

The Morphology of Proto-Indo-European

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§1 Introduction

This chapter aims to provide an updated overview of Proto-Indo-European (PIE) morphology, broadly establishing the typological properties of the reconstructible system, and offering some new perspectives on certain controversial aspects of this reconstruction. In this respect, we hope to make this chapter both relevant and accessible to several audiences: to students of IE languages looking to understand which categories are reconstructed for the proto-language and what their formal exponents looked like, so that they may see the daughter languages in the light of their diachronic developments; to specialists in IE linguistics, who may be interested in a “state-of-the-art” assessment of long-standing issues in PIE morphology and, to a lesser extent, the proposals we advance here; and to general linguists pursuing typological, historical, or theoretical questions who wish to see what kinds of morphological categories are reconstructed for the IE languages, on what basis they are reconstructed, and what types of analyses have been proposed.

Considerations of length prohibit a comprehensive survey of PIE morphology, a subject which, even more than phonology and much more than syntax, has received tremendous attention in the long history of the field. In a treatment of this size we simply cannot do justice to the wealth of reconstructed PIE morphology; consider that as of 2017 the projected coverage of morphology in the series “Indogermanische Grammatik” (gen.ed. Lindner; see www.winter-verlag.de) encompasses six volumes! Similarly, we cannot provide full discussion of the breadth of vigorous and informed controversy that envelops certain areas of PIE morphology; only salient features will be examined, with in-depth treatment reserved for areas of particularly great controversy. Readers looking for an introduction to the state of the field may consult Fortson (2010) and Clackson (2007), and for a more extensive overview Meier-Brügger (2010), the last with rich bibliography. The most extensive handbook of PIE morphology to date remains Brugmann and Delbrück (1906), although it is necessarily antiquated (especially in lacking evidence from Anatolian and Tocharian) and is currently in the process of being replaced by the volumes of the aforementioned “Indogermanische Grammatik;” note finally that a massive collection of bibliography on IE morphology has been assembled by Heidermanns (2005).

§1.1 Methodological preliminaries In this chapter, we aim to describe the morphology of the last stage of the proto-language that is the ancestor of all the IE languages (including the Tocharian and Anatolian branches of the family), and that is thus directly reconstructible by application of the Comparative Method (e.g. Meillet 1925; Weiss 2014). We reserve the label PIE for this directly reconstructible stage, thereby distinguishing it from the common ancestor of the non-Anatolian IE languages (including Tocharian), an entity referred to here as Proto-Nuclear-Indo-European (PNIE), whose inner articulation remains difficult to define (our PNIE is equivalent to what other scholars call “core PIE,” Germ. *Restindogermanisch*). We distinguish the label PIE from the still earlier stage of the language reached via internal reconstruction on PIE data, which we refer to as pre-PIE. We will repeatedly have

formal opacity and come to be treated as monomorphemic (“demorphologized”). As a further consequence, words affected by this morphological change strongly tend to adopt the language’s default accentual pattern (whether or not this occurs depends on word frequency and other factors; cf. Sandell 2015:192–214) — in Greek, recessive accentuation, which ultimately reflects the BAP in modified form (i.e. leftmost within the accentable domain). The differing surface accents of (e.g.) Gk. *ekh^hl^hrós* ‘enemy’ and Gk. *gúros* ‘circle’ thus do not reflect a fundamental difference in the historical formation of each item; rather, the connection between reconstructible **gū-rós* ‘circle’ (substantivized from the adj. *gū-rós* ‘round’) and other **-ro-* adjectives became opaque and, as a result, the word was eventually subject to default accentuation, whence **gūr-ós* > *gúros* (on this example see Probert 2006b:232–3).

Cases of this kind show definitively that two accentual patterns can emerge diachronically without an earlier synchronic intraparadigmatic accentual alternation. Furthermore, such cases provide evidence for a type of prosodically optimizing, non-proportional analogical change that can also be observed within the historical record of English (cf. Kiparsky 2015:82–3). Within the ancient IE languages, the Greek evidence for this type of change finds further support in Vedic, where a similar analysis can account for the development of Vedic **-ti-*stems (like Ved. *matí-* > *máti-*), as well in the Anatolian languages, where it can explain a variety of forms (such as PIE nasal-infix presents; cf. §4.3.1) that unexpectedly exhibit initial surface accent (i.e. leftmost, in accordance with the PIE default pattern; see Yates 2015). A broader implication of this finding is that the existence of more than one accentual pattern associated with a single suffix is not a sufficient condition to reconstruct an alternating accentual paradigm at any historical stage. To the extent that individual paradigmatic reconstructions are founded on this premise (as in “proterokinetic” **-ti-*stems), their (pre-)PIE status must be viewed as uncertain.

Finally, taking a still wider perspective, Kiparsky (2010a, fthcm.) in particular has also challenged the typological naturalness of the paradigmatic classes. Although it is true that the typological pool of known morphophonological properties is not comprehensive (see however van der Hulst (1999) on the word prosodic systems of the languages of Europe, as well as the *StressTyp2* database site (<http://st2.ullet.net/>)), no clear parallel for the pre-PIE system has yet been brought forward. Part of the uncertainty here is terminological: before comparing the pre-PIE system to that of another language family, the linguistic claim needs to be formulated more precisely — in what sense do paradigms “exist” in pre-PIE morphology? Are they prosodic templates associated with certain derivational categories, and if so, which ones? Or are they intended to be the surface result of a pre-PIE lexical accent system, perhaps not dissimilar from the one we have reconstructed above? Given the real gaps in knowledge currently facing researchers who reconstruct PIE morphophonology (as outlined above) — in particular, the fact that it is not yet fully clear what determines the surface accent of derivationally complex forms — the amount that can be said confidently about pre-PIE accent and its relation to ablaut is limited. Reconciling the results of research on pre-PIE paradigms with the morphophonology of PIE and its daughter languages will likely remain a major project for years to come.

§4 PIE verbal morphology

This section provides an overview of the reconstructed morphology of the PIE finite verb and associated non-finite verbal categories such as participles and infinitives. The structure and early history of the PIE verb continues to be one of the most hotly contested areas in IE studies today. While some consensus concerning the reconstruction of the PNIE verb was reached in the early 20th century, the advent of Anatolian and Tocharian called into question many of the generally accepted features of this traditional reconstruction (see Jasanoff, this volume). Consequently, much of our discussion focuses, first, on the reconstructible features of the PNIE verb, then we proceed to address the more controversial PIE verb, as well as the issues that problematize its reconstruction. While we attempt to flag serious points of contention and offer critical discussion of the major competing views, non-specialists in particular need to be aware that there is little unanimity in the field on these topics and that, due to limitations of space, not all views can be considered here. Further discussion can be found in recent general overviews of the IE verb, which include Clackson (2007:90–113), Fortson (2010:88–112), Weiss (2011:377–98) and Meier-Brügger (2010:295–321). The standard reference work in the field is Rix and Kümmel (2001) (= *LIV*²), a comprehensive collection of reconstructed PIE verbal roots and their verbal formations in the individual languages. Jasanoff (2003a) re-examines the foundations of the IE verb, especially in light of the Anatolian (and to an extent Tocharian) evidence (see too Jasanoff fthcm. b). The collection of papers in Melchert 2012b is representative of

recent research on the IE verb.

§4.1 Structure of the PIE verb As in the nominal domain, PIE verbal morphology was highly affixal. This property is observed in PIE verb inflection where five grammatical categories were distinguished: *person*, *number*, *voice*, *tense*, and *mood* (we treat *aspect* (below) as a derivational category). Fusional inflectional suffixes encoded grammatical agreement with the subject (nominative-accusative syntactic alignment; see Keydana, this volume) for person (1st, 2nd, 3rd) and number (singular, dual, plural), as well as voice (or “diathesis”), either active or middle; for example, **-m* is an exponent of the features [1st person, singular, active], while **-o* expresses [3rd person, singular, middle]. Separate segmentable suffixes are reconstructible as markers of tense (non-past; past is unmarked) and mood (subjunctive; optative; imperative; indicative is unmarked). These inflectional categories are discussed individually in §4.2 below.

Verbal inflectional suffixes were added to the verbal stem, which was specified with certain grammatical features. In PNIE, verbal roots canonically formed three morphologically distinct verbal stems, traditionally and here referred to as “present,” “aorist,” and “perfect” (see further §4.3 below); this tripartite distinction is maintained only in Indo-Iranian and Greek. It is widely thought that the three stems expressed primarily differences of grammatical *aspect*. A speaker could his or her view of the eventuality of the verb as internally complex, which was the work of the present (or “imperfective”) stem; as a bounded, complete whole, using the aorist (or “perfective”) stem; or as a resulting state, using the perfect stem. The three grammatical aspects interact with lexical aspect. By “lexical aspect” (German *Aktionsart*) we mean the inherent semantics of a verb’s event structure, such as durativity or telicity, which are inherent as opposed to chosen by a speaker to express a viewpoint. In the case of PNIE, it is generally assumed that there was close agreement between grammatical and lexical aspect in the formation of tense-aspect stems: verbal roots with telic lexical aspect had an underived aorist stem (i.e. root aorist), whereas verbs with atelic lexical aspect had an underived present stem (i.e. root present). However, the agreement between lexical aspect and stem formation is in practice not nearly so neat; rather, there are numerous mismatches in both directions, relatively clear cases in which apparently telic roots form underived present stems, and apparently atelic roots form underived aorist stems. We will return to some of the specific mismatches below (§4.3). Another real issue with the PIE verbal system stems from the well-known difficulties associated with analyzing the “perfect” as an aspectual category cross-linguistically (cf. Comrie 1976:52), to which may be added the challenge of establishing the prototypical meaning of the PNIE perfect (see further §4.3.3 below). The question of grammatical aspect and stem formation has been and continues to be a major locus of research in Indo-European linguistics.

The deeper prehistory of the PNIE verbal system is one of the most controversial topics in IE linguistics today. In particular, two important structural features of the verbal system reconstructible for PNIE are absent in the Anatolian languages: (i) a grammaticalized aspectual contrast between present and aorist stems; and (ii) the perfect as a grammatical category. It is therefore *a priori* uncertain whether these verbal features — as well as certain others, like the subjunctive and the optative (see §4.2.4 below) — should be reconstructed for PIE and their absence in Anatolian attributed to historical loss, or whether they should instead be viewed as post-PIE innovations. These issues are discussed in more detail below, but we lay out now the major assumptions that guide our presentation.

We adopt the position, shared by the majority of scholars, that PIE had an imperfective/perfective aspectual contrast realized in the distinction between present and aorist stems. With respect to (ii), however, we follow Jasanoff (2003a) in the view that a PIE verbal system was broadly Anatolian-like, in that all verbs belonged to one of two formally distinct but — from a synchronic perspective — functionally undifferentiated conjugational classes, the **m*-conjugation or the **h₂e*-conjugation. Furthermore, we assume with Jasanoff (fthcm. b) that an important innovation of PNIE — i.e. after the departure of the Anatolian branch — was the grammaticalization of the perfect, which developed out of a set of PIE verbs with the formal characteristics of PNIE perfects, including reduplication and **h₂e*-conjugation inflection (see further §4.2 and §4.3.3 below). Adopting these views has significant implications for the PIE verbal system — for instance, on how the inflectional endings of the PIE verb are reconstructed. This issue is addressed further in §4.2.5 and §4.2.6, where the evidence for the reconstruction of PIE **m*-conjugation endings and **h₂e*-conjugation are separately assessed.

§4.2 PIE verbal inflection The PIE verb inflects for five grammatical categories, whose reconstructions are discussed individually below: *tense* (§4.2.1), *person* and *number* (§4.2.2), *voice* (§4.2.3), and *mood* (§4.2.4). The ex-

ponents of person, number, and tense were fusional inflectional suffixes (“personal endings”), which were added directly to a verbal aspectual stem. Two distinct sets of active voice inflectional endings are reconstructible for PIE, one that became associated with the PNIE “perfect” stem, and another with the PNIE present and aorist stems; the latter are sometimes referred to together as “eventive” active endings (and the present and aorist stems together as the “eventive” system), a label that stems from the older view that verbs marked with these endings were semantically opposed to a fundamentally stative perfect (now generally viewed as resultative-stative; see further §4.3.3 below).

These two sets of active endings have distinct cognates in the Anatolian languages, where all verbs belong to one of two synchronically arbitrary inflectional categories, usually referred to as the *mi*- and *hi*-conjugations (after their respective 1sg.npst.act. endings in Hittite, *-mi* and *-h(h)i*). Active forms of Anatolian *mi*-conjugation verbs have active personal endings clearly cognate with PNIE present/aorist active endings, and *hi*-conjugation verbs, with PNIE perfect (active) endings. In what follows, we refer to PIE verbal endings that underlie the former as the endings of the PIE **m*-conjugation, and to the latter as the endings of PIE **h₂e*-conjugation; the evidence for their reconstruction is discussed in §4.2.5 and §4.2.6 respectively. In addition, PIE had a third set of verbal inflectional endings associated with the middle voice. The distinction between verbs that select **h₂e*-conjugation endings in their active forms and those that select **m*-conjugation endings is not realized in their corresponding middle voice forms, both of which are marked the same set of middle endings; we assess the evidence for the formal reconstruction of these endings in §4.2.7 below.

§4.2.1 Tense Tense is a grammatical category that relates the time of the event described to another point in time, typically to the moment of the utterance (“absolute tense”), but in some cases, to the time of some other discourse-relevant event (“relative tense”) (for the distinction, cf. Comrie 1976:2). Tense cuts asymmetrically across the PNIE verbal aspectual categories. The imperfective stem shows a morphological contrast between non-past and past tense forms (*present* vs. *imperfect*), and according to a majority of researchers, so does the “perfect” stem (*perfect* vs. *pluperfect*), while the perfective stem has only forms that lack non-past tense marking (*aorist*); this system is represented in (20):

		ASPECTUAL STEMS			
		IMPERFECTIVE	PERFECTIVE	“PERFECT”	
(20)	TENSE	NON-PAST	present	—	perfect
	PAST	imperfect	aorist	pluperfect ²	

The imperfective and perfect stems differ in the way the tense contrast is encoded. Separate segmentable markers of tense are clearly reconstructible in the imperfective stem, where non-past tense (i.e. present) verbal forms are generally distinguished from past tense (i.e. imperfect) forms by the presence of an additional suffixal element — in the active voice, by the “*hic et nunc* particle” **-i*, and in the middle voice, by **-r* (Yoshida 1990; cf. Jasanoff, this volume). These morphemes may be viewed as markers of non-past tense (i.e. [– past]). Inflectional endings characterized by these suffixal elements are traditionally referred to as “primary” endings, while the unmarked endings of the past tense are called “secondary” (these labels, which confusingly appear to reverse their morphological relationship, are due to their association with “sequences of tenses” in traditional grammars, “primary” and “secondary” respectively). Thus (e.g.) the PNIE 1sg.prs.act. was marked with the primary ending **-m-i* (vs. the imperfect “secondary” ending **-m*), and the 3sg.prs.mid. form was marked with the primary ending **-o-r*/**-to-r* (vs. imperfect **-o*/*-to*); for the precise distribution of these tense markers and the evidence for their reconstruction, see the detailed discussion of the reconstructible verbal “personal endings” in §4.2.5 and §4.2.7 below. The aorist employs the same secondary endings as the imperfect, and is thus formally indistinguishable from the imperfect in certain stem classes (cf. §4.3).

Whether PNIE had a tense contrast in the “perfect” stem has long been debated (cf. Wackernagel 1926-8 [2009]:238 with references to older literature). It is now the majority view that the *pluperfect*, a past tense of the *perfect*, should be reconstructed for this stage (see especially Jasanoff 2003a:34–43). The synchronic systems of both Greek and Vedic include a separate pluperfect tense generally functioning as a past tense to the perfect, but

its PNIE status is complicated by serious difficulties in reconstructing the formal markers of this category — in particular, reconciling what appear to be significant discrepancies between the Greek and Vedic inflectional endings. It is most likely, however, that the PNIE pluperfect was formed by addition of the secondary endings associated with the present/aorist system to the perfect stem, as in Vedic, e.g. 1sg. *ávedam* ‘I knew’ (to the unreduplicated perfect *véda* ‘knows’; cf. §4.3.2 below); 3sg. *á-bi-bhe-t* ‘feared’ (to the presential perfect *bi-bhāy-a* ‘fears’). For a possible (albeit complicated) scenario by which the same endings underlie the markers of the Greek pluperfect, see Katz (2008) and Jasanoff and Katz (2016).

The reconstruction of a future, i.e. as a morphologically distinct, inflectional category of the verb, is controversial. Futurity could be expressed by the present indicative stem with or without an adverb expressly indicating the future (on expressions of the future in ancient IE languages see Wackernagel 1926-8 [2009]:246–65 and references in 247 n.14). Additionally, the subjunctive could refer to the future, with further modal meanings, in at least PNIE. A desiderative suffix **-h₂se/o-* meaning ‘wanting to do X’ comes to mark the future in a number of daughter languages. The suffix has the shape **-h₂s-e/o-* as reflected directly in Greek, indirectly elsewhere (for instance in the Celtic futures descended from desideratives; cf. Stüber, this volume). Examples from Greek include *tenéō*, *tenō* ‘I will stretch’ < **ten-h₂se/o-* (cf. pres. *teínō*), or *dérk-so-mai* ‘I will see’ < **derk-h₂s-e/o-*. What is very likely the same suffix with a slight formal innovation, viz. **-h₂s-ye/o-*, underlies the futures in Indo-Iranian and Baltic; e.g. Ved. *drak-ṣyá-ti* ‘he will see’ < **derk-h₂s-ye-ti* (on this morpheme cf. Jasanoff 2003a:134–5; note that others — e.g. Willi (2011) — would derive this future instead from an **s*-aorist subjunctive).

An additional prefix **(h₁)e-*, the “augment,” marks past tenses in Indo-Iranian, Greek, Phrygian, and, in a phonologically restricted way, Classical Armenian. Examples include Ved. *á-han* ‘he smashed’ < **e-g^{wh}en-t* (cf. 3sg.prs.act. **g^{wh}én-ti* ‘smashes’), Gk. *é-p^her-e* ‘he was carrying’ < **e-b^her-e-t* (cf. 3.sg.prs.act. **b^her-e-ti* ‘he carries’). However, in the earliest Indo-Iranian and Greek texts past tense forms are not obligatorily marked with the augment, which looks instead like an emerging, additional marker of [past]. Since no certain traces of the augment have been found in other IE languages, augmented verbal forms are not reconstructible for PIE. The augment is most often derived from a temporal deictic/anaphoric particle **h₁e* ‘then’ (cf. e.g. Meier-Brügger 2010:315–6 with references), although other etymological attempts have been made: Watkins (1963) (= 1994:3–51) derives the augment from a sentence connective seen in Anatolian (but cf. Melchert fthcm. a); as an alternative proposal, Willi (2007) proposes to derive it from a reduplicating syllable, originally marking perfective aspect and only secondarily past tense.

§4.2.2 Person & number There is general consensus that the PIE verb was morphologically marked for three persons (1st, 2nd, 3rd) and three numbers (singular, dual, plural). Of these features, only the dual is somewhat uncertain. As in the nominal system (cf. §2.1.2 above), the Anatolian languages synchronically lack dual number. It is generally held that the 1du. marker (of the **m*-conjugation) has ousted the 1pl. marker in the prehistory of Anatolian. The Proto-Anatolian 1pl. primary active ending may be uncontroversially reconstructed **-weni* (based on e.g. Hitt. *-weni*, Pal. *-wini/-wani*, CLuw. *-unni* < **-weni*). Based on the resemblance of initial *w* in **-weni* to the reconstructed dual **-we-*, it is thought that 1pl. **-weni* is ultimately cognate with the ending of (primary/secondary) 1du. in Indo-Iranian (Ved. *-vah₂/-va*) and Balto-Slavic (Lith. *-va*, OCS *-vě*). The *n*-element would be presumably the same as in the Gk. 1pl. *-men* (cf. Jasanoff 2003a:3, and cf. n.39, 47 n.98; more hesitantly, Kloekhorst 2008:1000–1). Against this reconstruction, we note that the diachronic change whereby a dual ousts the plural is not typologically trivial (see Corbett (2000:38–50, 268–71) for possible examples and discussion), and that no Anatolian language shows any other trace of the dual in the verb or in pronouns (possible traces in the noun are discussed in §2.1.2 above). Although no alternative scenario has yet won acceptance, it may be the case that Proto-Anatolian **-weni* does not reflect an erstwhile dual marker (blended from dual **-wes* and pl. **-meni*). One attractive (if speculative) suggestion would reconstruct the cross-linguistically common category “inclusive” for the marker **-we*, which would then have become the Anatolian 1pl. **-weni* and the PNIE 1du., thus constituting another significant rift between the PIE and PNIE verb; for this reconstruction see Watkins (1969:46-8) (cf. Sihler 1993).

§4.2.3 Voice Two morphological voices are reconstructible for PIE, active and middle. This bivalent system is maintained unaltered in Anatolian and Tocharian; the opposition between active and middle is also continued in

Indo-Iranian and in Greek, albeit with the later development of a separate (partially morphologically distinct) passive voice in these branches. This opposition is securely reconstructible only for the PNIE present/aorist system. Indo-Iranian and Greek both synchronically make middle forms to the perfect stem, but do so using the same morphology as the present/aorist system (rather than distinctive PNIE “perfect” morphology); this lack of differentiation suggests that the development of the perfect middle as a category was chronologically “late,” although potentially already a feature of PNIE itself (cf. Jasanoff 2003a:44–5). Active and middle voices are characterized by distinctive inflectional endings. The active and middle endings reconstructible for PNIE generally bear little formal relationship to one another (e.g. 1sg.prs.act. **-mi* vs. mid. **-h₂er*); rather, the middle endings closely resemble the endings of the PNIE perfect (active), a feature which has been argued to reflect a pre-PIE connection between them (on which see §4.2.7 below).

Already by the PIE stage, however, the middle had become both formally and functionally differentiated from the ancestor of the PNIE perfect. One core function of the PIE middle was to express subject affectedness, which is clearly observed in transitive verbal stems that alternate between active and middle forms. In such oppositional pairs, middle morphology marks verbs that are reflexive (e.g. mid. Gk. *loué-tai* ‘washes him/herself’ vs. act. *loué-ei* ‘washes’), reciprocal (Ved. *yúdhya-ante*, Hitt. *zahhīy-anta* ‘they fight each other’ vs. Ved. *yúdhya-anti*, Hitt. *zahhīy-anzi* ‘they fight (someone)’), and self-benefactive (Ved. *yája-te* ‘sacrifices for his/her own benefit’ vs. *yája-ti* ‘sacrifices’). Middle morphology is also frequently used when the subject of a verb (transitive or intransitive) is non-agentive. It therefore surfaces on anticausatives in “causative alternation” verbs (see, e.g., Haspelmath 1993) — for instance, mid. Gk. *p^húe-tai*, Ved. *várdha-te* ‘grows (intr.)’ vs. act. Gk. *p^hú-ei*, Ved. *várdh-ati* ‘grows (tr.)’. Many non-agentive verbs, however, are *media tantum*, i.e. take only middle morphology. The class of PNIE *media tantum* — traditionally referred to in the IE literature as “deponents” (following Latin grammarians) — includes many verbs belonging to semantic types that cross-linguistically tend to exhibit middle morphology in languages where such dedicated morphology exists (see Kemmer 1993:41–94). These types include: verbs of cognition, e.g. PNIE **m₁-yé-tor* > Ved. *mánya-te*, ‘thinks’, OIr. *-maine-thar* ‘id.’, Gk. *maíne-tai* ‘rages’; non-translational motion verbs, e.g. PNIE **sék^w-e-tor* ‘accompanies; follows’ > Ved. *sáca-te*, OAv. *hacai-tē*, Gk. *hépe-tai*, Lat. *sequi-tur*, OIr. *sechi-thir*; PNIE **h₃ér-(t)o* > Ved. (*prá*) *ār-ta* ‘set forth’, Gk. *ōr-to* ‘arose’ (and from the same root, Lat. *ori-tur* ‘rises’); and stative verbs, e.g. PIE *wés-(t)or* ‘wears’ > Ved. *vás-te*, OAv. *vas-tē*, Gk. *heî-tai*, Hitt. *wěš-ta*. The IE languages also attest a number of agentive *media tantum* verbs, e.g. Ved. *dáya-te*, Gk. *daíe-tai* ‘distributes’; TA/B *pāš-tār*, Hitt. *paḥḥš-ari* ‘protects’. Several verbs of this type — which notably exhibit a “mismatch” between semantics and morphology — are reconstructible for the proto-language; for an assessment of the evidence, see Grestenberger (2014a:225–53, 2016).

No separate passive can be reconstructed for PIE (or PNIE), its functions being expressed by middle morphology (for which reason it is often referred to as “mediopassive”). The passive use of the middle is attested in all of the oldest IE languages (cf. Hettrich 1990), including with expressed agent (in the instrumental case; see Jamison 1979a,b, Melchert 2016a), although the rarity of examples within these languages suggests that this usage was relatively uncommon. A separate passive voice with distinctive morphology arises in many of the daughter languages (with or without loss of the middle). For instance, in the imperfective stem Vedic has an opposition between middle and passive, adding to the root the (always accented) suffix *-yá-* (a specialization of PIE **-yé/ó-*; cf. §4.3.1) plus middle morphology to mark passive voice, e.g. (3sg.prs.pass.) Ved. *kṣī-yá-te* ‘is destroyed’ (cf. mid. *kṣī-ya-te* ‘perishes’ with root accent) (see Kulikov 2012). Meanwhile in Greek a similar opposition developed in the perfective stem, with the emergence of a distinct aorist passive formed by suffixation of **(t^h)ē-* plus secondary active endings to the verbal root, e.g. (3sg.aor.pass.) Gk. *e-gráp^h-ē* ‘it was written’, *e-lú-t^h-ē* ‘was released’ (cf. mid. *e-gráp-sa-to* ‘wrote for him/herself’, *e-lú-sa-to* ‘released him/herself’). It is standardly assumed that the passive usage was an inner-Greek innovation, with the original core of the category formed by non-passive intransitive (i.e. anticausative) aorists, e.g. *e-mán-ē* ‘went mad’, *e-(w)ág-ē* ‘broke’; on the historical origin of this category, see §4.3.1 below, and for discussion of the *-ē-/-t^h-ē-* alternation in the suffix, Jasanoff 2003b:165–7 with references.

An older position — advanced by Oettinger (1976), influentially upheld by Rix (1988) and presupposed in *LIV*² — maintains that PIE had a third voice beside active and middle, the “stative” (Germ. *Stativ*). According to this view, the “stative” is continued in Indo-Iranian verbal forms like 3sg.prs. Ved. *śáy-e* ‘lies’, pl. *sé-re* (= YAv. *sōi-re/saē-re*), and ipfc. *á-sé-ran* (< **k^éy-o-i, -ro-i, -ro(n)*), which semantically indicate a state, and are marked with endings that share features with the regular endings of the middle (3sg.prs. *-te* < **-to-i*) and the perfect active (3s.pfc. *-a*

< *-e; pl. -ur < *-rs) but differ synchronically from both.

However, clear typological parallels for a trivalent voice system contrasting active, middle, and stative are lacking, and the actual evidence in support of reconstructing a third voice is slim. Only in the third person (sg./pl.) would distinctive “stative” endings be reconstructible; elsewhere in their paradigm, the relevant verbs use ordinary middle morphology (e.g. 2sg.prs. Ved. *śé-še* ‘you lie’), and functionally equivalent forms are attested in later texts marked with synchronically regular middle endings (3sg.prs.mid. Ved. *śé-te* (= YAv. *saē-te*), *śé-re* ‘lie(s)’). Moreover, in Anatolian, there is robust evidence for a 3sg.npst.mid. ending *-or (e.g. CLuw. *zīy-ar* ‘lies’; see further §4.2.7 below), from which the “stative” 3sg.prs. ending *-oi can be derived straightforwardly by regular Indo-Iranian replacement of the inherited *r-present tense marker of the middle with the *-i of the active (cf. 3sg.prs.mid. Ved. -te < PIIr. -tai < < PIE *-tor); within Anatolian, the reflexes of *-or mark ordinary 3sg.mid. forms, some which are clearly non-stative, e.g. Hitt. *ḫatt-ari* ‘strikes’, *paršiy-a* ‘breaks’ (cf. Yoshida 2013:157).

In view of these issues, the “stative” is better treated as a transient effect of the renewal of middle morphology (cf. Jasanoff 2003a:49–51). In the third singular the situation is clearest: two allomorphs of the 3sg.mid. ending are reconstructible for PIE, older unproductive *-o(r), and younger productive *-tor, the latter having been created on the model of the corresponding *m-conjugation active ending *-t(i) in accordance with a pattern that is well-established in IE languages (cf. §4.2.7 below). Archaic *-o(r) was gradually replaced by productive *-to(r) within the IE languages, but was exceptionally retained under certain conditions — for instance, when forms marked by *-or became semantically specialized, such as Ved. *bruv-é*, OAv. *mruī-ē* ‘is called’, whose passive sense contrasts with that of the renewed middle forms Ved. *brū-té*, YAv. *mruī-te* ‘calls to oneself’. In other cases, retention of *-or may have been due to high frequency, e.g. in a core vocabulary item like Ved. *śáy-e* ‘lies’; yet even such forms are liable to renewal, and indeed, in chronologically later Vedic texts 3sg. forms of this same verb are attested with identical semantics marked with the productive 3sg.prs.mid. ending -te (as noted above).

§4.2.4 Mood The following moods may be reconstructed for the PNIE verb: indicative, imperative, subjunctive, optative. These are the moods of the verb in Greek and Indo-Iranian; inheritance in the other branches of PNIE assures at least a PNIE age. Anatolian, however, deviates from this picture: the Anatolian languages distinguish only indicative and imperative moods. Hittite, for example, expresses the potential, the unreal, the wished for — notions associated with the subjunctive and optative (as well as the indicative) in PNIE languages — with the particle *man*. Consequently, the reconstruction of the subjunctive and the optative for the stage of PIE including Anatolian will depend on one’s evaluation of possible relic forms in Anatolian, together with one’s stance as regards loss vs. non-inheritance in the prehistory of Anatolian.

The current understanding of moods in PIE is buttressed by centuries of fine-grained philological work. Representative research in this vein includes the foundational study of Delbrück (1871), more recently e.g. Tichy (2006); for an overview of the study of moods within Indo-European linguistics (with older bibliography) see Wackernagel (1926-8 [2009]:266–323). Studies that take advantage of recent theoretical research on modality are thin on the ground (for one example see Willmott 2007); continued incorporation of research on modality into the descriptions of ancient languages will aid progress towards a more refined reconstruction of the meaning of the moods in PIE (on modality see, e.g., Portner 2009 and the survey in Nuyts and Van der Auwera 2016).

We note here that many authorities include an “injunctive” mood in the PIE inventory. The injunctive is formally the augment-less verbal stem with secondary endings (on the “augment”, cf. §4.2.1 above). Because its existence depends on the contrast with augmented verbal stems, and because we do not reconstruct the augment for PIE, we do not reconstruct an injunctive for PIE; with Watkins (1969:45) we treat it as a category primarily of Old Indic grammar. In the most influential account of the injunctive, that of Hoffmann (1967), it is proposed that the augment designates past tense and, inversely, that the augment-less forms — the injunctives — cannot designate the past. In mythological (arguably narrative/preterital) passages of the *Rigveda* the injunctive would have the function of “mentioning” (“Erwähnung”), and its modality would be “memorative.” The textual and cross-linguistic plausibility of this verbal structure (a “memorative” modality) is questionable, and has been critiqued especially by Kiparsky (1968, 2005), whom we follow in treating the injunctive not as a mood but rather as a stem underspecified for mood (as well as tense), taking on its values for tense and mood from context.

For reference, a table of the PNIE moods is provided in (21):

FORMATION OF MODAL STEMS

	INDICATIVE/IMPERATIVE	SUBJUNCTIVE	OPTATIVE
(21)	$*h_1(e)s-$ ‘be’ ($*h_1s-d^hi$)	$*h_1es-e/o-$ ($*h_1és-e-t(i)$)	$*h_1s-yeh_1-$ / $*h_1s-ih_1-$ ($*h_1s-yéh_1-t$)
	$*li-n(e)-k^w-$ ‘leave’ ($*li-n-k^w-d^hi$)	$*li-ne-k^w-e/o-$ ($*li-né-k^w-e-t(i)$)	$*li-n-k^w-yeh_1-$ / $*li-n-k^w-ih_1-$ ($*li-n-k^w-yéh_1-t$)
	$*b^her-e/o-$ ‘carry’ ($*b^héré$)	$*b^her-e-e/o-$ ($*b^hér-ē-t(i)$)	$*b^her-o-ih_1-$ ($*b^hér-oi(h_1)-t$)
	$*prk-ske/o-$ ‘ask’ ($*prk-ské$)	$*prk-ske-e/o-$ ($*prk-ské-ē-t(i)$)	$*prk-sko-ih_1-$ ($*prk-skó-oi(h_1)-t$)

§4.2.4.1 Imperative The imperative basically expressed orders and commands (more generally and more technically, “directives”). In the 2nd singular active of athematic verbs, the ending was either zero or $*-d^hi$ added to the weak stem; e.g. Ved. 2sg.aor. *śru-dhí* ‘listen!’ < $*k̑lu-d^hi$ (root $*k̑lew-$ ‘listen’). Thematic verbs used the bare stem, as in Gk. *p^hére* ‘carry!’ < $*b^her-e$. The 2nd singular middle imperative ending exhibits greater diversity across the daughter languages: Lat. *-re* (< $*-so$), Gk. *-o* (< $*-so$), Ved. *-sva*, Hitt. *-(h)hut* ($*-h_2u-d^hi$), etc. Jasanoff (2006) attempts to reconcile the forms under the reconstruction $*-sh_2(u)wo$ (for which Barnes 2015 provides Old Irish comparanda). The 2nd person plural and dual active imperatives were identical to the corresponding indicative forms, thus (e.g.) 2pl. Ved. *bhára-ta*, Gk. *p^hére-te* ‘carry!’ (< $*b^héré-te$); 2du. (athematic) Ved. *i-tám*, Gk. *i-ton* ‘you two go!’ (< $*h_1i-tóm$), (thematic) Gk. *p^hére-ton*, Ved. *bhára-tam* ‘you two carry!’ (< $*b^héré-tom$). Similarly, plural and dual middle imperatives deployed the same endings as the indicative (cf. §4.2.5). What are traditionally called third-person imperatives are modal forms expressing the speaker’s wish that a third person act in some way. Two formations encoding these third-person imperatives may be reconstructed. The first formation is the suffix $*-u$ agglutinated to the endings of the third-person, $*-t-u$, $*-nt-u$ (Hitt. *eš-tu*, Ved. *ás-tu* ‘let it be’ < $*h_1es-t-u$). The second formation is a suffix $*-ōd$, also added to the secondary endings, as in the so-called “future imperative” in Lat. *-tōd* (Cl. Lat. *-tō*), Ved. *-tād*, Gk. *és-tō* < $*h_1es-t-ōd$.

§4.2.4.2 Subjunctive The subjunctive encoded various modal readings, of which a prospective and hortative are traditionally reconstructed. In athematic verbs, the subjunctive marker is added to the full-grade root; for instance, from the root $*h_1es-$ ‘be’ was formed $*h_1es-e-ti$ (cf. prs. $*h_1es-ti$ ‘is’). Thus in athematic subjunctive forms looked identical to thematic indicative forms — compare (e.g.) athematic subjunctive (3sg.prs.act.) $*h_1es-e-ti$ with thematic indicative $*b^her-e-ti$ (to $*b^her-$ ‘carry’). This formal identity may indicate a functional split; it has been suggested that the subjunctive functions developed from a present indicative (Bozzone (2012) and Dahl (2013) provide possible diachronic pathways for the change). If the stem was thematic, the theme vowel and the subjunctive suffix contracted to a long vowel. As far as inflectional endings go, there is conflicting evidence for whether primary or secondary endings were used with the subjunctive (on the Vedic evidence see García Ramón 2009); we reconstruct primary endings here, but this reconstruction is not certain. It should be noted that numerous daughter languages have categories called “subjunctive” in their grammars, but these may or may not derive from the PIE subjunctive. In Latin, for instance, what grammarians call the “subjunctive” reflects in large measure the PNIE optative, while the PNIE subjunctive has become one ingredient of the Latin future. We provide below a chart of stem formation for athematic and thematic indicatives and subjunctives in PNIE:

	ATHEMATIC PRS.IND.	ATHEMATIC SUBJ.	THEMATIC PRS.IND.	THEMATIC PRS. SUBJUNCTIVE
(22)	$*h_1es-ti$ ‘he is’	$*h_1es-e-ti$	$*b^her-e-ti$ ‘he carries’	$*b^her-e/o-e-ti$ ($*b^herēti$)
	$*h_1s-enti$ ‘they are’	$*h_1es-o-nti$	$*b^her-o-nti$ ‘they carry’	$*b^her-e/o-o-nti$ ($*b^herōnti$)

Whether the subjunctive is to be reconstructed for PIE will depend on one’s assessment of the Anatolian evidence. No Anatolian language has a living subjunctive; whether any Anatolian language has a relic of the subjunctive is disputed (for different viewpoints see Jasanoff, this volume and Oettinger, this volume). Jasanoff (2012a) analyzes the Hittite 2sg.imp. *paḫši* ‘protect!’, *eši* ‘settle, occupy!’, and *ēšši* ‘do, perform!’ as containing a PIE imperative ending $*-si$, which ultimately derives from 2sg. subjunctives built to a variety of sigmatic formations via haplology, i.e. $*-s-e-si > *-si$; thus *paḫši* ‘protect!’ would derive from a subjunctive $*peh_2-s-(e-s)i$. There is evidence from Indo-Iranian, Celtic, and Tocharian for reflexes of an imperative in $*-s-e-si > *-si$ (see Jasanoff 2003a:182–3

with references); however, it should be emphasized that Jasanoff's (2012a)'s proposed Anatolian reflex of $*-s(es)i$ would be the sole Anatolian outcome of the PIE subjunctive.

§4.2.4.3 Optative The PIE optative expressed at least wishes and potentialities (traditionally “cupitive” and “potential” respectively). In a more nuanced reading of the moods in Homeric Greek, Willmott (2007:113–52, esp. 120–1) argues that the optative shows broadly “negative epistemic stance,” i.e. the optative indicates that the event is not in line with the speaker's view of the world. The mark of the PIE optative was an ablauting suffix $*-yeh_1/ih_1-$ added to athematic stems, non-ablauting $*-ih_1-$ to thematic stems ($*-o-ih_1-$), plus the secondary endings. Thus to the root $*h_1es-$ ‘be’ would be formed the 3sg.act.opt. $*h_1s-yeh_1-t$ ‘he would be’, and to the thematic stem $*b^h_1er-e/o-$ ‘carry’ would be formed 3sg.act.opt. $*b^h_1er-o-ih_1-t$ ‘he would carry’. We note here that the thematic vowel and the optative suffix — $*-o-$ + $*-ih_1-$ — appear not to have contracted within PIE; evidence from the daughter languages suggests that the two morphemes remained disyllabic (for possible reasons why, see Jasanoff 2009). The table in (23) provides illustrative optative forms for athematic and thematic present stems:

ATHEMATIC				THEMATIC		
Ved.	Gk.	Lat.	PIE	Ved.	Gk.	PIE
(23) $syát$	$eíē$	$siēt$	$*h_1s-yéh_1-t$	$bháret$	$p^h_1éroi$	$*b^h_1ér-o-ih_1-t$
$syáma$	$eímen$	$sīmus$	$*h_1s-ih_1-me$	$bhárema$	$p^h_1éroimen$	$*b^h_1ér-o-ih_1-me$

The optative is well-preserved in Greek and Indo-Iranian. In other branches, reflexes of the optative are clearly inherited but go by different names. For instance, the Italic subjunctive reflects in part the optative; we have used the verb $siēd$ (Cl. Lat. sit), $sīmus$ to illustrate the paradigm (fuller details in Vine, this volume). In Balto-Slavic the optative develops into the synchronic imperative (standard Lithuanian “permissive”); in Tocharian, the optative has become the optative of TA and TB, as well as the TB imperfect; etc. Once again, Anatolian presents a divergent picture: there is no evidence for the optative in Anatolian. This absence could be interpreted as either loss (the optative would be inherited into Proto-Anatolian, with subsequent evanescence) or non-inheritance (i.e. Anatolian branched off before the category had developed). We think the latter option is likelier, but the matter is still *sub iudice*.

§4.2.5 Verbal endings of the PIE $*m$ -conjugation It was noted in §4.2 that PIE had two sets of reconstructible active verbal endings, fusional exponents of person, number, and voice. One of these sets was the common source of the active verbal endings of the PNIE present/aorist system and of the Anatolian *mi*-conjugation. We refer to these endings as the PIE $*m$ -conjugation endings.

Verbal stems selecting the PIE $*m$ -conjugation endings can be further subdivided into two conjugational classes, athematic and thematic, the latter characterized by a stem-final ablauting thematic vowel ($*o/e$). As in the noun (cf. §2.1.1), the distinction between these classes was purely formal. With the notable exception of the 1sg.prs.act. ending (and for some scholars also the 3sg.prs.act.; see below), thematic verbs have the same inflectional endings as the athematic classes, being formally distinguished from the latter only by the presence of the thematic vowel, which has $*o$ -quality in 1sg./pl. and 3pl. paradigmatic forms, and $*e$ -quality elsewhere — thus (e.g.) 1sg.act.ipfc.act. athematic $*-m$ vs. thematic $*-o-m$; 3sg. $*-t$ vs. $*-e-t$; 3pl. $*-(e)nt$ vs. $*-o-nt$. The exceptional 1(/3)sg.act. primary thematic endings are discussed below together with their corresponding athematic endings.

The PIE athematic $*m$ -conjugation inflectional endings that are securely reconstructible are given in (24). A following dash (-) indicates the possibility that the PIE ending had additional segmental material, the reconstruction of which is problematized by conflicting evidence in the daughter languages. The evidence for these individual reconstructions, as well as their problematic or controversial aspects, are discussed further immediately below.

		PIE * <i>m</i> -CONJUGATION ACTIVE ENDINGS			
		SINGULAR		PLURAL	
		1 ^{ry}	2 ^{ry}	1 ^{ry}	2 ^{ry}
(24)	1ST	*- <i>mi</i>	*- <i>m</i>		*- <i>me</i> -?
	2ND	*- <i>si</i>	*- <i>s</i>		*- <i>te</i> -
	3RD	*- <i>ti</i>	*- <i>t</i>	*-(<i>e</i>) <i>nti</i>	*-(<i>e</i>) <i>nt</i>

The reconstruction of the primary (athematic) singular active endings is wholly uncontroversial and supported by robust evidence across the daughter languages. The 1sg.act. ending *-*mi* is clearly attested in (e.g.) Hitt. Gk. *ei-mí*, Ved. *ás-mi*, OAv. *ah-mī*, OCS *jes-mǐ*, Hitt. *ēš-mi* ‘I am’, and somewhat less transparently in VOLat. ES-OM (Lat. *s-um*), Goth. *i-m*, OIr. *a-m* (< PIE **h₁és-mi*).

The 2sg.act. ending *-*si* is continued in Ved. *á-si* and OAv. *a-hū* ‘you are’, as well as Gk. *e-í* (< PGk. **e-hi*), Goth. *i-s* (< PIE **h₁é-si* with degemination of */*s-s*/; see Byrd, this volume). For this lexical item, some languages attest only forms with root-final **s* analogically restored (e.g. OLat. *es-s*, Hitt. *ēš-ši*; pace Kloekhorst 2016:238–41), or else such forms coexist with the directly inherited ones (e.g. Hom. Gk. *es-si*).

The 3sg.act. ending *-*ti* is reflected in Gk. *es-tí*, Ved. *ás-ti*, OAv. *as-tī*, OLith. *ēs-ti*, ORuss. *jes-tǐ*, CLuw. *āš-ti* ‘is’, and additionally, in Lat. *es-t*, Goth. *is-t*, OIr. *is* (< PIE **h₁és-ti*).

Thematic inflection differs substantially from athematic in the primary 1sg.act. ending, where the daughter languages reflect an ending *-*ō* instead of expected **-o-mi*, e.g. Gk. *p^hér-ō*, Lat. *fer-ō*, Go. *bair-a*, OCS *ber-ǫ* ‘I bear’ (< PNIE **b^her-ō*); this morphological irregularity was eliminated within some language branches, e.g. Indo-Iranian (cf. Ved. *bhár-āmi*, OP *bar-āmi*, YAv. *bar-āmi* ‘id.’). It is the majority view that thematic 1sg. *-*ō* historically contains the same suffix *-*h₂e* that is found in the 1sg. endings of the PNIE perfect (active) and the middle voice (PNIE pfc.act. *-*h₂e*, 1sg.mid. *-*h₂e-r*; see further below). Since Pedersen (1938:80–6), some scholars have suspected that the simple thematic conjugation, the PNIE perfect, and the middle voice are historically related; pursuing this hypothesis, Watkins (1969:66–9, 105–23, *et passim*) proposed that *-*ō* descends from a unitary pre-PIE type underlying these three categories (later developed by Jasanoff (1978; 1998; 2003a, *et seq.*) as the “proto-middle;” see further discussion in §4.2.7), whose verbal paradigm had a 1sg. ending in ***-h₂e* and 3sg. in ***-e* (like the **h₂e*-conjugation; see §4.2.6 below). Some members of this category were eventually thematized — according to Watkins (1969), via reanalysis of 3sg. forms like ***b^her-e* as zero-marked ***b^here-ø*, whence new 1sg. ***b^hér(-)e/o-h₂e*. Generally these “pre-thematic” forms would then be re-characterized with ordinary PNIE **m*-conjugation active endings (e.g. 2sg. **b^hér-e-si*), but 1sg. ***-e/o-h₂e* was exceptionally retained, developing into P(N)IE *-*ō* (probably via *-*oh₂*, with apocope due to the same phonological process as in the thematic neuter dual ending; see §2.1.1).

Watkins (1969) further argued that *t*-less 3sg. forms like ***b^her(-)e* are directly reconstructible for PIE. Most of Watkins’ comparative evidence for this reconstruction (from Tocharian, Celtic, and Balto-Slavic) can be explained more straightforwardly as reflexes of *-*e-ti* (see Jasanoff 2003a:59–60). Somewhat more problematic is the evidence from Greek, where it is maintained by some (e.g. Rau 2009b:186 n. 14) that thematic verbs like Gk. *p^hér-ei* ‘carries’ directly continue ***b^her(-)e-i* (with only the addition of the present tense marker *-*i*; cf. §4.2.1). However, this analysis would imply a surprising divergence between Greek and other NIE languages with closely related verbal morphology (esp. Indo-Iranian, e.g. 3sg. Ved. *-a-ti*; economy therefore recommends the alternative approach, first proposed by Kiparsky (1967) and revised by Cowgill (1985) and Willi (2012), which derives the Greek thematic 3sg. ending *-ei* from *-*e-ti* via metathesis at word boundary followed by the regular loss of word-final stops in Greek (i.e. *-*eti#* > *-*ei-t#* > *-ei#*). Thus only a single thematic 3sg. ending *-*e-ti* is securely reconstructible for PIE, although Watkins’s (1969) *t*-less reconstruction may have obtained at an earlier, pre-PIE stage (cf. Jasanoff 2003a:148–9).

Similarly straightforward is the reconstruction of the secondary singular active endings. The 1sg.act. ending *-m* is reflected in (aor.) Ved. *á-sthā-m*, Gk. *é-st^hē-n* ‘I stood’ (< PNIE **steh₂-m*), as well as in the Latin (synchronic) imperfect ending *-bā-m* (see Vine, this volume). Thematic verbs show the expected 1sg.act. ending *-*om*, e.g. Gk. *é-p^hér-on*, Ved. *á-bhar-am*, YAv. *bar-əm*, OP *a-bhar-am* ‘I was bearing’ (< PNIE **bhér-om*).

The 2sg.act. ending *-*s* is directly continued in Ved. *á-dhā-s*, OAv. *dā-s(-ca)* ‘you placed’, Hitt. *tē-s* ‘you said’ (< **d^heh₁-s*), as well as the Germanic weak preterite ending (e.g. Goth. *-de-s*, OIc. *-ðe-r*), which should likely be

traced back to the same PIE form (see Harðarson, this volume). Further reflexes include (Dor.) Gk. *é-bā-s* ‘you went’, Ved. *á-gā-s*, (< **g^weh₂-s*), and the Latin imperfect ending *-bā-s*.

The 3sg.act. ending **-t* is evident in (aor.) Ved. *á-dhā-t*, (Boet.) Gk. (*an*)*é-t^hē* ‘placed’, and (pst.) Hitt. *tē-t* ‘said’ (< aor. **d^heh₁-t* ‘placed’, with semantic innovation in Hittite).

Somewhat more problematic is the reconstruction of the PIE 1pl.act. endings. Several of the attested primary and secondary endings in the daughter languages continue **-me-* (e.g. Ved. 1^{ry} *-mas(i)* / 2^{ry} *-ma*, OAv. *-mahī* / *-mā* (< PIIr. **-mas(i)/-ma*); Att.-Ion. Gk. *-men*, Dor. Gk. *-mes*), which is expected on structural grounds, but Italic and Slavic both reflect an *o*-grade **-mo-* (Lat. *-mus*, OCS *-mŭ*), and at least Lith. *-me* appears to require a lengthened variant **-mē*; it is uncertain whether these differences are due to independent innovations within these languages or reflect phonologically-conditioned allomorphy already at the P(N)IE stage (cf. Weiss 2011:385–6). There is also variation within and across language branches with respect to the post-vocalic segment: Latin *-mos*, Dor. Gk. *-mes*, and PIIr. (1^{ry}) **-mas(i)* contain an element **s*, while Att.-Ion. *-men* has **n* in its place, thus matching Anatolian (e.g. Hitt. 1^{ry} *-w(/m)eni* / 2^{ry} *-w(/m)en*; on the fluctuation of the ending’s initial consonant and its possible dual origin, see further in §4.2.2). Furthermore, it is unclear whether the primary and secondary endings were differentiated: past and present tense verbal forms in Greek, Italic, and Balto-Slavic reflexes of the PNIE 1pl. are identical, but in Indo-Iranian the primary ending is distinguished by an additional post-vocalic **s* (plus the “hic et nunc” particle **-i* in all Avestan and some Vedic forms, which similarly characterizes non-past tense forms in Anatolian).

Similar issues arise in the reconstruction of the PIE 2pl.act. endings, which had the basic shape **-te-*, e.g. Gk. *-te*, Lat. *-tis*, OCS *-te* and Goth. *-þ*. It is unclear whether there was any distinction between primary and secondary forms; the four languages cited above employ the same ending for both, but in Indo-Iranian, the primary ending PIIr. **-t^ha* (> Ved. *-tha*, OAv. *-θā*) contrasts with secondary **-ta* (> Ved. *-ta*, OAv. *-tā*) (see Kümmel, this volume). As in the 1pl. ending, Latin shows a post-vocalic segment **-s*, while Anatolian has **-n* (Hitt. 1^{ry} *-teni* / 2^{ry} *-ten*), but neither has external comparative support from Greek or Indo-Iranian. Lith. **-te* reflects a lengthened variant **-tē* just as in the 1pl. ending.

The PIE athematic primary 3pl. act. ending was **-enti*, e.g. prs. Ved. *s-ánti*, Myc. Gk. *e-e-si* [eh-ensi], Hitt. *aš-anzi* Osc. *s-ent*, Goth. *sind*, OIr. *it* [id] (< PIE **h₁s-énti* ‘are’). The corresponding secondary ending was **-ent* (aor. PIE **g^w(e)h₂-ent* ‘went’ > Ved. *á-gan*, Gk. *é-ban*; cf. perhaps Pal. *-vnta* [-nt]). Zero-grade allomorphs of these endings 1^{ry} **-nti* / 2^{ry} **-nt* are also attested in several NIE languages in athematic verbal formations that had fixed accent on a syllable preceding the ending: “Narten presents” (e.g. Ved. *tákṣ-ati* ‘they fashion’ < **té-tk^h-nti*); reduplicated presents (Ved. *dád-ati* ‘give’ < **dé-dh₃-nti*; simple thematic presents (Ved. *bhár-a-nti*) and **s*-aorists (Gk. *é-deik-s-an* ‘showed’ < **deik^h-s-nt*; OCS (*po-*)*grě-s-ę* ‘buried’ < **g^hrěb^h-s-nt*). The zero-grade allomorph **-nti* is therefore standardly reconstructed for PIE in these categories.

The reconstruction of the PIE dual endings is more difficult, given the more limited evidence for this category in the IE languages. However, the NIE languages agree that the basic shape of PNIE athematic 1du.act. ending was **-we-* (> (1/2^{ry}) Ved. *-vas/-va*, OCS *-vě*, Lith. *-va*; for Germanic traces, cf. Prokosch 1939:212, Ringe 2006:136); although dual number is absent as a grammatical category in the Anatolian languages, it is generally held that the Anatolian 1pl.act. endings (Hitt. *-w(/m)eni*, CLuw. *-unni*, Pal. *-wini/wani*) derive from **-we-* and thereby support projecting this ending back to PIE (but cf. §4.2.2 above). There is also comparative NIE evidence for reconstructing the 2du.act. ending as **-to-* (> 2^{ry} Ved. *-tam*, Gk. *-ton*, OCS *-ta*). A secondary 3du. ending **-teh₂m* is perhaps reconstructible as well in view of agreement between Gk. *-tēn* and Ved. *-tām*, but the P(N)IE situation is complicated by a mismatch in the corresponding primary ending between Gk. *-ton* and Ved. *-tas*.

§4.2.6 Verbal endings of the PIE **h₂e*-conjugation In addition to the **m*-conjugation endings (§4.2.5), PIE had a second set of active verbal endings that developed, on the one hand, into the endings of the PNIE perfect active and, on the other, into the endings of the Anatolian *hi*-conjugation. PIE reconstructions for these inflectional endings — referred to here as the **h₂e*-conjugation endings — are given in 25; note, however, that these reconstructions — much more so than the **m*-conjugation endings discussed in §4.2.5 above or the middle endings in §4.2.7 below — are quite uncertain. In particular, reconstructing the distinction between primary and secondary endings in the **h₂e*-conjugation is highly problematic, in part because only Anatolian provides direct evidence for the original morphological opposition (the PNIE pluperfect uses **m*-conjugation secondary endings; see §4.2.3

above), and in part due to open (and much disputed) questions surrounding the prehistory of the PNIE perfect — above all, whether the perfect endings stand in correspondence with (and so provide evidence for the reconstruction of) PIE primary endings (as recently argued by (e.g.) Jasanoff 2003a, Oettinger 2006) or with secondary endings (per Jasanoff fthcm. b). These issues are discussed below, together with the evidence for the formal reconstruction of the $*h_2e$ -endings.

		PIE $*h_2e$ -CONJUGATION ENDINGS			
		SINGULAR		PLURAL	
		1 ^{ry}	2 ^{ry}	1 ^{ry}	2 ^{ry}
(25)	1ST	$*-h_2ei^?$	$*-h_2e$	$*-me^?$	
	2ND	$*-th_2ei$	$*-th_2e$	$*-te^?$	$*-e^?, *-s^?$
	3RD	$*-ei^?$	$*-e^?, *-s(t)^?$	$*-(e)nti$	$*-(e)rs^?$

The PIE 1sg.act. primary and secondary endings of the $*h_2e$ -conjugation were probably $*-h_2ei$ and $*-h_2e$ respectively. Both are directly reflected in Anatolian, the former in Old Hitt. $-h_2e$ (e.g. $dā-h_2e$ ‘I take’; replaced by $-h_2i$ in younger texts), and the latter in CLuw. $-(h)h_2a$, Lyc. $-xa$ (CLuw. $a-h_2a$, Lyc. $a-xa$ ‘I made’; Hitt. $-(h)h_2un$ is remodeled on the basis of the corresponding mi -conjugation ending). The 1sg. ending of the PNIE perfect was $*-h_2e$, which yields Gk. $-a$, PIIr. $*-a$, and Goth. $-∅$ (e.g. Gk. $oid-a$, Ved. $véd-a$, OAv. $vaēd-ā$, Goth. $wait$ ‘I know’ < PIE $*woid-h_2e$). In Italic and Slavic, the perfect ending was recharacterized with the present tense marker $*-i$ (i.e. $*-h_2e-i$), whence (e.g.) OCS $věd-ě$ ‘I know’, Fal. PE:PARAI ‘I got’ (cf. Lat. $-ī$; see Weiss 2011:392). The formal identity between the endings of the PNIE perfect and the secondary endings of the $*h_2e$ -conjugation suggests that the former historically descend from the latter, and thereby offers some support for Jasanoff’s (fthcm. b) recent derivation of the perfect from a PIE reduplicated $*h_2e$ -conjugation aorist (rather than a reduplicated present, as per Jasanoff 2003a:168–9, Oettinger 2006, *i.a.*). There is some evidence to suggest that the presence of the present tense marker $*-i$ in the primary ending $*-h_2ei$ was a relatively recent innovation in PIE: the synchronically irregular m -conjugation 1sg.act. primary thematic ending $*-ō$ should probably be traced back to $*-e/o-h_2e$ (as discussed in §4.2.5), which would contain a 1sg.act. ending $*-h_2e$ unmarked for tense. Yet given the robust evidence across the IE languages for a formal opposition in singular verbal endings between primary and secondary forms, it seems more likely that pre-PIE $*-h_2e$ was recharacterized as $*-h_2ei$ already in PIE, and thus that the development of $*m$ -conjugation thematic 1sg. $*-ō$ also occurred prior to PIE (cf. §4.2.5 above).

The PIE 2sg.act. primary and secondary endings were likely $*-th_2ei$ and $*-th_2e$. The primary ending is indirectly reflected in Hitt. $-(t)ti$ (phonologically expected $-te^*$ having been analogically replaced already in the oldest texts). Just as in the first singular, the inherited secondary ending appears to be continued not only in 2sg.pst.act. Hitt. $-tta$ (e.g. $da-tta$ ‘you took’), but also in PNIE 2sg.pfc.act. $*-th_2e$, which yields the regular perfect ending in Indo-Iranian (PIIr. $*-t^h_2a$), e.g. Ved. $dad^h_2ā-th_2a$, OAv. $dadā-θ_2ā$ ‘you have placed’; Ved. $vēt-th_2a$, OAv. $vōis-t_2ā$ ‘you know’. Cognate Gk. $oīs-t^h_2a$ ‘id.’ exceptionally preserves the same ending, although elsewhere it has been replaced by $-as$ (e.g. $tēt^h_2ēk-as$ ‘you have placed’), with the $-s$ of the $*m$ -conjugation active and a -vocalism by analogy to the 1sg. $-a$ (see above). The second element of the Latin perfect ending $-is-tī$ (e.g. $fec-istī$ ‘you made’) also continues $*-th_2e-i$, with the inner-Italic addition of the tense marker $*-i$.

The reconstruction of the PIE 3sg.act. ending is a vexed question. The primary ending in PIE was likely $*-ei$, which is marginally continued in Old Hitt. $-e$ (e.g. $waršš-e$ ‘wipes’; replaced by $-i$ in younger texts); it is unlikely that Gk. $-ei$ derives from $*-ei$ despite its superficial resemblance (cf. §4.2.5 above). Jasanoff (2003a:70–1, 2012c) argues that the primary/secondary distinction was instead realized in the $*h_2e$ -conjugation by an opposition between $*-e$ and $*-et$, with the latter recharacterized by $*m$ -conjugation 3sg.act. $*-t$ already in PIE; see however Kim (2005:195) for the PIE primary ending as $*-ei$ with regular tense marking. Still more problematic is the reconstruction of the corresponding secondary ending, for which at least two forms are arguably reconstructible. One of these is structurally expected $*-e$, which is reflected in PNIE 3sg.pfc.act. $*-e$ (> Ved. $-a$, OAv. $-ā$, Gk. $-e$, Goth. $-∅$). The other is $*-s(t)$, which is reflected in Hitt. $-š$ (e.g. $dā-š$ ‘took’) and in the ending associated with Tocharian Class III preterites, TB/A $-sa/-ās$ (e.g. $prek-sa/prak-ās$ ‘asked’; see Melchert 2015). Both forms have strong claim to antiquity. Jasanoff’s (fthcm. b) derivation of the PNIE perfect from a reduplicated $*h_2e$ -conjugation aorist requires that $*-e$ marked the 3sg. in this category at the stage prior to its post-PIE grammaticalization as the perfect. However, the

match between Hittite and Tocharian with respect to structurally unmotivated $*-s(t)$ is *prima facie* evidence for a morphological archaism, and on these grounds Melchert (2015) argues that it is the original marker of the 3sg. $*h_2e$ -conjugation aorists (cf. Watkins 1969:54, Yoshida 1993:33–4). The distribution of these endings in PIE remains at present unresolved.

In PIE the $*h_2e$ -conjugation and the $*m$ -conjugation appear to have had the same 1pl.act. ending $*-me-$, which marked both primary and secondary forms (cf. §4.2.5 above). The ending $*-me$ is reflected in PNIE 1pl.pfc.act. $*-me-$ (> Gk. (w)íd-men, Ved. vid-má ‘we know’) and in both primary and secondary forms of *hi*-conjugation verbs in Anatolian, which have 2pl.act. forms that are inflectionally identical to *mi*-verbs (i.e. Hitt. 1^{ry} -w(/m)eni / 2^{ry} -w(/m)en). See however Jasanoff (2003a:32) for the possibility that Ved. -mā (e.g. vid-mā ‘id.’) — synchronically, a lengthened allomorph of the ending — derives rather from a PIE form with final laryngeal (e.g. $*-meh_x$) that was once unique to the $*h_2e$ -conjugation.

Similarly, the PIE 2pl.act. primary ending of the $*h_2e$ -conjugation was most likely $*-te$, just as in the $*m$ -conjugation (cf. §4.2.5 above); it is continued in Anatolian, e.g. 2pl.prs.act. Hitt. da-tteni ‘you (pl.) take’. Reflexes of $*-te$ are also attested in the PNIE perfect (Gk. (w)ís-te, Goth. wit-up ‘you (pl.) know’), but these have clearly been analogically introduced from the $*m$ -conjugation, since Ved. -a (e.g. vid-á ‘id.’) preserves the inherited PNIE 2pl.pfc.act. ending $*-e$. More complicated is the reconstruction of the corresponding secondary ending, for which two forms are potentially reconstructible for PIE: the $*-e$ ending discussed above, and $*-s$, which according to Melchert (2015) is reflected (with additional morphological material) in both Anatolian (Hitt. -šten, e.g. dai-sten ‘you (pl.) placed’; cf. Kloekhorst 2008:498) and Tocharian (2pl.pret.act. PT $*-sV(s)$; see Malzahn 2010 for TB/A outcomes, as well as references to alternative explanations). Agreement between Hittite and Tocharian would argue strongly that $*-s$ is an archaic feature, a common retention of these branches. However, there are compelling reasons to believe that $*-e$ is also archaic: analogical explanation is not viable, since it bears no affinity to any other PIE 2pl. ending. For this reason the ending is liable to diachronic renewal by the functionally transparent $*-te$ of the *m*-conjugation. Moreover, a remarkable feature of both $*-e$ and $*-s$ is that each is identical to one of the two possible secondary endings reconstructible for the 3sg.act. of the $*h_2e$ -conjugation (i.e. $*-e$, $*-s$; see above). Just as in the 3sg.act., the exact PIE distribution of $*-e$ and $*-s$ is at present unsettled, and still less clear is the broader significance of the structural symmetry between 3sg. and 2pl.act., which appears to be a unique feature of the $*h_2e$ -conjugation.

The PIE 3pl.act. primary ending of the $*h_2e$ -conjugation was probably $*-(e)nti$, once again identical to the $*m$ -conjugation; it is directly reflected in Anatolian, e.g. Hitt. 3pl.npst.act. akk-anzi ‘die’. The 3pl.act. secondary ending has several reflexes in the daughter languages (cf. Jasanoff 2003a:32–4): $*-ēr$, which yields 3pl.pst.act. Hitt. -ēr and pfc. Lat. -ere (via $*-ēr-i$ with inner-Italic addition of the primary tense marker; cf. 1/2sg.act. above); $*-ṛs$, which is continued in OAv. -arəš (see further below) and pfc./opt. Ved. -ur; and $*-ṛ$, which is continued in pfc. OAv. -arā (YAv. -ērā) and pret. OIr. $*-(a)tar$ (< $*-ont-ṛ$, a composite of thematic 3pl. $*-ont$ + $*-ṛ$). For arguments that $*-ṛ$ is a later analogical innovation, see Jasanoff (2003a:33). The remaining two endings $*-ēr$ and $*-ṛs$ can be reconciled as ablaut variants of $*-ers$ (whose status as a PIE surface form is however dubious; see discussion of thematic acc.pl. $*-oms$ in §2.1.1 above): its expected zero-grade form is $*-ṛs$, while full-grade $*-ers$ would develop straightforwardly into $*-ēr$ via Szemerényi’s Law. According to Jasanoff (1997, 2003a:39–43), PNIE originally had the full-grade allomorph $*-ēr$ in the perfect and $*-ṛs$ in the pluperfect, a distribution which — with the exception of the replacement of $*-ēr$ by analogical $*-ṛ$ — is maintained in Avestan ($*-ṛ/ *-ṛs$ > OAv. -arā/-arəš).

There is insufficient evidence to reconstruct dual endings for the $*h_2e$ -conjugation. Greek and Indo-Iranian both make perfect dual forms, but their endings cannot be derived from a single pre-form; rather, the endings in each language show clear effects of analogical re-shaping — for instance, 3pfc.du. Ved. -atuḥ and YAv. -atarā have evidently been influenced by the corresponding 3pl.pfc. endings (on which see above). Anatolian offers no help, since there is no trace of the dual in the *hi*-conjugation.

§4.2.7 Verbal endings of the PIE middle In PIE, both verbs whose active forms inflected according to the $*m$ -conjugation and those whose inflected according to the $*h_2e$ -conjugation had middle voice forms marked with the same set of endings. This situation is still observed within the Anatolian languages, where these two conjugational classes remain distinct, but verbs of both classes make use of the same middle endings, e.g. 3sg.npst.act. Hitt. ištamaš-zi ‘hears’, kānk-i ‘hangs (tr.)’ vs. mid. išdamaš-tari ‘is heard’, kank(a)-ttari ‘hangs (intr.)’. Similarly, the PNIE

perfect active is marked by endings that descend from the $*h_2e$ -conjugation, but perfect middle forms generally employ the same endings as in the present/aorist system (e.g. 3s.pfc.mid. Gk. *lélu-tai* ‘has been released’; cf. prs. *lúe-tai*), whose active endings come from the $*m$ -conjugation.

Reconstructions for the PIE athematic middle inflectional endings are given in (26). We discuss the evidence that supports — or else problematizes — the reconstruction of each ending below.

		PIE MIDDLE ENDINGS			
		SINGULAR		PLURAL	
		1 ^{ry}	2 ^{ry}	1 ^{ry}	2 ^{ry}
(26)	1ST	$*-h_2er$	$*-h_2e^?$	$*-med^h h_2$	
	2ND	$*-th_2er$	$*-th_2e$	$*-d^h h_2we^?$	
	3RD	$*-or, *-tor$	$*-o, *-to$	$*-ror^?, *-ntor$	$*-ro, *-nto$

The PIE primary 1sg.mid. ending was $*-h_2er$, which is most clearly reflected in Hitt. $-ha(ri)$ (e.g. *ar-ḫari* ‘I stand’) and — with regular renewal of $*-r$ by $*-i$ as marker of present tense (as in the active endings) — in PIIr. $*-ai$ (e.g. Ved. *bruv-é*, OAv. *mruii-ē* ‘I speak’). The synchronic “passive” endings Lat. $-or$ and OIr. $-or$ (e.g. Lat. *ori-or* ‘I rise’; OIr. *-mol-or* ‘I praise’) continue the corresponding thematic form $*-o-h_2er$. In Tocharian and Greek, the initial $*m$ of the $*m$ -conjugation active has been analogically introduced, thus TB/A $-mar/-mār$ (for details, see Malzahn 2010:36 with references) and Gk. $-mai$ (with the same renewal of presential $*-r$ by $*-i$ as in Indo-Iranian); this kind of analogical remodeling — viz. assimilation of the characteristics of the corresponding $*m$ -conjugation active endings — is typical of the development of the middle endings in the IE languages, as will become clear below. Hittite also attests an “iterated” (or “reduplicated”) allomorph of the ending $-(h)ḫaḫari$ (cf. *ar-ḫaḫari*), which points to a preform $*-h_2eh_2er$, but the antiquity of this form is uncertain (see discussion of the corresponding secondary ending below).

The PIE primary 2sg.mid. ending $*-th_2er$ is directly reflected in Hitt. $-(t)ta(ri)$, TB/A $-tar/tār$, and (in *media tantum* verbs) OIr. $-ther$. The other IE languages continue an ending $*-soi$, with initial $*s$ taken from the 2sg.act. $*m$ -conjugation ending and renewal of $*-r$ by $*-i$, e.g. Ved. $-se$, OAv. $-hē/-šē$, Myc./Arc.-Cypr. Gk. $-soi$ (in other dialects, $-sai$ with vocalism after 1sg. $-mai$), Goth. (pass.) $-za$.

Two primary 3sg.mid. endings are securely reconstructible for PIE, $*-or$ and $*-tor$ (cf. §4.2.3 above). The archaic $*-or$ allomorph is preserved in CLuw. *ziy-ar(i)* ‘lies’, Hitt. *paḫš-a(ri)* ‘protects’, OIr. *ber-air* ‘is carried’ and — with renewal of the tense marker in Indo-Iranian — Ved. *śáy-e* ‘lies’, OAv. *sruui-ē* ‘is heard’ (see further Jasanoff 2003a:49–51). The productive allomorph $*-tor$ — with analogical $*t$ from the $*m$ -conjugation 3sg.act. ending — is also attested in the same languages (e.g. CLuw. *puppušša-tari* ‘is crushed’, Hitt. *ki-tta(ri)* ‘lies’ (cf. Pal. *kī-tar* ‘id.’), OIr. *sechi-thir* ‘follows’), in some cases, even in the same lexical items (late Ved. *śé-te*, YAv. *saē-te* ‘lies’); the latter, in particular, show the strong tendency for $*-or$ to be morphologically renewed by $*-tor$, a pattern that likely began in PIE itself and led eventually to the complete elimination of $*-or$ in other NIE languages, which have only $*-tor$: Lat. *sequi-tur* ‘follows’, TB *wike-tār* ‘disappears’, Cypr. Gk. *ke-i-to-i* [kei-toi] ‘lies’ (cf. Att.-Ion. Gk. *keî-tai* ‘id.’ with vocalism after 1sg. $-mai$).

The PIE secondary athematic 1sg.mid. ending was likely $*-h_2e$, which is directly reflected in Hitt. $-(h)ḫat(i)$, e.g. Hitt. *ēš-ḫa-t(i)* ‘I sat down’ (with further addition of a reflexive particle $*-di$, on which see Yakubovich 2010:182–205); it may also be maintained, as an archaism, as the ending of optative forms in Indo-Iranian (PIIr. $*-a$, e.g. Ved. *sac-ey-a* ‘may I accompany’, OAv. *vāur-aīi-ā* ‘may I cover’). Elsewhere, the Indo-Iranian languages show endings (Ved. $-i$, OAv. $-ī <$ PIIr. $*-i$), which have been argued to derive from a shorter ending $*-h_2$ (e.g. Kortlandt 1981, García Ramón 1985); however, it is more likely that PIIr. $*-i$ should be explained analogically (see Kümmel, this volume). The Tocharian preterite endings (TB $-mai$; TA $-we/-e$) probably also contain $*-h_2e$; see the discussions of Malzahn (2010:44–5 with references) and Pinault, this volume.

Less certain is the PIE status of an “iterated” allomorph of the 1sg.mid. ending $*-h_2eh_2e$, which appears to be continued in both Hittite (e.g. *ēš-ḫaḫat(i)* ‘id.’) and Lycian (*a-xagā* ‘I became’; see Melchert 1992a). Potential evidence for its deeper reconstruction comes from Greek, where it has been suggested that the same form underlies (non-Attic-Ionic) Gk. $-mān < *-m-h_2eh_2e-m$ with analogical remodeling after the 1sg.act. $*m$ -conjugation ending (Weiss 2011:388–9; but cf. the critique of Yoshida 2010, 2013).

The PIE secondary 2sg.mid. ending $*-th_2e$, is continued — with different additional morphological material in each language — in Hitt. $-(t)tat(i)$ (+ reflexive $*-di$; cf. 1sg. above), Ved. $-thās$, and TB/A $-tai/-te$, as well as OIr. $-tha$. Other IE languages have replaced $*-th_2e$ with $*-so$, an analogical form with the initial $*s$ of the m -conjugation 2s. active ending and the vocalism of 3sg.mid. $*(t)o(r)$; $*-so$ is reflected in Gk. $-so$, OLat. $-re$ (on Cl. Lat. $-ris$, see Weiss 2011:388–91), and in the Iranian languages (OAv. $-šā$, OP $-šā$; on the split within Indo-Iranian, see Kümmel, this volume).

Just as in the corresponding primary form, two allomorphs of the athematic 3sg.mid. secondary ending are reconstructible for PIE, $*-o$ and $*-to$. Archaic $*-o$ is maintained in Hitt. $ēš-at(i)$ ‘sat down’ (with reflexive $*-di$; cf. 1sg/2sg. above), and famously, in Ved. $á-say-at$ ‘was lying down’ (with analogical final $*t$; Wackernagel 1907:309–13 (= 1953a:498–502)). Once again, the same languages also reflect productive $*-to$, including in forms of the same lexical items attested in chronologically younger texts: Hitt. $ēš-tat$; late Ved. $(a)še-ta$ (cf. YAv. $sae-ta$). In other NIE languages, older $*-o$ has been wholly ousted by younger $*-to$: Gk. $-to$, Iranian (OAv. $-tā$, OP $-tā$), TB/A $-te/-t$.

The PIE 1pl.mid. ending was $*-med^h h_2$ or $*-mesd^h h_2$; it is possible that one of these forms was once specialized as the primary ending and the other as secondary, but if so, the daughter languages provide no clear evidence for the original distribution. Support for reconstructing $*-med^h h_2$ comes from Gk. $-met^h a$, as well as Tocharian and Indo-Iranian; in the latter two, a distinction has been introduced between primary (Ved. $-mahe$, OAv. $-maidē$ < PIIr. $*-mad^h ai$; TB/A $-mtär$) and secondary forms (Ved. $-mahe$, OAv. $-maidī$ < PIIr. $*-mad^h i$; TB/A $-mte/-mät$; see Kümmel, this volume and Malzahn 2010:37, 46). However, Greek also attests a variant $*-mest^h a$, which points to $*-mesd^h h_2$; an $*s$ is also found in the same position in Hittite, which has — like Indo-Iranian — differentiated primary $-wašta(ri)$ and secondary $-waštati(i)$ (using the same morphological material as in the singular; see above). As in the 1pl.act. (cf. §4.2.5), the initial $*w$ of the Hittite form is usually attributed to the influence of the dual (see §4.2.2 above), either directly (i.e. < 1du.act. $*-we/o(s)- + -d^{(h)} h_2$ of the 1pl.mid.; cf. §4.2.5 above) or else by analogy with the 1pl.act. ending Hitt. $-w(m)en(i)$.

The reconstruction of the PIE 2pl.mid. ending is problematic. The 2pl.mid. endings attested in the NIE languages (with the possible exception of Tocharian) can be derived straightforwardly from an ending $*-d^h we$, likely undifferentiated for primary/secondary as in Gk. $-st^h e$ (with s generalized from coronal-final roots, where it is phonologically regular via the “Double Dental” rule; see Byrd, this volume). As in the 1sg.mid., Indo-Iranian has introduced the primary/secondary distinction; furthermore, the attested endings appear to continue $*-d^h uwe$, a variant of the ending conditioned by Siever’s Law (on which see Barber 2013 and Byrd, this volume): 1^{ry}/2^{ry} Ved. $-dhve/-dhvam$ (with frequent disyllabic scansion); OAv. $-duiē$ /OAv. $-dūm$ (YAv. $-ðβe/-ðβam$). The same phonologically conditioned variant underlies Cl. Arm. $-(a)ruk^c$ (Jasanoff 1979:144–5), synchronically the 2pl. aorist passive ending. More difficult is Tocharian, where there is a clear split between (1^{ry}/2^{ry}) TB $*-tär/-t$ and TA $-cär/-c$; there is no consensus about whether either ending is the phonologically expected outcome of $*-d^h we$, but most scholars agree that both are ultimately based on $*-d^h we$ (see Malzahn 2010:37–8 with references).

The deeper PIE situation is problematized by the endings attested in the Anatolian languages: (1^{ry}/2^{ry}) Hitt. $-ttuma(ri)/-dumat$ (on m < $*w$, see §4.2.2 above), CLuw. $-(d)duwar(i)$. The principal issue is that the initial geminate (or “fortis”) stop (Hitt. $-tt-$) cannot be the outcome of $*d^h$. Melchert’s (1984:26) alternative derivation of the ending from PIE $*-d^h h_2 we$ explains the geminate stop, and in addition, accounts more neatly (i.e. without appeal to Siever’s Law) for the post-consonantal anaptyctic u vowel clearly observed in the Hittite form (cf. Melchert 1994a:57–8, 77–8); however, whether $*-d^h h_2 we$ can be reconciled phonologically with the NIE evidence remains to be systematically assessed. A different solution is proposed by Jasanoff (2003a), who suggests that Anatolian replaced ending-initial $*d^h$ with $*t$ by analogy to the 2pl.act. (m -conjugation) ending $*-te$.

For the PIE primary 3pl.mid. ending — like the corresponding singular — two allomorphs are reconstructible, likely $*-ror$ and $*-ntor$. The older ending $*-ror$ is not continued as such in any IE language, but is in all probability the source of PIIr. $*-rai$ (> Ved. $-re$, YAv. $-re$), which would be derived by the across the board replacement of the inherited middle tense marker $*r$ by active $*i$ in that branch; PIIr. $*-rai$ is selected by the same set of verbs that take the archaic 3sg.mid. ending $*-ai$ (< PIE $*-or$; cf. §4.2.3 above), e.g. Ved. $duh-ré$ ‘give milk’, $śé-re$ ‘lie’ (= YAv. $sōi-re/saē-re$), and in the 3pl.pfc.mid., e.g. Ved. $jajñi-re$ ‘are born’. The endings attested in the other IE languages and elsewhere in Indo-Iranian all derive from productive $*-ntor$: Hitt. $-anta(ri)$, Arc-Cyp. Gk. $-ntoi$ ($-ntai$ in other dialects with analogical vocalism), Ved. $-ate$ (< $*-ntoi$; cf. thematic $-ante$), TB/A $-ntär$, Goth. $-nda$, OIr. $-tir$, Lat. $-ntur$ (but see Weiss 2011:390–1 on the complicated Italic evidence; alternative view in Clackson and Horrocks

2007:33).

Similarly, the PIE secondary 3pl.mid. ending has two reconstructible allomorphs, **-ro* and **-nto*. Archaic **-ro* is continued in Ved. *-ran/-ram* (with added final nasal), which marks imperfects corresponding to presents in *-re*, e.g. Ved. *á-sé-ran* ‘were lying’, *á-duh-ran* ‘were giving milk’, as well as 3pl. forms of the aorist “passive,” e.g. *á-dṛś-ran* ‘were seen’, *á-budh-ram* ‘woke up’ (on the development of this category in Indo-Iranian, cf. Kümmel 1996, Jasanoff 2003a:153–73, 206–10). Productive **-nto* yields Hitt. *-antat(i)*, Gk. *-nto*, Ved. *-ata* (< **-nto*; cf. thematic *-anta*), and TB/A *-nte/-nt*.

No secure reconstruction of dual middle endings is possible. The IE languages that preserve the dual, above all Vedic and Greek, have dual middle endings that cannot be traced back common pre-forms; rather, the attested endings generally appear to be created by combining features of the *m*-conjugation active dual endings and inherited middle plural endings — for instance, 1du.mid. Ved. *-vahe* amalgamates 1du.act. *-vas* and 1pl.mid. *-mahe*, while 2du.mid. Gk. *-st^hon* mixes 2du.act. *-ton* and 2pl.mid. *-st^he*.

§4.3 PNIE verbal stem formation A tripartite division of tense-aspect stems into “present” (imperfective aspect), “aorist” (perfective aspect), and “perfect” (resultative-stative) is reconstructible for PNIE. Only Greek and Indo-Iranian exhibit this three-fold distinction directly, but it underlies other PNIE languages which have merged the aorist and the perfect, e.g. Latin. The present stem could be inflected in present and past tenses (the latter called the “imperfect”). For example, to the root **g^{wh}en-* ‘smash; slay’ could be formed the 3sg.prs.ind.act. **g^{wh}én-ti* ‘smashes, slays’ (Ved. *hán-ti* ‘id.’), 3sg.ipfc. **g^{wh}en-t* ‘was smashing’ (Ved. (*á*)-*han*). The aorist stem expressed perfective aspect and could be used in the indicative only to refer to past tense, e.g. **wēg^h-* ‘convey, move’ ⇒ **wēg^h-s-t* ‘conveyed, moved’ (> Lat. *vēxit*). Thus the perfective/ imperfective distinction is overlaid with a past / non-past distinction only in the imperfective stem. The perfect stood apart from the present and aorist on formal and functional grounds in ways we will discuss below; an example of a perfect is Ved. *ca-kár-a* ‘I have made, I made’ (1sg.pfc.act.ind.) < PNIE **k^we-k^wór-h₂e*. Bybee and Dahl (1989) survey tense-aspect stems cross-linguistically, from which the tripartite system reconstructed for PNIE emerges as commonest in the languages of the world; see further Wackernagel (1926-8 [2009]:195–268) for an overview of tense-aspect in several ancient IE languages with copious examples and references.

It is important to distinguish between various uses of the term “aspect”. We will use the term “grammatical aspect” for the grammatical means by which a speaker expresses views on the action of the verb (such as ongoing, imperfective or as a complete whole, perfective). Grammatical aspect is conveyed by the morphology of the verb. We will use the term “lexical aspect” for what is considered the inherent, unmodified lexical meaning of the verbal root; often this notion goes under “Aktionsart” in IE studies (the term is fairly elastic and may refer to other phenomena as well, cf. Napoli 2006:45–51). In PNIE the assignment of a verbal root to the present or aorist stem was related to the verb’s lexical aspect (cf. Hoffmann 1970, Strunk 1994). Basically, if the root was telic or “punctual” it would be assigned to the aorist stem, if atelic it would be assigned to the present stem. Thus lexically telic roots like **deh₃-* ‘give’, **d^heh₁-* ‘put, place’, and **mer-* ‘die’ all made root aorists as their basic formation (e.g. **deh₃-t* ‘gave’ > Ved. (*a*)-*dāt*). Atelic roots like **b^heh₂-* ‘speak’, **h₁ed-* ‘eat’, **h₁ey-* ‘go’ all made root presents as their basic formation (e.g. **b^heh₂-ti* ‘he speaks’ > Gk. *p^hēsi*). A root with telic lexical aspect could derive a stem with atelic grammatical aspect (i.e. the “present” stem) via affixation — for instance, **deh₃-* ‘give’ formed a reduplicated present **de-deh₃-ti* ‘gives, is giving’. A number of different derivational affixes may derive present stems, including a thematic vowel added to the root (**b^hér-e-ti* ‘bears’ > Ved. *bhár-a-ti*) and a nasal-infix inserted into the root (**yeug-* ‘yoke’ forms **yu-né-g-ti* ‘yokes’ > Ved. *yu-ná-k-ti*). Vice-versa, a root with atelic lexical aspect could derive a stem with perfective grammatical aspect (i.e. the “aorist” stem) via affixation — most commonly, by suffixing **-s-* to the root; for instance, **wēg^h-* ‘convey, move’ makes the aorist stem **wēg^h-s-t* ‘conveyed, moved’ (> Lat. *vēxit*).

This neat picture is, however, disturbed by numerous mismatches between semantics and root formation. For instance, one notorious example is the root **g^{wh}en-* ‘kill, slay’, of prominent use in the Indo-European dragon-slaying myth (Watkins 1995). Given its meaning ‘slay, kill’ one might expect a root aorist, yet it forms a root present in PIE, **g^{wh}én-ti* (e.g. Ved. *hán-ti*). García Ramón (1998) proposes that the root originally meant ‘(repeatedly) strike’, thus bringing into better accord semantics and stem formation. Similarly, lexically atelic **peh₃-* ‘drink’ forms a root aorist, not a root present as would be predicted; here too it is surmised that **peh₃-* originally had a more telic meaning in line with its root aorist formation, i.e. **‘take a gulp’*. In the end, a number of stubborn

mismatches between lexical aspect and stem formation remain.

Two further divisions of aspect must be mentioned. The first is “predicational aspect,” where aspect interacts with syntax. For instance, lexical aspect may be changed in the presence or absence of additional arguments (e.g. imperfective *John reads a lot* vs. perfective *John reads a book*). This domain has proven fruitful for understanding the individual daughter languages (cf. e.g. Napoli 2006:85-128 on Homeric Greek) and future research will likely cast light on the PIE verb; it is, however, situated more in the syntax, so we will leave off further discussion of it here. Secondly, the more developed notion of “state-of-affairs” (or “actionality”) is sometimes used in Indo-European studies to describe the types of situation a verb may express (following the seminal work by Vendler 1967). To illustrate using Ancient Greek, where the PIE situation is often thought best preserved, many studies depart from a first order distinction between verbs expressing states vs. dynamic situations (cf. Napoli (2006, 2015), and the overview by George 2014, both with references). States include (e.g.) *eínai* ‘to be’, *ék^hein* ‘to have’, *keísthai* ‘to lie’. Dynamic verbs may be either telic or atelic. If the verbal eventuality is durative (i.e. persists through time), the telic verb is called an “accomplishment” (e.g. *manthánein* ‘to learn’, *poieîn* ‘to create, make’); if it occurs instantaneously, the telic verb is called an “achievement” (e.g. *apokteínein* ‘kill’). Atelic verbs are called “activities” if durative, as with e.g. verbs of motion (*phéreîn* ‘carry’). Here too further research may shed light on the structure of the PIE verb (cf. e.g. Dahl 2010 on Vedic; Weiss 2011:377–98 gives an overview on PIE).

Whether and to what extent the PNIE system also underlies Anatolian (and is thus of PIE age) is debated, since the Anatolian verbal system shows no obvious trace of grammatical aspect. In the Anatolian languages all finite and non-finite verbal forms are based on a single stem. Many of these stems are formed by suffixes that derive imperfective stems in the PNIE languages — for instance, the suffix **-ské/ó-* makes stems in various NIE languages with the aspectual value [imperfective] (e.g. Ved. *gáchati* ‘goes’ << **g^wm-ské-ti*), but its Hittite reflex *-ške-(z)zi* modifies the lexical meaning of the verbal stem, indicating that iteration, pluractionality, or related notion is a property of the event. The mere fact that PNIE has so many affixes all deriving the same functions ([imperfective, perfective]) suggests a merger of categories; at an earlier stage the suffixes would have marked varieties of lexical aspect, and it has been proposed that this stage underlies and is reflected by Anatolian (cf. Cowgill 2006:37–68 [= 1974b, 1979b]; Strunk 1994). Melchert (1997) contests this finding, arguing that Anatolian might have inherited a prehistoric contrast in grammatical aspect. He points to Hittite and Luwian verbs reflecting the suffix **-ye/o-* (see 4.3.1 below) exclusively in the present stem vs. a stem lacking **-ye/o-* in the preterite (e.g. Hitt. npst. *karp(i)ye-* ‘lift’ beside pst. *karp-*). Thus Anatolian would have inherited PIE **-ye/o-* as an imperfective formant confined to the present system beside a perfective stem (i.e. a root aorist). But the question remains an open one due to the paucity of evidence (see Melchert fthcm. a for a recent assessment of the Anatolian data).

One further means of instantiating the imperfective vs. perfective contrast should be noted here: stem suppletion. The notion of “suppletion” is a fraught one, since what defines suppletion cross-linguistically has been disputed (Veselinova (2003, 2013) is helpful for orientation and discussion). For present purposes, by “suppletion” we mean the process whereby regular semantic relations are encoded by unpredictable formal means. In terms of verbal suppletion according to tense and aspect, this will mean that one root is used for one tense-aspect stem (e.g. present), a separate root is used to form another stem (e.g. aorist). For example, in numerous IE languages reflexes of the present stem **b^héreti* ‘bears’ have only a suppletive perfective, giving well known pairs like Gk. *p^hérō* : *énegkon*, Lat. *ferō* : *tulī*, TB/A *pār-* : *kām-*. On suppletion in PIE, see García Ramón 2002 and Kölligan’s (2007b) recent study of the Greek evidence (with particular attention to diachrony).

The basic architecture of the PNIE system of present and aorist stems is exemplified in (27):

PRESENT/IMPERFECTIVE STEM		AORIST/PERFECTIVE STEM
PRESENT	IMPERFECT	AORIST
<i>*de-deh₃-ti</i> ‘gives’	<i>*de-deh₃-t</i> ‘was giving’	<i>*deh₃-t</i> ‘gave’
<i>*d^he-d^heh₁-ti</i> ‘places’	<i>*d^he-d^heh₁-t</i> ‘was placing’	<i>*d^heh₁-t</i> ‘placed’
<i>*b^her-e-ti</i> ‘bears’	<i>*b^her-e-t</i> ‘was bearing’	[suppletive]
<i>*weġ^h-e-ti</i> ‘conveys’	<i>*weġ^h-e-t</i> ‘was conveying’	<i>*weġ^h-s-t</i> ‘conveyed’

§4.3.1 Imperfective stem formation Present (imperfective) stems show a wide variety of formations and we offer here an abbreviated catalogue of verbal stem types, formally divided between athematic and thematic, therein divided between “primary” formations (made to verbal roots) and “secondary” formations (derived verbal stems). Our catalogue aims to be a descriptive overview of some present types reconstructible from the IE daughter languages, with the caveat expressed about the role of these suffixes in Anatolian. We will list the reckoning from *LIV*² for how many roots build a given formation, often followed by how many examples are considered “secure” by the authors. We do not accept the analysis of *LIV*² in every instance: the numbers are provided merely as a rough guide to current thinking in the field. Fuller inventories of verbal stem types may be found in Jasanoff (fthcm. a), Meier-Brügger (2010:297–311) (based squarely on *LIV*²), and Beekes and de Vaan (2011:251–86) (representative of Leiden views of the verb, which differ in many ways from those presented here).

Root presents are formed by adding the endings to the root without overt affixation; in *LIV*² such a present is listed for about 200 roots. Examples include 3sg. **h₁és-ti* ‘is’, 3pl. **h₁s-énti* ‘are’ (Hitt. *ēš-zi*, *aš-anzi*, Ved. *ás-ti*, *s-ánti*, etc.); 3sg. **h₁éy-ti* ‘goes, walks’, 3pl. **h₁y-énti* (CLuw. *ī-ti*, Ved. *é-ti*, etc.). A number of prominent *media tantum* are root presents, e.g. PIE **k₁éy-or* ‘lies’ (CLuw. *ziyar(i)*, Ved. *śáye*), and **wés-(t)or* ‘clothes oneself, wears’ (Hitt. *wešta*, Ved. *váste*, Gk. *héstai*) (cf. §4.2). A controversial subtype is the “Narten” (or lengthened-grade) present, named in honor of Johanna Narten’s work from the 1960s. This type showed **é*-grade in the singular, **é*-grade plural, for which the prime example is 3sg. **stéw-ti*, 3pl. **stéw-nti* ‘praises’ (> Ved. *stáuti*, etc.). The lengthened-grade in these root presents reflects a derived present type. Some examples form imperfective stems to root aorists: Kümmel (1998) gives (e.g.) **dék-/dék-* ‘to expect, accept’ (Ved. root *dás-*, 3sg. *dāṣ-ṭi* ‘serve religiously’ via a semantic development of Vedic) beside the root aorist **dék-* (Gk. 3sg.mid. *dék-to* ‘received’). Other examples are arguably formed to root presents: Melchert (2014b) gives (e.g.) **h₁és-ti*, **h₁és-nti* ‘sits’ (OHitt. *ēš-zi* ‘is sitting’) to the aforementioned root present **h₁és-ti* ‘is’. The formation likely had an earlier aspectual nuance; Melchert suggests iterative-durative.

molō-presents: Another kind of PIE root present had **o/e*-ablaut in the root and — according to a still controversial proposal by Jasanoff (2003a:64–90) — inflected with the perfect-like endings of the **h₂e*-conjugation (on which see §4.2.6 above). The verbs constituting this class are typically those of vigorous activity, such as PIE 3sg. **b^hód^hh₁-ei* ‘digs’ (e.g. OCS *bodq* ‘I stab’, Lith. *bedù* ‘I poke’ beside Hitt. *paddai* ‘digs’). Jasanoff names the class “*molō*-presents” after the Lat. outcome *molō* ‘I grind’, whose cognates give evidence for both **o*-grade vocalism of the root (e.g. Go. *malan* ‘to grind’, Lith. *malù* ‘I grind’, both with *a* < **o*) and **e*-grade (e.g. OIr. *melid* ‘grinds’, OCS *meljō* ‘I grind’). As in the noun, these diverse ablaut grades suggest bifurcated levelings of a once unitary paradigm **mólh₂-/*mélh₂-*. Hittite arguably provides direct evidence for such a unitary paradigm in the *hi*-conjugation, a class that includes the cognate verb (3sg.) Hitt. *mall-(a)i* ‘grinds’; although the original weak stem root vocalism of this verb is obscured by sound change (3pl. *mall-anzi*), Hittite preserves **ó/é*-ablaut in a recessive sub-class of *ā/e*-ablauting *hi*-verbs, e.g. *k(a)rāp-/k(a)rep-* ‘devour’ (< PIE **g^hrób^h-/*g^hréb^h-* ‘seize’), *š(a)rāp-/š(a)rep-* ‘sip’ (< **srób^h-/*sréb^h-* ‘id.’). Kloekhorst (2012, 2014) disputes this evidence, arguing that the *hi*-conjugation in Hittite reflects only **o/∅*-ablaut, but his alternative inner-Hittite derivation of the weak stem *e*-vocalism of this class cannot be maintained — for instance, the root *e*-vowel in the verbs cited above cannot be epenthetic, since there is no plausible phonological or morphological motivation for epenthesis in this environment (see Melchert 2013; cf. Yates 2015:154–5, 166 n. 43).

Reduplicated athematic presents: Partial copy reduplication is another major device for forming present stems to root aorists. Two types of reduplicated presents may be formally distinguished, an athematic and a thematic (treated below). The athematic type is well attested in Greek and Indo-Iranian, but with formal differences — in particular, in the vocalism of the reduplicant — that problematize its reconstruction. In Greek, all reduplicated presents have fixed *i*-segmentism in the reduplicant, e.g. WGk. *hí-stā-mi* ‘I stand’ (beside root aorist stem WGk. *stā-*), *tí-t^hē-mi* ‘I place’ (beside root aorist stem *thē-*). In contrast, Indo-Iranian has reduplicated presents with *i-*, *a-* (< **e*) and even *u*-vocalism of the reduplicant, e.g. Ved. *í-yar-ti* ‘moves’ (beside root aorist stem *ar-*); Ved. *dá-dhā-ti* (= OAv. *da-dāi-ti*) ‘places’ (beside root aorist stem *dhā-*); Ved. *ju-hó-ti* ‘pours’. While the last type, which occurs only when the verbal root contains *u*, is generally regarded as an innovation, both **e*- and **i*-reduplicated forms are usually viewed as inherited — for instance, *LIV*² reconstructs two distinct athematic reduplicated presents for PIE, one with **e*-fixed segmentism, another with **i*. Yet while this “maximal” reconstruction is possible, it still does not straightforwardly account for the mismatch between Vedic and Greek in cognate

lexical items (e.g. Gk. *tí-t^hē-mi*, Ved. *dá-dhā-mi* < PIE **d^h-d^heh₁-mi* ‘I place’), or for the fact that a few roots are attested in Indo-Iranian with both **e-* and **i-*reduplicated forms, e.g. Ved. 3sg. *sí-šak-ti* (= YAv. *hišhaxti*) vs. 3pl. *sá-šc-ati* (: *sac-* ‘accompany’), Ved. 3sg. *jí-gāt-i* vs. fossilized prs.act.ptcp. *já-g-at-* ‘(moving) world’ (: *gā-* ‘go’). Various other interpretations of this evidence have been advanced. Jasanoff (2003a:128–32) contends that PIE had only **e-*reduplicated presents in the **m-*conjugation, arguing that **i-*reduplicated athematic presents in Greek and Vedic are due to the analogical influence of PNIE thematic **i-*reduplicated presents, which would ultimately derive from PIE **h₂e-*conjugation **i-*reduplicated forms (see below). Another possibility — proposed already by Hirt (1900:190–3) and further developed in recent scholarship (Sandell 2011; Hill and Frotscher 2012) — is that all athematic presents descend from a single PIE paradigm in which the reduplicant had two allomorphs, one with **e-*vocalism and one with **i-*vocalism; this intraparadigmatic allomorphy would then have been leveled out separately in the individual languages. Dempsey (2015:339–41) suggests that this hypothesis better explains the situation in Anatolian, where reduplicated **h₂e-*conjugation verbs may have either fixed **e-* or **i-*segmentism in the reduplicant (with no corresponding functional difference) — e.g. Hitt. *we-wakk-i* (: *wek-* ‘demand’) vs. Hitt. *li-lhuwa-i* (: *lah(h)u-* ‘pour’). However, there is not yet scholarly consensus on this issue.

Nasal-infix presents: An ablauting nasal-infix **-ne/n-* is one of the commonest means for making present stems to root aorists: in *LIV*² it is reconstructed for 248 roots (168 secure). An example is the root **yeug-* ‘yoke’: the infix is inserted after the first syllable of the (zero-grade) root to derive a present 3sg. **yu-né-g-ti*, 3pl. **yu-n-g-énti* ‘yokes’ (> Ved. *yu-ná-k-ti*, *yu-ñ-j-ánti*), beside the root aorist **yeug-t* (> OAv. *yaogāt*; cf. 1sg. Ved. *yójam*). The formation is well attested across a number of branches and is traditionally divided into three varieties based on the consonantal quality of the final segment of the root into which **-né/n-* was inserted: (i) a final obstruent, e.g. aforementioned **yu-né-g-ti*; (ii) final laryngeal, **k^wreyh₂-* ‘buy’ > **k^wri-né-h₂-ti* ‘buys’ (Ved. *krī-ñā-ti*, TB 3sg.mid. *kārn-ās-tār*); or (iii) glide **-w-*, e.g. **klew-* ‘hear’ > **k_l-né-w-ti*, **k_l-n-w-énti* ‘hears’ (Ved. *śṛ-ñó-ti*). The sequence **-n(e)w-* was reinterpreted as a suffix already in PIE and added suffixally (not infixally) to roots, e.g. **st_ṛ-néw-ti* ‘strews’ (Ved. *st_ṛ-ñó-ti*). Although in the NIE languages it is mainly attested as a present stem formant beside root aorists (cf. Strunk 1967), there is some evidence to suggest that the infix may have earlier had a valency-increasing role. The infix is clearly transitivizing in pairs like (transitive) Hitt. *har-ni(n)-k-* ‘kill’ (also *harg(a)nu-* ‘id.’) beside (unaccusative) *hark-* ‘die’. In at least one case there is comparative evidence for a transitive/causative nasal-infix verb derived from an adjective: Hitt. *tep-nu-zi* ‘belittles’ and Ved. *dabh-nó-ti* ‘deceives’ (cf. 2pl. OAv. *dabənaotā*) directly reflect PIE **d^heb^h-né-u-ti* ‘belittles’ (from **d^heb^h-ú-* ‘little, small’). Moreover, the related nasal suffix PIE **-n(é)w-* is highly productive in valency-increasing derivation in the Anatolian languages, e.g. Hitt. *link-* ‘swear’: *ling(a)nu-* ‘make swear’; HLuw. *ta-* ‘stand’: *tanu(wa)-* ‘make stand’ (cf. Luraghi 2012). Accordingly Meiser (1993) has argued that the nasal infix was originally valency-increasing and only secondarily used as a means for deriving present stems. It is, however, noteworthy that higher transitivity aligns cross-linguistically with perfective, not imperfective, aspect (see Hopper and Thompson 1980); the nasal-infix should thus be expected to derive a PIE aorist, not present, stem (see too Clackson 2007:151–5).

***-eh₁-stative/fientives:** Presents formed with **-eh₁-ye/o-* make stative as well as change of state verbs across a wide swath of IE languages. Such presents are sometimes made to a verbal root (e.g. Lat. *hab-ē-re* ‘to have’, OCS *bŭd-ě-ti* ‘to be awake’, Lith. *bud-ė-ti* ‘to be awake’) and are sometimes deadjectival (e.g. Hitt. *marš-e-zzi* ‘be false’ to *marš-a-*, Lith. *sen-ė-ti* ‘to grow old’ to *sėn-as*). The deadjectival forms have been derived from “Caland” adjectives since Watkins (1971). Greek has present forms reflecting the **-eh₁-stative* (type *tharséō* ‘am bold’; cf. Tucker 1990) but additionally the intransitive (“passive”) aorist is formed with **-eh₁-* (e.g. *e-mán-ē* ‘went mad’), which is hard to square with the evidence from the other languages. Harðarson (1998) posits that **-eh₁-* formations were at home in the aorist (privileging the Greek evidence) and calls the type “fientive” (i.e. change of state) meaning ‘to become X’; presents to the fientive would be derived via further suffixation as **-h₁-ye/o-*, named “essives,” which some languages reformed as **-eh₁-ye/o-*. This account was taken over wholesale by the influential *LIV*². The categories “essive” and “fientive” are both rejected by Jasanoff (2003b), in part on the phonological grounds that **-h₁-ye/o-* would infringe “Pinault’s Law” (cf. Byrd, this volume; note, though, that Byrd suggests restricting the law to **h₂*, **h₃*). Jasanoff reconstructs instead a suffix **-eh₁-ye/o-*, which he derives from the predicatively used instr.sg. of a root noun in **-eh₁*, e.g. **h₁rud^h-éh₁* ‘with redness’ > **h₁rud^h-eh₁-yé/ó-* ‘be(come) with redness, blush’ (> Lat. *rub-ē-re* ‘to be red, ruddy’). On the basis of the reanalyzed stative stem the daughter languages created or extended other formations including: change of state verbs in **-eh₁-s-* in Hittite; verbal abstracts (infinitives) in **-*

eh₁-ti- in Balto-Slavic; and intransitive aorists in bare **-eh₁-* in Greek. The matter has not been settled: Yakubovich (2013b) presents an overview of the problem; Bozzone (2016) builds on Jasanoff's scenario, with further typological considerations.

***-h₂-factitives** (the “*nawah₂hi*”-type): When added to thematic adjectives, the factitive suffix **-h₂-* derives transitive verbs. Examples include the class's eponymous Hitt. *newa-h₂hi* ‘make something new’ (< **newe-h₂-ei* ‘new’; cf. Hitt. *nēwa-* ‘new’). Other languages probably reflect the **-h₂-* suffix only in its extended form **-h₂-ye/o-*; for instance, the extra-Anatolian comparanda for *nawah₂hi* include Lat. *nou-ā-re* ‘make something new’ and the rare Gk. verb *neáo* ‘plough up (fallow land)’ (both from extended **new-e-h₂-ye/o-*). The derivation remains productive in Italic, e.g. Lat. *sānus* ‘healthy’ ⇒ *sānāre* ‘heal’, etc.; see further Watkins (1971:61, 85–6) and Jasanoff (2003a:139–41).

“Simple” thematic presents: Roots with an affixed thematic vowel **-e/o-* are a bedrock formation of PNIE; LIV² lists 426 roots (224 secure) that make simple thematic presents. Examples include **b^hér-e-ti* ‘bears, carries’ (e.g. Ved. *bhárati*; cf. §4.2.5), **h₂éǵ-e-ti* ‘leads, drives’ (Ved. *ájati*, Lat. *agit*, Arm. 1sg. *acem*, etc.). Simple thematic presents are often found beside other present types in the daughter languages (e.g. athematic 3sg.prs. Lat. *fer-t* ‘bears, carries’ < **b^hēr-ti*). Jasanoff (1998) has argued that simple thematic presents in the IE languages come from at least two historically distinct sources, as indicated by their relationships to other present formations, and the kinds of aorists they co-occur with. The **b^hér-e-ti* type occurs beside other present formations (e.g. **b^hēr-ti* > Lat. *fer-t*) and makes a suppletive aorist (both **b^hér-e-ti* and **h₂éǵe-ti* make suppletive aorists). A second type, whose present is formally identical, is represented by (e.g.) **wéǵ^h-e-ti* ‘conveys’ (Ved. *váhati*, Lat. *vehit* etc.), which does not have competing present formations, and makes its aorist stem with the **s*-aorist (**wéǵ^h-s-t* > Lat. *vēxit*). This evidence would indicate that the two thematic present types derive from historically distinct origins, a conclusion bolstered by their “fit” within the chronology of IE dialects. That is, the **wéǵ^heti* type does not occur in Anatolian, whether the **b^héreti* type does is disputed. Many researchers find an isolated example of the **b^héreti* type in HLuw. [tammari]* ‘builds’ (in transcription: AEDIFICARE+MI-ra/i + i), which could derive from PIE **dém(h₂)-e-ti* with thematic cognates in Gk. *dém-ō* ‘build’ and Go. *ga-timan* ‘fit’ (but cf. Lehrman (1998) for a dissenting view). The rarity — and possibly complete absence — of both present types in Anatolian is striking and suggests that both types could represent post-Anatolian innovations. Tocharian knows thematic presents of the **b^héreti* type (Toch. class II presents and subjunctives) but in reduced numbers; arguably the **wéǵ^h-e-ti* type does not occur in Tocharian, and therefore represents a PNIE innovation. Ringe (2000) leverages the dearth of such presents in Anatolian and Tocharian to suggest an early branching off of these languages, a view Malzahn (2010:363–366) disputes. Fitting the simple thematic type of PNIE into the picture of the earlier PIE verb is an ongoing project.

tudáti-presents: Zero-grade presents with accented thematic vowel — known as “*tudáti*”-presents after the canonical class VI present of Sanskrit grammar *tudáti* ‘strikes’ — are considerably less well-represented than simple thematic presents; in LIV² it is reconstructed for 52 roots (20 secure). Significantly, at least one example of this class is found in Anatolian: Hitt. *šuwe-zzi* ‘pushes away, shoves’ forms an equation with Ved. *suv-á-ti* ‘impels’ and OIr. *soid* ‘turns’ < **suh_x-é-ti* ‘push’ (with Oettinger 1979:279, pace Kloekhorst 2008:797–8). It has often been thought that this present class, with its preference for markedly telic activities in Vedic, might have developed from aspectually shifted thematic aorists; the imperfect of the zero-grade present and the thematic aorist are formally identical (e.g. imperfect **suh_x-é-t* ‘pushed’ and aor. **wid-é-t* ‘found’; on the aorist type see below). Because these presents are held to have their origins in aorists, the class sometimes goes by the unfortunate name “aorist presents.” The early diachronic development of the *tudáti*-presents is in need of further investigation (on the Vedic material see Hill 2007 and now Malzahn 2016). A number of *tudáti*-presents are made to roots in final *-i-* in Old Indic (e.g. *sy-á-ti* ‘binds’ to root *say-/si-*, cf. Kulikov 2000); Jasanoff (2003a:105–107) argues that these represent part of a wider class of presents with an **-i-* suffix in the protolanguage.

Thematic reduplicated presents: A thematic reduplicated type is also found beside the athematic type discussed above. An example is **ǵi-ǵn(h₁)-e-ti* > Lat. *gi-gn-i-t*, Gk. *gí-gn-e-tai* (deponent mid. beside root aorist **ǵenh₁-to* > Gk. *e-géneto*). In some cases, thematic reduplicated presents have athematic reduplicated cognates (see above) in other NIE languages, e.g. Lat. *si-st-ō*, Ved. *tí-ṣṭha-ti* vs. WGk. *hí-stā-mi* (cf. root aorist PIE **stéh₂-t* ‘stood’). The etymological equation between thematic reduplicated present Gk. *mí-mn-ō* ‘I stand fast’ and **h₂e-* conjugation *i*-reduplicated verb Hitt. *mimma-i* ‘refuses’ points to a diachronic connection between these categories, and it has been argued, specifically, that some (if not all) PNIE reduplicated thematic presents arise via

“thematization” of PIE **h₂e*-conjugation **i*-reduplicated presents (see esp. Jasanoff 2003a:128–132, García Ramón 2010; cf. §4.2.5).

***-yé/ó-presents:** The suffix **-ye/o-* is a thematic present formation only (i.e. there is no aorist **-ye/o-*). A prominent type has accented suffix and zero-grade root, many examples of which are deponent, including the roots of birth and death: **m₁-yé-tor* ‘dies’ > Ved. *m₁i-yá-te*, Lat. *mor-i-tur* and **ǵ₁h₁-yé-tor* ‘is born’ > OIr. *gain-i-thir*, Ved. *já-ya-te*, and **m₁-yé-tor* ‘thinks’ > Ved. *mán-ya-te*, Gk. *maíne-tai* ‘rages’. In Indo-Iranian, this suffix, accented and with middle inflection, becomes specialized as a present passive marker (e.g. 3sg. *-yá-te*; cf. §4.2); Kulikov (2012) is an extensive treatment of the Vedic evidence. **-ye/o-* is also the normal denominative suffix forming verbs that mean ‘be, become, act like X’. Examples include Ved. *v₁ṣā-yá-te* ‘acting the bull (*v₁ṣan-*)’, Gk. *poimainō* ‘I am a herdsman (a *poimén*)’ < **poh₂i-m₁-yō* (cf. Tucker 1988). A number of primary **-ye/o-* presents give evidence for an accented full grade of the root, such as **(s)pék₁-ye-ti* ‘sees, looks at’ (> Ved. *pás-ya-ti*); in *LIV*² this full-grade formation is considered a distinct type made to 50 roots (19 secure).

***-ské/ó-presents:** The suffix **-ské/ó-* with the zero-grade of the root formed thematic presents in PNIE. Examples include **ǵ^wm₁-ské/ó-* ‘be walking’ (Ved. *gáchati* ‘goes’, 2sg.imp. Gk. *báske* ‘go!’, TA *kumnāštār* ‘comes’), and the widespread item **p₁r₁k₁-ské-* ‘ask’ (Ved. *p₁r₁chāti*, Lat. *poscit*, OIr. *-airc*). In PNIE the suffix derives present stems especially to root aorists, with further innovations and extensions defining the daughter languages (see Zerdin 1999, 2002 on this issue with special reference to Greek). There are, however, sufficient indications to reconstruct its earlier aspectual functions. In Hittite the suffix *-ške-* derives an aspectual stem whose function can be iterative, habitual, and pluractional (cf. Hoffner and Melchert 2008:318–22). In Tocharian B, reflexes of the suffix **-ské/ó-*, viz. *-ṣṣə-/ske-*, form class IX presents (e.g. *we-skau*, *we-ṣṣān* ‘say’), but the suffix is mostly used in the present (and subjunctive) to form the causative — e.g., to the root *wik-* ‘disappear’ is formed a causative present 3sg. *wikāṣṣān* ‘drives away, removes’. Peyrot (2013:515–24) has recently presented new arguments that the Tocharian A class VIII presents in *-s-/ṣ-* of TA (“s-transitives” in his terminology) — traditionally held to reflect presents in **-s-e/o-* — derive via inner-Tocharian changes from the **-ské/ó-* suffix as well. This causative feature is usually understood as an inner Tocharian development (recently Adams 2014 with references). Li and Whaley (fthcm.) argue on cross-linguistic grounds that there is a grammaticalization cline of intensive > causative > reciprocal; Tocharian would perhaps fit into this schema. One intriguing detail is that the suffix makes iterative and durative stems not only in Anatolian but also an iterative preterite in *-(e)skon* in the Ionic dialect of Greek; Puhvel (1991:13–20) and Watkins (2001:58–9 [= Watkins 2008:954–5]) plausibly attribute the spread (or rebirth) of the iterative functions of this suffix to diffusion from Anatolian to the Greek speakers of the Ionic coast.

***-éye/o-causative-iteratives:** A thematic formation in **R(o)-éye/o-*, making transitive and causative verbs, is widespread across the languages; in *LIV*² it is reconstructed to 400 roots (237 secure). Examples include **men-* ‘think’ > **mon-éye-* ‘call to mind’ (> Lat. *monēre* ‘warn’) and **sed-‘sit’* > **sod-éye-* ‘set something’ (> Go. *satjan* ‘to set, plant’). Two etymological equations set the date of this formation back to PIE antiquity: Hitt. *lukke-zzi* ‘lights up, sets ablaze’ was taken by Watkins (1971:69) to derive from a causative **louk-éye/o-* seen also in e.g. Ved. *rocáyati* ‘make shine’, Lat. *lūceō, -ere* ‘ignite, light’; and Hitt. *waššezzi* ‘clothes (someone)’ continues **wos-éye/o-*, to be equated with Ved. *vāsáyati*, Goth. *wasjip* (PGmc. **waz-jan*, also Eng. *wear*), Alb. *vesh*, as demonstrated by Eichner (1969). The formation knows a particularly rich development in its Old Indic avatar the *-áya-*presents (extensively studied by Jamison 1983). In certain languages there are also verbs formed with the suffix that have iterative meaning. Kölligan (2007a) argues that in the case of Latin the distinction depends on the agentivity of the base verb: if the base is agentive, the derived verb is iterative-intensive; if the base verb is non-agentive, the derived verb is transitive-causative. It is possible that both meanings of iterativity and transitivity-increasing were available in the proto-language (see also Kölligan 2004). In some languages the reflexes of **R(o)-éye/o-* have merged with denominal verbs made to **o-*grade nominals; Greek is a case in point (discussed in detail by Tucker 1990:123–84).

§4.3.2 Perfective stem formation There were fewer types of aorists — we reconstruct four — but still diversity is found. As in the present system, the redundancy of four formal markers expressing one functional category suggests that early mergers define the prehistoric development of the aorist.

Athematic root aorists: Like the athematic root presents, the (secondary) endings are added directly to the root. Thus **d^heh₁-* ‘to place’ formed a root aorist **d^heh₁-t* ‘placed, put down’, reflected in Ved. *dhā-t*, Gk. *é-t^hē-k-e*

(whose older *k*-less form is preserved in Boeot. Gk. *(an)-é-t^hē*). Root aorists typically form their present stems by further affixation; Gk. *é-t^hēke* is the root aorist to the reduplicated present *tít^hēmi* ‘I place, set something’. PNIE root aorists show up in Anatolian as stems that make presential forms; thus beside the inherited root aorist **d^heh₁-t* ‘placed, put down’ (> Hitt. *tēt* ‘said’) are attested Hitt. *tē-zzi* ‘says’ and Lyc. *ta-di* ‘puts’, and beside the root aorist **k^wer-t* (> Ved. *(a)kar* ‘made’) is found Hitt. *kuer-zi*, *kuranzi* ‘cut(s)’ and CLuw. *kuwarti*, *kur-* ‘id.’. The Anatolian forms are usually explained as innovations, when old aorists were retrofitted with new primary endings, in this case **d^héh₁-t-i* ‘places’; Malzahn (2010:267–8, *et passim*) calls this process of morphological renewal the “*tēzzi*-principle.”

***s-aorists:** Athematic **s*-suffixed aorists (“sigmatic aorists”) are a widespread aorist type in PNIE. The **s*-aorist and its offshoots make up the most productive aorist type in Greek, Indo-Iranian, and Slavic (although it is notably absent from Baltic); furthermore, relics are uncontroversially found in Latin, Celtic, and elsewhere. From the PNIE languages, a formation with lengthened grade root and secondary endings may be reconstructed; e.g. the root **weg^h-* ‘convey, move’ forms an **s*-aorist **wég^h-s-t* (Lat. *vēxit* ‘conveyed’, Ved. *āvāt*, etc.). Despite this agreement between the NIE languages, reconstructing the **s*-aorist for PIE — including Tocharian and Anatolian — is beset with difficulties. Some connection of the Tocharian *s*-preterite (pret. class III) with the PNIE **s*-aorist is universally accepted; the nature of that connection, however, remains elusive. Essentially the following three positions have been advanced: (i) the Tocharian *s*-preterite derives wholly from the **s*-aorist; (ii) it represents instead a conflation to some extent with the PIE perfect; or (iii) it reflects an ancestor of the PNIE aorist, namely a “pre-sigmatic aorist” (see the review of literature in Malzahn 2010:208–14). No proposal has yet won universal accord; recent investigations of this problem may be found in the volume edited by Malzahn et al (2015), especially the contributions therein by Kim, Melchert, and Oettinger (all against the pre-sigmatic aorist). Even more difficult to pin down is the prehistory of Anatolian. There is widespread agreement that the Hittite preterite third singulars of the *hi*-conjugation like *nai-š* ‘turned’ and the **s*-aorist (cf. to the same root Ved. *á-nāi-š-am* ‘I led’) are historically related (from very different viewpoints see Oettinger 1979:405 and Jasanoff 2003a:174–214), but there is no agreement on what that relationship is. Jasanoff’s innovative proposal (for which see already Jasanoff 1988b, and also his account in this volume) has not won general acceptance (as witnessed by the critical remarks of Kim 2005:194 and Oettinger 2006:43–4, *i.a.*) and the issue remains unsettled at present. Further studies on the developments of the **s*-aorist in the ancient Indo-European languages include Drinka (1995), Narten (1964) on Vedic, Schumacher (2004) on Celtic, and Ackermann (2014) on Slavic.

Reduplicated thematic aorist: The reduplicated thematic aorist is not widely attested but the examples look old; *LIV*² reconstructs it for only 18 roots (5 secure). Examples include the root **wek^w-* ‘say’, which makes a reduplicated aorist **we-uk^w-e-t* ‘said’ (> Ved. *voc-a-t*, Av. *-vaocat*, Gk. *(w)eíp-e*), and **werh₁-* ‘find’ > **we-wr(h₁)-e/o-* ‘found’ (> Gk. *heúr-e*, OIr. *fo-fuair*). Willi (2007) argues that the reduplication seen in the reduplicated aorist was a marker of aspectual perfectivity in PIE. Besides Indo-Iranian examples like Ved. *vocat* ‘said’ (< **we-wk^w-e-t*), there is also attested in Vedic a reduplicated preterite regularly aligned with the *-áya-* transitives (discussed above under **-éye/o*-presents), e.g. Ved. *dars-áya-ti* ‘shows, makes see’ beside the aorist *a-dī-dṛś-a-t*. The fact that the reduplicant in this class regularly contains the vowels *-i-*, *-u-* (not *-a-*) leads Jamison (1983:216–9) to argue that it derives from a different historical source than the PIE reduplicated aorist, viz. imperfects to the reduplicated present.

In a number of daughter languages, the reduplicated aorist is valency increasing; Ancient Greek is a case in point (Duhoux 2000:79–80). Bendahman (1993:61–100, 140–70) finds in Greek about 30 reduplicated aorist stems, which fall into two types: (i) roots referring to prototypically transitive events with an agentive subject form transitive reduplicated aorists, **g^{wh}én-ti* ‘strikes’ ⇒ **g^{wh}e-g^{wh}n-e/o-* ‘struck’ (> Gk. *pép^hn-e* ‘slew’ = YAv. *-jaynat*); (ii) roots referring to prototypically intransitive events form transitive reduplicated aorists, e.g. **h₂er-* ‘fit’ ⇒ **h₂e-h₂r-e/o-* (> Gk. *arareîn* ‘to make fit (tr.), to adapt’). Similarly the reduplicated aorist underlies the productive preterite to “causative” formations in Tocharian A, viz. its class II preterite (e.g. *ca-cäl* ‘lifted’ to the root *täl^(ā)* ‘lift’ < **telh₂-*; cf. Malzahn 2010:172–3 on the function of this preterite). Whether the TB preterite II can also be derived from the reduplicated aorist is not certain; see Malzahn (2010:184–189) for an overview of the question and, in addition, the recent analysis of Jasanoff (2012b), who books the TB forms under “long-vowel preterites,” a class which he derives from the imperfects of “Narten presents” (see above under root presents). It is possible that the cross-linguistically common alignment of high transitivity and telicity (cf. Hopper and Thompson 1980:270–6, Wagner 2006) feeds the development of transitivity in this class of aorists, though the fact that not all types of aorists become transitivizing implies a more complicated evolution.

Thematic aorists: Aorists with zero-grade root and accented thematic vowel are known from at least two equations: PNIE **wid-é-t* ‘saw, found out’ (> Ved. 3sg. *á-vid-a-t*, Gk. *é-(w)íd-e*, Arm. *e-git*), and **h₁lud^h-é-t* ‘went out’ (> Gk. *élud^h-e* ‘came’, OIr. *luid* ‘went’, TA *läc*, TB *lac* ‘went out’). The latter example in particular demonstrates the PIE antiquity of the thematic aorist, since it is continued in languages where the category was by no means productive (Old Irish and Tocharian). Cardona (1960) analyzes most thematic aorists in Greek and Indo-Iranian as thematized root aorists, and considers only two examples cited above to be of PIE antiquity, although the fact that we have these two examples suggests that more existed in the protolanguage. LIV² unaccountably fails to reckon with a thematic aorist; for one account of the type’s origins (ultimately a type of imperfect reanalyzed as an aorist) see Jasanoff (fthcm. b).

§4.3.3 Perfect stem formation “Perfect” stems exhibit far less formal diversity than present and aorist stems; there is effectively one type of perfect, which is set off from the system of present and aorist stems in several formal and functional ways. The perfect is formed by partial copy reduplication (with fixed *e*-segmentism in the reduplicant) and **o/ø*-ablaut in the root. The inflectional endings of the perfect (active) are distinct from the present/aorist active endings (cf. §4.2). Examples include **men-* ‘think’ ⇒ 3sg. **me-món-e* ‘has in mind’, 3pl. **me-mn-ér* (> 3sg. Gk. *mémone* ‘intends’, Lat. *meminit* ‘remembers’); **g^{wh}en-* ‘smash’ ⇒ 3sg. **g^{wh}e-g^{wh}ón-e* ‘has slain’, 3pl. **g^{wh}e-g^{wh}n-ér* (> 3sg. Ved. *ja-ghán-a*). Another formal peculiarity of the perfect is its distinctive active participle suffix **-wós-* (contrast the eventive’s **-nt-*). There is one certain example of a PIE root that makes an unreduplicated perfect: **woíd-e* ‘knows’ (Gk. *(w)oíd-e*, 1pl. *(w)íd-men*, Ved. *véd-a* 1pl. *vid-má*, Go. *wait*, *witum*, etc.). It has long been disputed whether this form represents an archaism (i.e. reflecting a pre-stage when perfect stems were formed without reduplication), an innovation, or is something else entirely (for one account see Jasanoff 2003a:234–46 with references, but compare now Jasanoff fthcm. b).

Beyond these formal differences, it is notable that the perfect’s semantic value is resultative-stative, again setting it apart from the eventive system. The three-way split between present, aorist, and perfect stems survives only in Greek and Indo-Iranian, and it is therefore only in these two branches that semantic distinctions between these categories can be investigated. Early Greek is thought to be most conservative in reflecting the value of the PNIE perfect: Wackernagel (1904) established that in Homeric Greek a perfect can have the meanings of a present state and/or a resulting state (cf. further Wackernagel 1926-8 [2009]:215–20 with the editor’s notes, and Chantraine 1926). The value of the perfect in Indo-Iranian is broadly harmonious with that of Greek; in a thorough investigation of the category Kümmel (2000:65–78) shows that the Indo-Iranian perfect divides into a stative-like perfect and a past perfect, which refers to a greater or lesser extent to the present value relevance of a past action. However, on the particulars of the perfect in Vedic a number of questions remain. Dahl (2010:343–424), for instance, argues that the primary meaning is anteriority, a result critically reviewed by Jamison (2014), who disputes that any overarching function of the perfect can be established for the Rigveda due to the heterogeneous nature of the text. The diversity of functions in earliest Vedic would reflect ongoing diachronic change from the resultative-stative value of PIE, found in earliest Vedic, to the anterior meaning found more consistently in its use as a preterital narrative perfect in later Vedic, regularly in Epic and Classical Sanskrit. The precise functional value of the perfect in Old Indic is thus a topic still undergoing investigation (see now also Jamison 2016). For further analysis of the PIE perfect, see the three volume study by Di Giovine (1990-1996).

The status of the perfect in Anatolian is unsettled and inextricably bound up with one’s views on the foundational question of the prehistory of the *hi*-conjugation (a helpful introduction to this complex problem is given by Clackson 2007:129–56). Deriving the *hi*-conjugation as a whole from the perfect is simply not viable in the wake of Jasanoff’s (2003a:1–27) criticism (following esp. Cowgill 1975, 1979). Whether any Anatolian items reflect the perfect is disputed. Jasanoff (2003a:11, 37, 117–8) claims that Hitt. *wewakk-* ‘demand’ and *mēm(a)i-* ‘speak’ descend from PIE perfects, and Forssman (1994) argues that Hitt. *šipand-* ‘libate’ continues a perfect **spe-spónd-*; however, Jasanoff (fthcm. b) now derives *wewakk-* ‘demand’ and *mēm(a)i-* ‘speak’ (and other apparent non-resultative perfects like Gk. *mémēke* ‘bleats’) from reduplicated **h₂e*-presents with a strong stem **Cé-CoC-ei*, while deriving the PNIE resultative-stative perfect from reduplicated **h₂e*-aorists with a strong stem **Ce-CóC-e* (cf. §4.2.6 above). If Hitt. *šipand-* ‘libate’ reflects a reduplicated stem at all, its attested telic sense argues that it represents a reduplicated **h₂e*-aorist **se-spónd-* (Melchert 2016b).

§4.4 Non-finite formations PNIE made participles to each tense-aspect stem and for the two voices of active and middle. Yet again, Anatolian does not conform to this model, and we address below the specific points at which Anatolian problematizes the deeper PIE reconstruction. No single marker for the category infinitive can be reconstructed for the protolanguage since the daughter languages disagree too greatly on how the category is marked, although the fact that numerous daughter branches build infinitives with case-forms of abstract nouns strongly suggests that the proto-language did so as well.

§4.4.1 Participles Morphologically participles attach to tense-aspect stems (present, aorist, perfect), making verbal formations with adjectival agreement features. No recent work devoted entirely to participles in PIE exists; Lowe (2015) is a thoroughgoing account of participles in the *Rigveda*, with diachronic material throughout. Lowe (2015:5–6, 226–94) proposes to define participles along the cline of an adjective’s status as an inflectional part of the verb system. Thus participles are defined as non-finite, inflectional forms of verbs, which are morphologically adjectival. As inflectional forms, participles convey adjectival agreement of case, number, and gender with their head noun; morphologically participles mark the verbal categories of voice (active and middle) and tense-aspect. The participle is defined in distinction to verbal adjectives, which are lexical adjectives that display some verbal properties. A deciding criterion between participle and verbal adjective is whether the adjective obligatorily inherits the argument structure of the base verb from which it is derived; participles in Vedic always inherit the argument structure of the base, but with deverbal adjectives this may, but need not, be the case.

Present/aorist active participle: In PNIE the active participle to present and aorist stems is formed by an ablauting suffix **-ont/nt-* (fem. **-nt-ih₂-*). Thematic forms were **-o-nt-*, while in athematic verbs the suffix was added to the weak stem — for instance, **h₁es-* ‘be’ makes a prs.act.ptcp. **h₁s-ónt-* ‘being’ (cf. Lat. *sōns* ‘guilty’ and *in-sōns* ‘innocent’, relics from **h₁s-ónt-s*; Watkins 1967). In thematic verbs the zero-grade suffix was added to the thematic vowel, as in **b^hér-o-nt-* ‘bearing’ (Gk. *p^hér-o-nt-*). Similarly **-nt-* could be added to aorist stems.

The Anatolian cognate of **-nt-* presents several serious discrepancies. The Hittite cognate of the participial suffix **-nt-*, viz. *-ánt-*, regularly expresses a resultant state: Hitt. *kunant-* means ‘killed, having been killed’ (not ‘killing’), a meaning matched residually in Luwian and Lycian relics, as in CLuw. *walant(i)-/ulant(i)-* ‘dead’, Lyc. *lāta-* ‘dead’. In the case of transitive verbs the Anatolian participles show usually a passive, but sometimes an active sense, e.g. Hitt. *šekkant-* ‘knowing/known’, *appānt-* ‘taken, seized’. This state of affairs contrasts with other IE languages, as illustrated by Hitt. *kunant-* ‘killed’ beside its cognate in Vedic *ghnánt-* ‘smashing, killing’ (though see Watkins 1969:142–4 for possible relics of passive meaning of the **-nt-* participle). In general, then, the Hitt. *-nt-* participle in functional terms most closely resembles PNIE **-to-/*-no-* adjectives. Precisely how to derive the Anatolian or non-Anatolian attested function from the other remains an unsolved problem (Melchert fthcm. b and Fellner and Grestenberger fthcm propose possible step-by-step diachronic scenarios).

It may be noted that a formally identical suffix **-nt-* is also used outside the verbal system to build adjectives to property concept roots (within the “Caland system,” Rau 2009a:176–7 *et passim*). For instance, Ved. *bṛhánt-* ‘high’, Av. *bərəzant-* ‘id.’, TA *kom-pārkānt* ‘sunrise’, etc. all derive from the root **b^herǵ^h-* ‘high’, whose meaning is typical of property concept roots, and which builds adjectival stems (this example was identified already by Caland 1892:267). Verbal stems formed to this root are sporadically attested (see further Lowe 2014a:283–94).

Middle participle: The middle participle (present, aorist, perfect) is reconstructible as athematic **-mh₁no-*, thematic **-o-mh₁no-*. The comparative method requires the reconstruction of this peculiar suffix shape, as shown by Klingenschmitt (1975:161–3); the suffix is certainly composite in diachronic terms, although its internal structure is opaque. The suffix is found as a productive participle marker in Indo-Iranian (Ved. [athem.] *-ānā-*, [them.] *-a-mānā-*), Greek ([pfc.] *-ménos*, [prs.] *-menos*), and Tocharian (TA *-mām*, TB *-mane*). In other languages mere vestiges remain, such as Arm. *anasown* ‘animal’ < **n₁-h₂eǵ-omno-* lit. ‘non-speaking’, and Latin relics include *fēmina* ‘woman’ and *alumnus* ‘nursling’ (cf. Weiss 2011:437). There is no trace of this participle in Anatolian; for arguments against Luwian *-Vmma-* as a reflex of **-mh₁no-* see Melchert (2014a:206–7).

Perfect Participle: The perfect participle active was formed with the ablauting suffix **-wos/us-* (f. **-us-ih₂-*) added to the perfect stem. The formation is clearly continued into a number of daughter languages, as in Myc. Gk. *a-ra-ru-wo-a* [arar(u)-woh-a] ‘fitted’ (n.nom.pl.), Ved. *ca-kṛ-váms-am* (m.acc.sg.) / *ca-kṛ-úṣ-ī* (f.nom.sg.) to the root *kṛ/kar-* ‘make’. Forms of the perfect participle active are continued in languages where the perfect has been lost as a finite category; it is found in Tocharian’s preterite participle, e.g. TB *kekamu/kekamoṣ* (root *kām-* ‘come’ +

–*u* < *–*wos*–), and remade in Balto-Slavic (details in Olander 2015:94–5). A curious trace of the formation survives in Go. *berusjos* ‘parents’ (reflecting the feminine *–*us-yeh₂*–). Possible vestiges remain in Italic (see Vine, this volume §7.3.1.2); no trace has been found in Armenian or Albanian. With greater consequences for PIE, the perfect participle active is absent from Anatolian; it is highly likely that this absence is due to the category’s nascence after Anatolian’s departure from the common ancestor of the NIE languages.

§4.4.2 Infinitives The infinitives in the IE languages are usually frozen case-forms of deverbal nominalizers (cf. §2.4.1 above); it is very likely that infinitives were formed in this way in PIE too. However, the significant formal diversity attested in the marking of infinitives in the daughter languages seriously problematizes efforts to reconstruct the PIE exponent(s) of this category — that is, precisely which case form or forms of which nominalizers marked the category of infinitive remains unclear (for one overview of the problem, see García Ramón 1997). Keydana (2013a) proposes criteria for segregating event nominalizations from true infinitives in Vedic. His strongest proposed criterion for nounhood is that event nominalizers do not inherit argument structure from the verb, and therefore cannot govern a transitive object (they instead take a genitive complement). True infinitives do inherit verbal argument structure, which includes transitivity (and potentially tense, aspect, and voice), and thus will govern accusative case (Keydana 2013a:25–58). It is not yet clear whether the Vedic texts always conform to the proposed criteria (cf. Lowe 2014b); see also the extensive discussion of Old Irish verbal nouns and infinitives by Stüber (2015).

The following infinitives are representative of the forms attested in the daughter languages. The suffix *–*tu*– (forming abstract nouns) makes infinitives in various cases, for instance (acc.sg.) Ved. *dá-tum* ‘to give’, (dat.sg.) Ved. *pá-tave* ‘for drinking’, also in Old Prussian *da-twei* ‘to give’. Likewise the suffix (forming abstract nouns of feminine gender) *–*ti*– in various cases: Ved. *pī-táye* (dat.sg.) ‘for drinking’, Lith. *bū-ti* ‘to be’ (from loc.sg. *–*tēi*). The suffix *–*men*– furnishes infinitives in various cases, such as Ved. *vid-mán-e* (dat.sg.) ‘to know’, Hom. Gk. (*w*)*íd-men-ai* ‘to know’; comparable is *–*wen*–, which underlies the Anatolian infinitives, Hitt. –*wanzi* (< abl.-instr. *–*wen-ti*), Palaic and Luvian –*una* (< Proto-Anatolian allative *–*un-eh₂*). The suffix *–*d^hye/o*– (cf. Fortson 2012, 2013) makes infinitives across a number of branches: Indo-Iranian *–*d^hyāy* (e.g. Ved. *pība-dhyai* ‘to drink’) can be equated with Italic infinitives, viz. Osc. –*fīr*, Umb. –*f(e)i*, Lat. prs.pass. –*rier*, as well as the Tocharian infinitive in –*tsi* (e.g. TB *lkā-tsi* ‘to see’).

§5 Conclusions

Our survey of PIE morphology, written in the first quarter of the 21st century, builds directly on the great foundations of the field laid in the 19th and 20th centuries. However, the picture of PIE morphology it presents differs radically in many respects from the one presented by our predecessors; as one adage has it, “no language changes so fast as Proto-Indo-European.” We have attempted here to survey where there is consensus in the field and to flag points of interest for future research. We have aimed to present a state-of-the-art view on PIE morphology, in full knowledge that this picture will change in coming years. The continued integration of Hittite and Tocharian into our understanding of PIE will undoubtedly play a major role in the 21st century, much as it has done in the 20th; philological work on the daughter branches will continue apace, challenging and revising our understanding of the proto-language; and advances in theoretical linguistics and in synchronic and diachronic language typology will continue to shed new light on old problems.

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