOI: https://doi.org/10.1093/acprof:oso/9780199756056.003.0001

Vendler, Zénó. 1957. Verbs and times. *The Philosophical Review* 66(2). 143–160. DOI: https://doi.org/10.2307/2182371

Villanueva Svensson, Miguel. 2021. The origin of the Indo-European simple thematic presents. *Indo-European Linguistics* 9(1). 1–29. DOI: https://doi.org/10.1163/22125892-bja10010

Watkins, Calvert. 1969. *Geschichte der indogermanischen Verbalflexion* (Indogermanische Grammatik III,1). Heidelberg: Winter.

Watkins, Calvert. 1971. Hittite and Indo-European studies: The denominative statives in *-ē-*. *Transactions of the Philological Society* 70(1). 51–93. DOI: https://doi.org/10.1111/j.1467-968X.1971.tb01140.x

Weiss, Michael. 2020. *Outline of the historical and comparative grammar of Latin*. Ann Arbor: Beech Stave, 2nd edn.

Willi, Andreas. 2018. *Origins of the Greek verb*. Cambridge: Cambridge University Press. DOI: https://doi.org/10.1017/9781108164207

Zukoff, Sam. 2017. The reduplicative system of Ancient Greek and a new analysis of Attic reduplication. *Linguistic Inquiry* 48(3). 459–497. DOI: https://doi.org/10.1162/ling_a_00250

Zyman, Erik & Kalivoda, Nick. 2020. XP- and X^0-movement in the Latin verb: Evidence from mirroring and anti-mirroring. *Glossa: a journal of general linguistics* 5(1). 20. DOI: https://doi.org/10.5334/gjgl.1049