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Abstract

There are around sixty Indo-European roots that are (sometimes) reconstructed with a vowel *a in the scholarly literature that otherwise fully embraces the laryngeal theory. This number is extremely low compared to the number of morphemes in which the vowels that are traditionally reconstructed as *e and *o are found. This marginal status of the vowel *a is typologically odd and has led some scholars to deny the existence of a vowel *a in Proto-Indo-European or in a precursor of Proto-Indo-European. This paper discusses the comparative evidence for the reconstruction of Proto-Indo-European *a. It concludes that there is insufficient evidence for the reconstruction of *a for any stage of the proto-language.

Keywords

Indo-European phonology – marginal phonemes

1 Introduction

How many vowels did Proto-Indo-European (PIE) have? This is a question that became pertinent after the discovery of the laryngeals. It became clear that for the vast majority of cases in which Indo-Europeanists used to reconstruct *a and *$\bar{a}$, these vowels stood next to *h_2 and could be reinterpreted as positional variants of the vowel *e. As a consequence, *a and *$\bar{a}$ are now no longer reconstructed for any suffixes or endings (Rasmussen 1989: 261, Beekes 1991: 238),[1] and the number of nominal and verbal roots in which they are reconstructed

1 See below on the alleged abl.sg. ending *-$o(h_1)ad$.

is very limited. The *Lexikon der Indogermanischen Verben* (LIV²) lists only 23 verbal roots that are reconstructed with a vowel **a* out of a total of over 1200 roots.[2] Also, in most of the roots for which **a* and **ā* are still reconstructed, these vowels do not take part in ablaut, unlike the more frequent vowels **e* and **o*.

The rarity of **a* and the fact that it rarely if ever takes part in ablaut has led scholars to question the very existence of a phoneme **a* in early or late Proto-Indo-European. While Kuryłowicz (1956: 193) still stated that "nous hésitons encore, en face d'étymologies comme **kaiko-*, **daiu̯er-*, **k̂anku-*, **k̂aso(n)-*, **sauso-*, *ĝhans-*, à considérer comme *définitive* la preuve de l'origine *post-indo-européenne* (méridionale) du vocalisme *ă*", others have since concluded that the evidence in favour of reconstructing PIE **a* was insufficient (Lubotsky 1989, Beekes 1991: 238, Smoczyński 2006: 85 f., Kloekhorst 2008: 15, fn. 11, Kortlandt forthc.). The most elaborate treatment of the problem is that by Lubotsky, who provided a detailed discussion of a number of words often reconstructed with **a* and concluded that none of them warrant the reconstruction of a PIE phoneme /a/. Beekes (1991: 238) agreed, stating that "I consider it as one of the most important insights provided by the laryngeal theory that PIE had no phoneme **a*." A less radical view distinguishes between early PIE phonetic [a] and late PIE phonemic /a/ (NIIL xix, Kümmel 2012: 306). The meaning of "late PIE" in this context appears to be the latest reconstructable common ancestor of all Indo-European branches, including Anatolian.

The aim of the present paper is to re-evaluate the evidence for phonemic **a* and **ā* in PIE and, if there is any evidence supporting the reconstruction of these phonemes, to decide whether they must be attributed to a specific stage of PIE. It will be argued that the emergence of phonemic **a* and **ā* can be dated after the dissolution of the latest common ancestor of the non-Anatolian Indo-European languages. Before we discuss the data, a few words about typology are in order.

The "peripheral status [of **a*] in the vowel system is typologically very odd" (Sihler 1995: 45). It may seem that this problem can be resolved by assuming that any **e* that was adjacent to **h_2* had already been interpreted as a separate

2 Five of those 23 (2. **$h_1$ai-*, **las-*, **rasd-*, **slak-* and **tag-*) are marked with a question mark. PIE **las-* (Gr. λιλαίομαι 'to desire') should be **leh$_2$s-* in view of Ru. *lásyj* 'greedy, eager', **tag-* seems to be no better than **teh$_2$g-* (Gr. τᾱγός 'commander', τάσσω 'to array (troops)'). 2. **$h_1$ai-* is only Hittite (*aāri* 'is warm'), **rasd-* is only Italo-Celtic (Lat. *rādō*, W. *rhathu* 'to scrape') and **slak-* is too uncertain to use (Goth. *slahan* 'to beat, strike', OIr. (gloss) *slacc* 'sword'). In the *Addenda et corrigenda* of LIV², **d^{h}alh$_1$-* is changed to **d^{h}elh$_1$-* and **ǵ^{h}an-* to **ǵ^{h}eh$_2$-*, while an uncertain root ?**ḱat-* 'zerreißen, zerschlagen' has been added.

phoneme **a* by speakers of late Proto-Indo-European, as a result of, or leading to, the borrowing of non-Indo-European words with a new phoneme **a*. This scenario is also implied by the notations **h_2a* and **ah_2* instead of **h_2e* and **eh_2* employed by Eichner (1988) and a number of other scholars. Assuming, for the moment, that this is correct, it could be hypothesized that all words in which **a* cannot be interpreted as a positional variant of **e* or **o* are recent borrowings that entered PIE when the colouring of **e* to **a* next to **h_2* became or had become phonemic. This scenario is possible for some words for which reconstructions with **a* have been proposed in the literature, like Lat. *faber* 'artisan' or *cānus* 'white, grey', but much less so for nouns like Lat. *nāris* 'nose', which belongs to basic vocabulary, and verbs like Gr. ἀΐω 'to perceive', φαγεῖν 'to eat, consume' and αἴνυμαι 'to take, seize'. These words do not appear to be recent borrowings and likely belonged to the PIE vocabulary already before laryngeal colouring of **e* had taken place. If they are reconstructed with **a*, such a phoneme would have been very marginal in the early Proto-Indo-European phonological system, which would, as Sihler observed, be very odd from a typological perspective.[3]

A PIE system without **a* would have had just four vowels **e*, **o*, **i*, **u* (or two, if one counts **i* and **u* as allophones of **i̯* and **u̯*). Such a system is typologically less spectacular, especially if one takes into account that **e* and **o* are just labels. The phonetics of these vowels were almost certainly not mid [e] and [o]. For possible phonetic interpretations see Martinet (1972: 304), Villar (1993), Kortlandt (2010: 37) and Kümmel (2012: 306 ff.). The various phonetic realizations of vowels in around 50 languages that have been claimed to have a four-vowel system have been collected by Hitch (2017: 17, 27–29). Hitch distinguishes the following four types, of which type 4c comes closest to a reconstructed Proto-Indo-European without **a*:

4a

i		u
	ə	
	a	

4b

i	ɨ	u
	a	

4c

i		u
æ		ɒ

4d

i		
e		o
	a	

In some branches of Indo-European, the rise of [a] would have caused **e* and **o* to shift to a position near mid [e] and [o] after the disintegration of

3 To my knowledge, it has never been suggested that **a* was phonetically not an open central unrounded vowel. Reconstructing it as, e.g., a mid-vowel and **o* as an open central unrounded vowel might solve the typological issue, but then it becomes unclear why these vowels shifted to [a] and [o] in Greek and Latin.

Proto-Indo-European. The reconstructed phonological system of Proto-Indo-European is, however, ultimately not determined by typology, but by the comparative method. The comparative evidence will therefore take centre stage in the following discussion.

It is of course impossible to disprove that PIE had the phonemes *a and *$\bar{a}$, but what we can do is see to what extent the data *demand* a phoneme *a or *$\bar{a}$. In other words: are *a or *$\bar{a}$ part of the minimal set of phonemes of the proto-language from which all plausibly inherited forms can be explained? Their reconstruction is warranted if there are any etyma, but preferably more than a few, that are more likely than not to be of Proto-Indo-European origin and that show correspondences that cannot be explained using the tools otherwise available to us. Whether an etymology is solid enough to be used as evidence is of course to some extent subjective. For the purposes of this paper, full weight will be attached to etyma that are securely attested in two, but preferably more, branches that are not adjacent and for which the etymology does not require special pleading to account for formal or semantic peculiarities. Etymologies that do not fall into this category, e.g. because the semantics of the etymology are not straightforward, because the etymon is limited to a specific geographic area or because the etymology requires the assumption of otherwise unusual ablaut patterns or controversial sound laws, can be discarded as evidence, because the correctness of the etymology in that case partly depends on the existence of a PIE phoneme *a or *$\bar{a}$ and the argument would become circular.

Below, we will reassess those reconstructions with *a that are found in literature that otherwise fully embraces the laryngeal theory. I have tried to be as complete as possible, but cannot rule out that I have missed some proposed reconstructions containing *a or *$\bar{a}$. The list of potential PIE roots with the vowel *a consists of around sixty items. Over half of the items on the list also occur in languages outside Europe (Anatolian, Tocharian, Indo-Iranian) and are à priori unlikely to be local post-Proto-Indo-European borrowings from some non-Indo-European language. This is important, because since Kuryłowicz (1956: 194) it has often been claimed that *a is widespread in words that were borrowed from one or more European substratum languages. Eighteen items on the list have a reflex in Anatolian. They are of special interest because they could serve to show that Proto-Indo-European had a phoneme *a even before the Anatolian branch split off or that it acquired *a after the split.

I will ignore roots that used to be reconstructed with an initial vowel and are now generally reconstructed with an initial laryngeal in accordance with Benveniste's ideas about Indo-European root structure, even if direct comparative evidence for a laryngeal is scarce or lacking, e.g. *$h_2eǵ$-/*$h_2aǵ$- 'to drive'

and *h_2eid^h-/*h_2aid^h- 'to kindle' instead of *$a\acute{g}$- and *aid^h- (cf. also the long $\bar{\imath}$- of Skt. *$\bar{\acute{\imath}}jate$* 'drives' < *h_2i-$h_2\acute{g}$-). Such reconstructions are a direct consequence of the laryngeal theory, not of the hypothesis that Proto-Indo-European did not have a phoneme /a/.

2 *a in Indo-Anatolian

2.1 *Evidence from Hittite*

2.1.1 *$ma\acute{k}$- 'long' (Klingenschmitt 1982: 260, fn. 1, Weiss 2009: 41, Ringe 2017: 12)

Gr. μακρός 'long, great, high', μῆκος 'length', Lat. *macer*, OHG *magar*, Hitt. *maklant-* 'meagre, thin'. The often adduced YAv. *masah-* 'greatness' is not related to these words but must be derived from *$me\acute{g}$-h_2- 'great', as was shown by Kümmel (2018). Gr. μακρός, μῆκος can be derived from *$mh_2\acute{k}$-*ro-* and *$meh_2\acute{k}$-*os-* respectively, with the expected zero-grade in the *ro*-adjective and *e*-grade in the *s*-stem (Beekes 1988: 25). According to Beekes, the vocalization *$mh_2\acute{k}$- > Gr. *mak- was regular (see further 3.23 below). Lat. *macer*, OHG *magar* and Hitt. *maklant-* show a similar development of the zero-grade *$mh_2\acute{k}$-. Neri (2016: 12) suggested that a reconstruction *$meh_2\acute{k}ro$- would also produce the attested forms due to regular loss of the laryngeal in the sequence *-VHTR-* (the so-called "Wetter-Regel"). This is less attractive because the reality of the "Wetter-Regel" is doubtful (see 3.8 below) and because PIE *ro*-adjectives usually display zero-grade of the root. In any case, this etymon did not contain *a.

2.1.2 *$(\acute{k})\underset{\smile}{u}as$- 'to kiss' (Eichner 1988: 33, LIV^2, Melchert 2016a, Ringe 2017: 12)

Hitt. *$ku\underset{\smile}{u}a\check{s}zi$*, Gr. κυνέω 'to kiss'. The vowel *a is reconstructed on the basis of the fact that Hitt. *$ku\underset{\smile}{u}a\check{s}zi$* is a *mi*-verb, which makes a reconstruction with an *o*-grade, i.e. *$(\acute{k})uos$-, unlikely. However, a reconstruction with *a*-grade is equally unsatisfactory, because the full grade normally reflected in *mi*-verbs is an *e*-grade. The Hittite verb could alternatively be cognate with OHG *kussen* 'to kiss' < *$(\acute{g})us$- or, as preferred by Puhvel (1997: 312), an onomatopoetic word formed in a similar fashion to the Greek and Germanic verbs. Kloekhorst (2008: 506) observed that the Hittite verb is consistently spelled with a geminate *-šš-*, pointing to an earlier consonant cluster. He argued that, if the Hittite verb is indeed cognate with Greek κυνέω, they could reflect *$\acute{k}u$-*en*-*s*- and *$\acute{k}u$-*ne*-*s*- respectively. In his 2014 book on Hittite accent, however, Kloekhorst withdrew this reconstruction, because the attestation *ku-$\underset{\smile}{u}$a-a-aš-zi* (KBo 30.101 iii 12) shows plene spelling, which, if taken at face value, makes the connection with Greek

κυνέω impossible (2014: 286 f., with fn. 1069). He proposed a new reconstruction *$Ku(e)h_3s$-, which could also be reflected in Skt. *cúṣati* 'to suck, smack'. Summarizing, the prehistory of the Hittite verb remains uncertain, but there is no basis for the reconstruction of a proto-form with **a*.

2.1.3 *$ḱ^{(}atu$- 'fight' (EIEC 201, Matasović 2009: 195, Melchert 2016b: 299, Ringe 2017: 170)

OIr. *cath* 'battle, troop', OW *cat* 'battle', OHG *hadu*-, ON *hǫð* 'battle', MHG *hader* 'quarrel, dispute', OCS *kotora* 'quarrel, fight', Gr. κότος 'rancour', Hitt. *kattu*- 'talon', *kattawatar* 'enmity', Skt. *śátru*- 'enemy'. Vedic *ś*- is incompatible with the velar of OCS *kotora* (Mayrhofer 1996: 607), and the vocalism of Gr. κότος is incompatible with that of OIr. *cath*. The latter problem can be resolved by reconstructing *$ḱ^{(}h_3$-*t*- (Kroonen 2013: 214) or *$ḱ^{(}h_2e/ot$- (Kloekhorst 2008: 466), but in that case the Sanskrit and Slavic words cannot be related. Mallory and Adams (EIEC: 201) and Derksen (2009: 240) group the Celtic, Germanic and Slavic together as a northern European term **kat*-. I would like to suggest that the Greek, Sanskrit and Hittite words (perhaps excluding *kattu*- 'talon', Melchert 2016b: 299) reflect PIE **ḱot*- 'enmity, rancour', a reconstruction that also works for Germanic. Because the meaning and formation of Celtic **katu*- 'battle' are so close to those of Germanic **hadu*- 'battle' < **ḱotu*-, the Celtic word can then be analyzed as a borrowing from Germanic (Matasović 2009: 195).

2.1.4 *$h_2u̯ap$- 'to harm' (Eichner 1988: 32 f., Ringe 2017: 12)

Hitt. *ḫuu̯app-^{i}* 'to be hostile towards, do evil', Goth. *ubils* 'evil'. The Hittite verb probably originally belonged to the *ḫi*-conjugation (Kloekhorst 2008: 369, 2014: 556 f.), so it must continue *$h_2u̯op$-, not *$h_2u̯ap$-.

2.1.5 *$h_1au̯$- 'to put on (clothing)' (Melchert 2016a)

Hitt. *ú-nu*- 'to adorn', Lat. *ind-uō*, Arm. (*h*)*aganim*, Lith. *aũti* 'to put on (shoes)', OCS *ob-uti* 'to put on (shoes)'. The reconstruction with **a* is based on the idea that initial *h_2 or *h_3 would surface as *ḫ*- in Hittite or, if it does not, should colour the following **u* to /o/, spelled *u*-. The development of the laryngeal before **u* is controversial; a reconstruction *$h_2eu(H)$- is argued for by Klingenschmitt (1982: 173 f.), followed by LIV^2, while Kloekhorst (2008: 918 ff.) argued for *h_3eu-. In neither case is there any need to reconstruct **a*.

2.1.6 *$ǵ^{h}alH$-*ro*- (EIEC 43, Vine 2002: 338 f.)

Hitt. *kallar* 'unfavourable, baneful', OIr. *galar* 'sickness, distress', cf. also OE *gealla* 'skin lesion', Lith. *žalà* 'damage, injury', OCS *zъlъ* 'bad, evil' (< *$ǵ^{h}lH$-). The

Celtic form, which is decisive here, does not require **a*, as it regularly developed from **gelaro-* with Joseph's rule (Matasović 2009: 149, cf. Driessen 2003: 301 f.). Driessen (2003: 283 f., followed by Melchert 2016b: 4 f.) reconstructed **ǵʰelh₂-*, with **h₂* on the basis of Scots Gaelic *galad* 'good girl, brave girl (used in encouraging address)', which would be a borrowing from British Celtic and reflect **ǵʰlh₂-eto-*, not **ǵʰelH-to-*, because of the expected zero-grade in a PIE *to*-stem. An inner-Celtic *to*-formation **galato-* (quasi-PIE **ǵʰelH-*) is entirely feasible, however, cf. also OIr. *nert* 'strength' < **h₂ner-to-* with *-e-*. The idea that the name of the Galatians, Γαλάται, derives from the same root ('the ferocious ones'?) is mere speculation. The colour of the laryngeal thus remains unknown. In spite of Beekes' skepticism (2010: 1641), it seems likely that a further cognate is found in Gr. χολέρα 'cholera'. A reconstruction **ǵʰe/olh₃-ro-* 'sick, bad, bilious' would allow an explanation of the etymon as derived from PIE **ǵʰe/olh₃-* 'bile, gall' (Av. *zāra-*, Gr. χολή, Lat. *fel*, ON *gall*), which in turn derives from PIE **ǵʰelh₃-* 'yellow, green'. This is also in accordance with Lubotsky's unpublished etymology of Skt. *hr̥̄-* 'to be angry', Av. *zar-* 'to anger' as a derivative from PIE **ǵʰelh₃-*.

2.1.7 **sak-*, **sāk-* 'rite' (Vine 2002: 338, Ringe 2017: 12)

Hitt. *šāklāi-* 'custom, rule, rite', Lat. *sacer* 'sacred', *sācer* 'worthy to be sacrificed'. It seems preferable to reconstruct **s(e)h₂(ḱ)-* (Schrijver 1991: 97, 134, Kloekhorst 2008: 700) in order to account for the ablaut variants, with a regular zero-grade in the *ro*-adjective **sh₂kro-*. There is no need to assume that *sācer* is a PIE *vr̥ddhi*-derivative from *sacer* (*pace* Forssman 1992: 308 f.; on the only other alleged example of such a formation, *ācer* 'sharp', see Schrijver 1991: 132–134).

2.1.8 The abl.sg. ending of the *o*-stems

The abl.sg. ending of the *o*-stems is by some scholars reconstructed as **-āt/d* < **-oat/d* on the basis of a) Lithuanian gen.sg. *-o*, Latvian gen.sg. *-a* < **-ā*, cf. the discussion in Olander 2015: 134–136, and b) the alleged identification of the ending with Lat. *ad* 'towards', Goth. *at* 'at, to', OIr. *ad-* 'to'. Melchert & Oettinger (2009) argued for a reconstruction **-o-h₁-ad*. The Indo-European handbooks reconstruct **-ōt* < **-oet* (Meier-Brügger 2002: 200), **-ōd* (Clackson 2007: 98, Beekes 2011: 212) and **-ōt* < **-o(h₂)at* (Fortson 2010: 126). The East Baltic ending **-ā* is in my view best explained as the regular reflex of **-oeT* > **-a(H)e* with a (restored?) hiatus > **-ā*, cf. the sometimes disyllabic Skt. *-āt* < **-a(H)at*, but always monosyllabic *-ā-* in the dat.sg. *-āy-a* (= Baltic **-ōi* > Lith. *-ui*). Kortlandt explains the Baltic endings from **-ōT* with a regular change **ō* > **ā* in unstressed syllables, but this leaves other unstressed endings with **-ō-* > **-uo-*, like Lith. dat.sg. *-ui* < **-uoi* < **-ōi*, ins.sg. *-u* < **-uo* < **oH* and acc.pl. *-us* < **-uoNs*

< *-*oHNs*, unexplained. I see no reason to assume that the PIE ablatival ending contained the preposition **h*$_2$*ed*, because the preposition does not have an ablatival meaning. In fact, the reconstruction of an ending containing **h*$_2$*ed* is disproven by the *e*-vocalism shown by Lat. abl.sg. *mēd* 'me' and Hitt. ins.sg. *ḫūmantet* 'all', abl.-ins. *apet* 'that', *kēt* 'this' and, with unstressed *-*et* > -*it*, ins.sg. *gābinit* 'thread', *genzuit* 'lap' etc. (Kloekhorst 2014: 103–105).

In any case, there is no reason to reconstruct the preposition as *(*h*$_1$)*ad*. Note the zero-grade variant **h*$_2$*d*- in **h*$_2$*d-o* (with the allative ending *-*o*) in OIr., OCS *do*, Latv. *da* 'to'; **h*$_2$*d-oH* in OHG *zuo* 'to'; **h*$_2$*d-eh*$_1$ (with the ablative-instrumental *-*eh*$_1$) in Lat. *dē*, OIr. *di* 'from'. The ablaut between **h*$_2$*ed*- and **h*$_2$*d*- is similar to that between PIE **per*, **per-i* 'through, about' and **pr-o*, **pr-oH* 'before'. The thematic ablative ending is best reconstructed as *-*o-eT*.

2.2 *Initial* *a *in Anatolian*

A number of other reconstructions with **a* are based on Anatolian forms with initial *a*- corresponding to *a*- in other Indo-European languages. The lack of initial *ḫ*- in Anatolian would preclude a reconstruction **h*$_2$*e*-. The alternative would be to assume that **h*$_2$ was regularly lost in some environments. Following a suggestion by Kortlandt, Kloekhorst (2006b: 83 f.) argued that **h*$_2$ regularly merged with **h*$_1$ before an *o*-grade in Hittite, i.e. **h*$_2$*o*- > *ă*-, e.g. in *āns-*^{i} 'to wipe' < **h*$_2$*omh*$_1$*-s*- versus *haneššˇ-*^{zi} 'to wipe' < **h*$_2$*mh*$_1$*-s*-. Rieken and Sasseville (2014: 305fn.) describe this sound law as "highly disputed", but in the absence of conclusive counterevidence, it remains a serious possibility that PIE **h*$_2$ is not reflected by *ḫ* if it was followed by **o*.[4] The cases relevant for the present discussion are the following:

2.2.1 *h$_1$*aU̯*- 'to perceive' (Melchert 2016a)

Hitt. *aU̯-/u-* 'to see', Gr. ἀΐω, αἰσθάνομαι 'to perceive', Skt. *āvíṣ*, Av. *āuuiš* 'evidently', Lat. *audiō* 'to hear'. Melchert's reconstruction **h*$_1$*aU̯*- is problematic because it requires unique *a/o*-ablaut of the root. The Hittite verb *aU̯-/u-* originally belonged to the *ḫi*-conjugation (Kloekhorst 2008: 228) and therefore the full grade forms should reflect *o*-vocalism, not *a*-vocalism. *O*-grade is further found in Gr. ὀΐομαι, ὀΐω 'to suspect, suppose' (on the etymology see Beekes 2010: 1059) and probably in Skt. *āvíṣ*, Av. *āuuiš* 'evidently' < **Houis*. Reconstructing the root as **h*$_2$*eu*- instead of **h*$_1$*au*- would mean that it shows normal *e/o*-ablaut, but

4 Counterexamples are active singular forms of *ḫi*-verbs like Hitt. 3sg.pres.act. *ḫāni* 'draws water' < **h*$_2$*onei*, *ḫarrai* 'crushes' < **h*$_2$*orh*$_3$*ei*, *ḫāši* 'gives birth' < **h*$_2$*omsei* and *ḫatki* 'shuts' < **h*$_2$*od*^{h}*ǵ*^{h}*ei*, for which Kloekhorst (2008: 281, 300, 319) assumes restoration of *ḫ*- from forms with zero-grade **h*$_2$*C*- > *ḫaC*-.

requires the assumption that the initial laryngeal was somehow lost in Hitt. *au̯-/u-*, provided that the Hittite verbal root is indeed the root from which the adverb **h*$_2$*e/ou-* is derived. According to Kloekhorst, the Hittite verb reflects **h*$_2$*ou-* > *au-* with subsequent analogical loss of **ḫ-* in the forms with *u-* < zero-grade **h*$_2$*u-*. The expected zero-grade **h*$_2$*u-* might be reflected in *ḫuške/a-*^{zi} 'to wait for, linger' (Kloekhorst 2008: 229). For the semantics of that etymology cf. En. *to watch* and *to wait*.

2.2.2 *(*h*$_1$)*ar-* 'to join, fit' (LIV^2 s.v. 1**h*$_2$*er-*, Rieken & Sasseville 2014: 304, Ringe 2017: 12)

Hitt. *āra-* 'right, proper(ly)', *arā-* 'friend', *arāu̯a-* 'free', Lyc. *arawa-* 'freedom'. The most promising direct link is to my mind the one with OPr. *arwis* 'true, real', Lith. (hapax) *arvesnis* 'free (?)' (Petit 2010: 180 f.), OCS *ravьnъ* 'even, straight' < **orv-*, *nravъ* 'nature, character' < **nā-orv-* (Pronk 2013: 294–296) and ON *ǫrr* 'generous', Goth. *arwjo* 'ready' (Kroonen 2013: 37). These all point to a root **HVr-* and a *u*-stem **HVr-u-* meaning something like 'proper'. Lyc. *arawa-* 'freedom' can reflect **erewa-* < **Hore/ou-* with *a*-umlaut (Kloekhorst 2008: 198).[5] Further cognates may be Av. *auruua-* 'quick, courageous' and ToA *ārwar*, B *ārwer* 'ready', but both etymologies are uncertain (Pronk 2013: 296).

Although a reconstruction **h*$_1$*or-*(*u-*) would explain all forms, it is difficult to separate **HVr-*, **HVr-u-* 'proper' from the semantically close Skt. *ṛtá-* 'proper, truthful', *áram* 'fittingly', with which the Anatolian forms are indeed traditionally connected. This means that all these words ultimately derive from the verbal root **h*$_2$*er-* 'to fix, adjust, make proper', for which the Greek evidence clearly points to a root beginning with **h*$_2$-, e.g. the reduplicated aorist ἀραρεῖν and perfect ἄρᾱρα and formations with zero-grade like ἀρτύω 'to arrange, prepare' (cf. Skt. *ṛtú-* 'fixed time, right time') and νήριτος 'countless' < **n-h*$_2$*r-i-* (cf. ON *rím* 'computation'). Apparently, the reflex of the laryngeal was somehow lost in Anatolian. As for the preceding etymon, Kloekhorst (2006b: 83) reconstructed an *o*-grade, which would explain the absence of *ḫ-*: **h*$_2$*or-* > Hitt. *ar-/ār-*.

2.2.3 **atta* 'dad' (Ringe 2017: 170)

Hitt. *atta-*, Lat. *atta*, Gr. (voc.) ἄττα, Goth. *atta*, OCS *otьcь*, Alb. *at*. This word is a nursery term that cannot be used for the reconstruction of PIE phonology. This is confirmed by the fact that the word contains a geminate **-tt-*, whereas the normal PIE lexicon never contains geminates. It is uncertain

5 Lyc. *erawazije-*, *arawazije-*, *erublije-* 'monument' are probably unrelated (Melchert 2004: 4, 17).

whether the Hittite word should be seen as directly cognate with the non-Anatolian forms, because similar Anatolian words like Hitt. *anna-* 'mother' and HLuw. *tata/i-* 'father' used to have *o*-vocalism in view of Lyc. *ẽni* and *tedi*.

2.3 *Doubtful Anatolian etymologies*

In the following cases, the etymologies of the Anatolian words are too uncertain to be used as evidence for the reconstruction of the phonology of the proto-language:

2.3.1 **Halb^h-* 'white' (Weiss 2009: 41, Ringe 2017: 12)

Hitt. *alpaš* 'cloud', Lat. *albus* 'white', Gr. ἀλφός 'dull white leprosy'. The etymology of the Hittite word is clearly based on the superficial formal resemblance to Latin *albus*, because the meanings of the words are rather far apart. Etymologizing the word for cloud as 'the white one' does not account for the fact that *alpa-* is predominantly associated with rain and thunder (Puhvel 1984: 38). The etymology obviously cannot be used as evidence for the reconstruction of the PIE phonemic system.

2.3.2 **(h_1)ar-* 'to take' (Melchert 1999)

CLuw. *ārlanuwa-* 'to bestow, make a gift', *aranuwa-* 'to confer, bestow upon', Skt. *rā-* 'to give, grant', Av. *ərənauuaṇte* (3pl.mid.pres.subj.) 'to grant', Gr. ἄρνυμαι 'to gain, win'. The interpretation of the Luwian forms is problematic. The translation of *aranuwa-* appears to be based on the alleged etymological connection with *ārlanuwa-*. The one (Hittite) context that allows an approximation of its meaning, KBo 4.12 recto 27–30, is the following (translation after Melchert 1999: 244):

> *nu=šmaš=kan* GAL.DUB.SAR^{UTTA} *kuiēš dāmauš arnušker nu=šmaš=at ŪL arannuḫḫa nu ANA* GAL.DUB.SAR^{UTTI} ^{m}UR.MAḪ.LÚ-*in* DUMU ^{m}*Middan^{an}namūwa titta*[*nunun*]
>
> Those others who were trying to obtain the office of chief scribe for themselves—I did not *arannu-* it to/for them. I installed Walwaziti, son of Middannamuwa, as chief scribe.

According to Melchert, the context "calls for 'confer/bestow upon, grant' ". However, other translations seem to be possible as well, including 'establish, fix' or 'make come true, realize', in which case we would be dealing with a *nu*-factitive of PIE **$h_2$er-* 'to join' (see 2.2.2, cf. Hitt. *āra-* 'right, proper(ly)') instead.

Yakubovich (2017: 12, fn. 12) translates 'accord', with the same etymology. In spite of Poetto's (1997) attempts to establish the meaning of the verb *ārlanuwa-*, which occurs twice in a single passage, as 'to bestow', this interpretation remains uncertain due to the scant attestation of the verb, the fact that *ārlanuwa-* is used with the preverb *anda-* 'in(to)' and the fact that the alleged Hieroglyphic equivalent *49a*-nu-wa/i-ha* is used alongside *pi-a/i(a)-ha* 'I gave', which makes it unlikely that *49a*-nu-wa/i-ha* also meant 'I gave, bestowed'. Yakubovich's (2017) translation of *ārlanuwa-* as 'to replace, relocate' makes more sense. As long as there are uncertainties about the meanings of these words, their etymologies remain speculative and cannot be used in the present discussion.

2.3.3 *(h_1)*arg-u-* 'to plead a case' (Weiss 2009: 41)
Lat. *arguere* 'to show, declare, accuse', Hitt. *arkuuae-^{zi}* 'to make a plea'. The primary meaning of Latin *arguere* is without doubt 'to make clear', cf. *argūtus* 'clear, bright', which is why it is traditionally connected with ToB *ārkwi*, Gr. ἀργύφεος 'white', Skt. *árjuna-* 'white, silver-coloured' etc. The meaning 'to show, declare' of the Latin verb appears to be a relatively recent development in view of the fact that the derivative *argūtus* preserves the older meaning 'clear, bright'. This renders the connection with the Hittite verb very uncertain. The latter would have to be an independent derivative from 'white, bright', with a parallel development to 'clear' and subsequent derivation and further development to 'to declare' and finally to 'to make a plea'. This would be a remarkable coincidence. I think that the etymology is a mirage. Melchert (1998: 50) and Kloekhorst (2008: 205) maintained the etymology, however. Kloekhorst reconstructed *h_2*orǵ-u-i̯e/o-* for the Hittite verb, with loss of initial *h_2 before **o*, but the *o*-grade would be unexpected.

2.3.4 **al-* 'to sweat' (Melchert 2016b: 298)
Hitt. *allaniu̯anzi* 3pl.pres.act. 'to sweat (?)', OIr. *allas* 'sweat', according to Szemerényi (1971: 653) also cognate with Gr. ἀλέα 'warmth (of the Sun)' and Lat. *adoleō* 'to burn (as an offering)'. The translation of the Hittite verb as 'to sweat' is unlikely to be correct (cf. Kammenhuber 1961: 61 fn. *a*) and therefore there is no evidence for an Indo-European root containing *a*.

2.3.5 *h_1*ai̯-* 'to take, give' (LIV^2, Melchert 2016a)
ToA *e-*, ToB *ai-* 'to give (active), take (middle)', Gr. αἴνυμαι 'to take, seize'. The reconstruction with **a* is based on the alleged connection with Hitt. *pai-/pi-* 'to give', which cannot contain *h_2. This verb is often analysed as Hitt. *pe-* 'away' (PIE *h_1*poi*) plus a root **ai-*. Kloekhorst (2006a) rejected the etymol-

ogy, because it does not account for the Hittite zero-grade allomorph *pi-* that is also found in, e.g., CLuw. 3sg.pret. *pí̯atta*. Kloekhorst reconstructs *$*h_1p$-(*o*)*i*-, a present of the type *dai-*/*ti-* 'to lay, put', to the root of Hitt. *epp-*/*app-* 'to take'. His etymology is formally more straightforward than the connection with Gr. αἴνυμαι 'to take'. The latter can then be reconstructed as *$*h_2ei$-* (thus Hackstein 1995: 252 f., Beekes 2010: 40).

2.3.6 **angʷʰi-* 'water-snake' (Katz 1998, Oettinger 2010a: 279 f., 2010b)

Lat. *anguis*, Hitt. *illui̯anka-*, *illii̯anka-*, *ellii̯anku-* 'snake', Arm. *awj*, OHG *unk*, Lith. *ungurỹs* 'eel', probably also Skt. *áhi-*, Av. *aži-*. Most of these forms could go back to a proto-form *$*h_2$(*e*)*ngʷʰ*-, except for the the Hittite noun, in which *$*h_2$-* should have been preserved as **ḫ-* (unless one accepts Kloekhorst's sound law *$*h_2o$- > a-* and reconstructs *$*h_2ong^{wh}$-*). According to Katz, the initial element of Hitt. *illui̯anka-*, *illii̯anka-*, *ellii̯anku-* would be the stem of the otherwise isolated Germanic word for 'eel', ON *áll*, OE *ǣl* < **ēl-*, allegedly also present as a suffix in Gr. ἔγχελυς and Lat. *anquilla* 'eel'. A proto-form **Hēl*(*H*)*-i-angʷʰ-* would perhaps be compatible with the Hittite variant *ellii̯anku-* (provided that the geminate **ll* can be derived from **lH*, Oettinger 2010b), but does not account for *illui̯anka-* or *illii̯anka-*. Oettinger's explanation of the vowel alternations (*illui̯anka-*, *illii̯anka-*, *ellii̯anku-*) in terms of dissimilation is *ad hoc* and has no parallels. Also, there is no indication that the velar of the Hittite word reflects a labiovelar, nor is there any independent support for the alleged delabialization of **gʷʰ* by a following **o* in the variant *illui̯anka-* (Katz 1989: 319 f.). The reconstruction of a labiovelar is thus an example of circular reasoning and further compromized by counterexamples to the delabialization rule like *kuu̯āt* 'why' < **kʷod* and *šākuu̯a* 'eyes' < **-kʷ-o*, which Katz (1989: 319, fn. 8) was forced to explain as analogical. Summarizing, the Hittite word cannot be used to establish the exact reconstruction of the root of the PIE word for '(water-)snake', which may therefore have been *$*h_2$(*e*)*ngʷʰ*-.

2.3.7 **aul-* 'tube' (Kimball 1994)

Hitt. *auli-* 'throat' or 'carotid artery' (?), Gr. αὐλός 'pipe, flute', αὐλών 'hollow, defile, channel, pipe', OPr. *aulis* 'shinbone', Lith. *aulỹs* 'beehive', *aũlas* 'leg of a boot', Ru. *úlej* 'beehive'. The Hittite word denotes not only an organ, but also 'blood sacrifice' and 'sacrificial animal'. Kühne (1986) argued that there are two passages in which *auli-* denotes an organ associated with animal sacrifice that betray the meaning 'throat' or perhaps 'carotid artery'. On the basis of this interpretation, he proposed the etymological connection with Gr. αὐλός etc. (1986: 114). In fact, Kühne's translation is rather doubtful. The two crucial passages are the following:

1. ("When the cook prepares the sheep for sacrifice") ^{UZU}*auliš šiu̯ezi* (KBo 29.72 ii 13–14 and KBo 14.96 ii 11–12).
2. *nu=šš̆an* ^{LÚ}EN É-*TIM ŠA* UDU.ŠIR ŠA GUD.MAḪ=*i̯a auliu̯a* GÍR ZABAR-*it QĀTAM dāi*. "The lord of the house places on the *auli-* of the ram and the bull his hand with a bronze knife" (KBo 15.33 iii 10–13).

The first example probably means "the *auli-* spurts [blood]", with an omitted object *ēšḫar* (Kühne 1986: 101, referring to *ēšḫar šiu̯ati* 'blood spurted' in KBo 3.16 verso 6–14). If this is correct, it is preferable to translate *auli-* as 'sacrificial animal', which is a meaning that is well-established for *auli-* (cf. Kühne 1986: 107). In the second example, we are dealing with a ritual that takes place before the actual sacrifice. Although it is conceivable that the lord of the house places his hand on the place where the animal will be cut, this need not be the case. Because there are other attestations of *auli-* referring to an organ that cannot be the throat or the carotid artery, as Kühne (1986: 103–105) himself admits, there is actually little reason to think that in this passage it does mean throat or carotid artery. The etymological connection between Hittite *auli-* 'blood sacrifice, sacrificial animal; some organ' and Gr. αὐλός etc. should thus be given up. The non-Anatolian words can be reconstructed as PIE *$*h_2eul$-o-*.

3 *$*a$ in core Indo-European

None of the etyma with a secure Anatolian cognate turn out to contain a reflex of PIE *$*a$. The following cases are etyma with (potential) cognates in Indo-Iranian and/or Tocharian, but not in Anatolian. These words cannot be borrowings from European substrate languages, but they could have entered Indo-European after the Anatolian branch split off.

3.1 *$*b^hag$- *'to obtain like a share'* (*LIV*^{2}, *NIIL* 1, *Ringe* 2017: 12)

Skt. *bhájati*, OAv. *baxštā* (3sg.aor.inj.med.) 'to share, distribute', Gr. φαγεῖν 'to eat, consume'. OCS *bogatъ* 'rich', *nebogъ*, *ubogъ* 'poor' and ToA *pāk*, ToB *pāke* 'share' are usually thought to be borrowings from Iranian (Derksen 2009: 50, Adams 2013: 389). Lubotsky (1981: 134) reconstructed the root as *$*b^heh_2g$- with loss of the laryngeal in Indo-Iranian before a cluster starting with *-g-* (Lubotsky's law, see 3.8), but informs me that he now connects these words to Skt. *bhanákti*, Arm. *bekanem*, OIr. *do-beig* 'to break', NPhr. βεκος 'bread' < *$*b^heg$-, under the assumption that *$*b^hng$- was generalized in Greek from the nasal present. This is entirely plausible and disqualifies the item as evidence for PIE *$*a$.

3.2 *daiu̯ér- *'brother-in-law'* (*NIIL 58 f.; Ringe 2017: 170 reconstructs* *dayh$_2$wér)

In a footnote, however, NIIL states that the accentuation of Lith. *díeveris* would show a laryngeal. Indeed, the acute cannot be explained otherwise (Lubotsky 1989: 59). Other possible traces of a laryngeal are the velar in OE *tācor* (Kortlandt 1988: 356, Kroonen 2013: 506) and the initial voiceless reflex in Pers. dial. (*h*)*ēwar*, Oss. *tiw*, Yaghn. *séwir* < **ϑaiwar-* < **dh$_2$eiuer-* (Kümmel 2018). The position of the laryngeal reflected in Germanic, i.e. **deih$_2$uer-*, would then have to be the result of laryngeal metathesis (Kortlandt 1988: 356). Anthony Jacob suggests to me that the different reflexes imply the existence of a zero-grade allomorph **dh$_2$iuer-* > **dih$_2$uer-* in Proto-Indo-European. Knobloch (1992) suggested that the word for 'brother-in-law' derives from the verbal root **deh$_2$i-* 'to divide, distribute' as 'divider', which would be his role in the marriage ritual. In any case, the word for 'brother-in-law' did not contain **a*.

3.3 *ǵar- *'to call'* (*LIV*^{2})

OIr. *gairid* 'to call', *gáir* 'shout', Lat. *garriō* 'to chatter', Gr. γῆρυς 'voice, speech', Oss. *zælyn* 'to sound', *zaryn*/*zarun* 'to sing', MP *zryg* 'sorrow, suffering', Khwar. *zrÿ* 'to announce', Goth. *kara* 'care, worry'. Beekes (2010: 271), de Vaan (2009: 255) and Kroonen (2013: 281) prefer a reconstruction **ǵeh$_2$r-*, in which case the reflexes with a short vowel reflect **ǵh$_2$r-* or result from Dybo's shortening of **ǵeh$_2$r-*. If this is correct, the Iranian forms do not belong here. According to Cheung (2007: 470), the Iranian verb originally meant 'to bewail the deceased'. It could be cognate with Goth. *kara* 'care, worry' and reflect a root **ǵer-* or to OE *galan* 'to sing, enchant, call', *gielan* 'to yell' and reflect a root **ǵ^{h}el-* (the traditional etymology that connects OE *galan* etc. to Ru. *gálit'* 'to smile', Ukr. *halýty* 'to urge', Bulg. *gálja* 'to caress' seems unattractive to me). All three possible etymologies of the Iranian verb amount to little more than a guess. This etymon does not provide any evidence in favour of PIE **a*.

3.4 *gras- (*Sihler 1995: 153*)

Skt. *gras-* 'to devour', Gr. γράω 'to gnaw, eat'. The reconstruction with **a* is based on the alleged connection with Latin *grāmen* 'grass' < **gras-men-*. The Latin word is alternatively connected with Goth. *gras* 'grass' (see de Vaan 2008: 269 f. and Kroonen 2013: 187 for a discussion). Without the Latin word, the Vedic and Greek verbs have been reconstructed as **gres-*, **grs-* (LIV^2). A reconstruction **grns-* would, however, provide a better explanation for the Greek forms (van Beek 2013: 253). The Sanskrit superlative *grásiṣṭha-*, taken by LIV^2 to refute **gr̥ṇs-*, must be a recent formation in any case. Because there is an alternative

etymology for the Latin word that is at least equally plausible, we cannot use it as evidence for PIE **a*.

3.5 *ǵʰais- *'throwing spear'* (*EIEC 537: "zero-grade from* *ghh$_a$i- *'throw'"*)
OIr. *gai*, MW *gwaew*, ON *geirr*. Skt. *héṣas-* 'weapon' is sometimes considered to be a direct cognate, but it looks like an inner-Aryan derivative from the verbal root *hiṣ-* 'to injure'. It is usually assumed that the word for 'spear' is a derivative from **ǵʰei-* 'to hurl' (Skt. *hinóti*, Av. *zaiia-* 'kind of weapon'). Szemerényi (1989: 124) argued that the Celtic word is a borrowing from Germanic (like Finnish *keihäs* 'spear'), cf. also Kroonen (2013: 164) with some supporting evidence for that claim. In that case the Germanic word can reflect **ǵʰoi-s-ó-*. This etymon did not contain **a*.

3.6 *gʰaiṯ- *'mane, animal hair'* (*Matasović 2009: 154*)
Av. *gaēsa-* 'curly hair', Gr. χαίτη 'mane, loose, flowing hair', MIr. *gaísid* 'coarse stubbly hair or bristles'. A reconstruction **gʰh$_2$eit-* or **gʰeh$_2$it-* would also produce the attested forms. Note, however, that the Avestan word can hardly be separated from Skt. *kéśa-* 'hair on the head', which puts the entire etymology in doubt. This etymon does not provide compelling evidence for PIE **a*.

3.7 *(ǵ)ʰans- *'goose'* (*Mayrhofer 1986: 170, Griepentrog 1995: 229–232, Sihler 1995: 45, Ringe 2017: 170*)
Skt. *haṁsá-*, Gr. χήν, Lat. *ānser*, OHG *gans*, Lith. *žąsìs*, OCS *gǫsь*. The word is traditionally considered to be a derivative of the root of Gr. χάσκω, aor. ἔχανον 'to yawn' (Pokorny 1959: 411). A reconstruction **ǵʰh$_2$n-* is suggested by Old Norse *gana*. The Old Norse word is a stative verb in which one would expect zero-grade of the root, i.e. **ǵʰHn-eh$_1$-*. These words can hardly be separated from Lat. *hiāre*, Lith. *žióti*, OCS *zijati*, ON *gína* < **ǵʰHi-*. These verbs are often reconstructed with **h$_1$*, but this seems unnecessary. LIV^2 adduces as evidence Gr. χήμη 'mussel' and the OCS present *zějǫ* 'to yawn'. Gr. χήμη 'mussel', if at all cognate, can also continue **ǵʰeh$_2$-m-*. OCS *zějǫ* can hardly be used as evidence because it follows the pattern of *smijati sę*, *směǰǫ sę* 'to laugh' < **smei-* and *lijati*, *lějǫ* 'to pour' < **leh$_3$-i-* (with **h$_3$* because of Hitt. *lāḫui* 'pours', Gr. λοέω 'wash', cf. Melchert 2011). OCS *zě-* is best explained from **ǵʰh$_2$-e/oi-* (Lubotsky 2011: 107). The PIE root for 'to open one's mouth, yawn' was thus **ǵʰeh$_2$-* (Kloekhorst 2010: 216f., fn. 55, Lubotsky 2011: 107–109). It follows that if it is accepted that the word for 'goose' is related to 'to open one's mouth, yawn', it must have contained **h$_2$*. Kortlandt (1985, 2013: 14f.) reconstructs the word for 'goose' as nom.sg. **ǵʰeh$_2$ns*, acc. **ǵʰh$_2$ensm*, gen.

**ǵʰh₂nsos*. This is more probable than Lipp's **ǵʰéh₂-nōs*, **ǵʰéh₂-nos-m*, **ǵʰh₂-ns-́* (2009, I: 63–73), because none of the stems in Lipp's reconstruction produces any of the attested forms directly. On the suffix *-ns-* that is also found in **meh₁-ns-* 'month' see Lubotsky (2019). The laryngeal might be reflected indirectly by the initial velar of OCS *gǫsь* for expected **zǫsь*, which could be due to depalatalization of the palatovelar by a following laryngeal (Lipp 2009, I: 65).

3.8 **Hiaǵ- 'holy'* (*Mayrhofer 1986: 170, Eichner 1988: 33, Rasmussen 1989: 260, LIV², Ringe 2017: 12*)

Gr. ἄζομαι 'to honour', ἅγιος, ἁγνός 'holy', Skt. *yaj-* 'to worship, sacrifice', perhaps also Lat. *ieiūnus* 'hungry', *ieientāre* 'have breakfast' < **i̯agi̯-* (Forssman 1993), but this etymology need not be correct. An alternative reconstruction **(H)ieh₂ǵ-* was advocated by Lubotsky (1981: 135) and Beekes (1988: 24 f.). For Greek, the development **ih₂ǵ-* > **i̯ag-* would be similar to the development of **uh₂stu-* > **u̯astu-* discussed below (3.23), either due to regular sound law or analogically. Lubotsky explained the Vedic forms with a sound law **-VHDC-* > **-VDC-* that finds independent support in, e.g., *pajrá-* 'solid, strong' < **peh₂ǵro-* and *ślakṣṇá-* 'slippery, smooth' < **sleh₂gsn-* and also helps to account for the variant with a short root-vowel of *svad-/svād-* 'to sweeten' < **sueh₂d-* (1981). If we accept Lubotsky's law, the short vowel of *yaj-* would be regular in a number of verbal forms and nominal derivatives, e.g. Skt. ipv. *yákṣi* < **Hieh₂ǵ-s-*, ppp. *iṣṭá-* < **Hih₂ǵ-to-*, *yajñá-* 'sacrifice', *yáṣṭar-*, *yaṣṭár-* 'worshipper', *íṣṭi-* 'worship' etc., and must have spread to Skt. *yajatá-*, OAv. *yazata-* 'worthy of worship' from there, while the short vowel in the thematic present is due to regular shortening in the older athematic present that is suggested by the imperative *yákṣi* (Lubotsky 1981: 136).

Lipp (2009, II: 161 ff.) argued against Lubotsky's law, offering alternative reconstructions for some of the key examples. He derived *pajrá-* from **ph₂-n-ǵ-ro-*, with a nasal infix that would come from the nasal present reflected in Lat. *pangō* 'to insert, fix' and Goth. *fahan* 'to catch' and secondary *p-* for **ph-* < **ph₂-*. The evidence for a nasal infix is very weak, though, because Goth. *fahan* is more likely to reflect **h₂po-h₂nḱ-* (Praust *apud* Scheungraber 2014: 53), and Lat. *pangō* can also reflect **ph₂ǵ-n-* like *pandō* 'to spread out' < **pt-n-*. Lipp also derived Skt. *svad-* from **suh₂nd-*, with the nasal infix that is also found in Gr. ἀνδάνω 'to please'. The identification of the two presents is, however, not straightforward. Gr. ἀνδάνω is used with the dative and originally meant 'to be sweet', cf.

ἀλλ᾽ οὐκ Ἀτρεΐδῃ Ἀγαμέμνονι ἥνδανε θυμῷ
Il. 1, 24

but it did not please Agamemnon, son of Atreus, in his heart

Vedic *svádati*, *svádate* 'to sweeten', on the other hand, is a factitive and therefore cannot be equated with the Greek form. Lipp suggested that the factitive meaning was replaced by the intransitive meaning of the aorist in Greek, but there is no evidence to support this suggestion. It seems more likely that ἀνδάνω is an inner-Greek creation, like λιμπάνω for older λείπω. Moreover, the nasal infix is never vocalized in Sanskrit. I therefore consider Lubotsky's law to afford the most probable explanation for *pajrá-* and *svádati* (on Skt. *bhaj-*, *śad-* and *mad-*, which have also been argued to have undergone Lubotsky's law, see 3.1, 3.9 and 3.16).

For Gr. ἄζομαι, Skt. *yaj-*, Lipp (2009, II: 167) reconstructed **i̯eǵ-*. Gr. ἄζομαι, ἅγιος, ἁγνός and Lat. *ieiūnus*, *ieientāre* would reflect inner-Greek and inner-Latin secondary zero-grades of the shape **i̯ag-*. Greek did indeed eliminate all ablaut of the type **iC-*/**i̯eC-* and **uC-*/**u̯eC-*, but usually in favour of the full grade, e.g. ἑκών, f. ἑκοῦσα (Cyren. ἑκασσα) 'deliberate' versus Skt. *uśán*, f. *uśatī́* 'willing'. Similar secondary zero-grades to the one proposed by Lipp are found in Gr. ναίω 'to dwell' < **nas-* for **as-* by analogy to **nes-*, **nos-* in νέομαι 'return home', νόστος 'homecoming', cf. the regular zero-grade in ἄσμενος 'glad' < **n̥s-*, and **rag-* for **rēg-* < **urh₁ǵ-* in aor.pass. ῥαγῆναι to ῥήγνυμι 'to tear apart, break' (Lipp 2009, II: 167). Note, however, that the secondary nasal in ναίω must be recent, because it post-dates the post-Proto-Greek denazalization that caused the merger of the syllabic nasals with **a* or **o*. Gr. ῥαγῆναι appears to be a recent innovation, too. The alleged secondary zero-grade **i̯ag-*, however, can hardly be recent because Greek preserves no trace of the full grade **i̯eg-* on which it would be based. I therefore prefer the reconstruction **(H)ieh₂ǵ-* over Lipp's **i̯eǵ-*.

A third scenario would be that the short reflexes of in ἄζομαι, ἅγιος, ἁγνός, *yajñá-*, *iaiīūnus* and *iaiientāre* reflect **(H)ieh₂ǵ-* with late Proto-Indo-European loss of the laryngeal due to the so-called "Wetter-Regel". This rule, which goes back to Schindler but was first argued for in print by Peters (1999), states that laryngeals were regularly lost before an occlusive and a resonant or glide, i.e. **CVHTR/I̯-* > **CVTR/I̯-*. Unlike in the scenario that operates with Lubotsky's law, almost all the attested forms of Sanskrit *yaj-* would have to have a secondary short vowel. Also, the amount of counter-examples against the "Wetter-Regel" speaks against the idea that the rule would have operated in Proto-Indo-European, and there seems to be insufficient evidence to suggest

that the rule operated at a younger date within Greek, Indo-Iranian or Italic (Hackstein 2002: 226f., Müller 2007: 134ff., Zair 2012: 150ff.). For the present discussion, it suffices to observe that a reconstruction **Hiag-* is warranted only if one rejects Lubotsky's law, secondary *e/a*-ablaut in Greek and the "Wetter-Regel".

3.9 **ḱad- 'to fall' (Ringe 2017: 12; LIV²: "[d]enkbar wäre auch *ḱh₂ed-, wenn *kh₂ > gr. *k")*

Skt. *śad-*, Lat. *cadō* 'to fall'. The appurtenance of Gr. (Hom.) ὑπὸ κεκάδοντο 'they receded', κεκαδών 'robbing' is very uncertain (Beekes 2010: 665), as is that of OIr. *casar* 'hailstorm, lightning' (cf. Matasović 2009: 193). Lubotsky (1981) reconstructed **ḱeh₂d-* with loss of the laryngeal in Indo-Iranian before media plus another consonant (see 3.8). 3pl.fut. *śatsyanti* would thus regularly reflect **ḱeh₂d-s-*. Lipp (2009, II: 168f.) reconstructed the root as **ḱed-*, with Lat. *cadō* from a secondary zero-grade **ḱ̥d-e/o-* like *scabō* 'to scratch' < **sḱ̥bʰ-e/o-* (on which see 4.16, cf. Kuryłowicz 1956: 180). Both alternatives for **ḱad-* are conceivable.

3.10 **kaiko- 'blind in one eye' (Mayrhofer 1986: 172, Weiss 2009: 41, Ringe 2017: 170)*

Lat. *caecus* 'blind, dark, invisible', OIr. *cáech* 'blind in one eye', Goth. *haihs* 'one-eyed', perhaps also Skt. (late) *kekara-* 'squint-eyed'. A reconstruction **keh₂i-ko-* or, if the Sanskrit word is unrelated, **kh₂ei-ko-* is equally possible (thus de Vaan 2008: 79, Kroonen 2013: 200). Matasović (2009: 197), who sees "no reason to reconstruct *kh₂ey-ko-", thinks that the word may be a borrowing from a non-Indo-European source, citing Croatian *ćòrav* 'one-eyed' from Turkish *kör* as a parallel for such borrowing. In any case there is no compelling reason to reconstruct **a* in this word.

3.11 **kal- 'bald' (Weiss 2009: 41)*

Lat. *calvus*, Skt. *áti-kulva-*, YAv. *kauruua-*. The reconstruction **klH-(e)uo-* explains all forms without reconstructing **a* (de Vaan 2008: 85).

3.12 **(ḱ)an- 'to sing' (Sihler 1995: 45, LIV², Mayrhofer 2004: 11, Ringe 2017: 12)*

Lat. *canō*, OIr. *cainid* 'to sing', Gr. ἠι-κανός 'cock', OHG *hano* 'cock', *huon* 'hen'. There is no formal objection to the alternative reconstruction **kh₂n-* (Schrijver 1991: 95, 219, Kroonen 2013: 207, 240). If ToA *kaṃ* and B *kene* 'melody, tune' are related (cf. Adams 2013: 206), they would have to reflect **k(h₂)on-o-* with a full grade. If one accepts that the sequence **-n̥HV-* regularly vocalized to *-anV-*

in Latin, as was argued by Vine (2011: 273 f.), the root could be reconstructed as **(ḱ)e/onH-*, with regular reflexes of the zero-grade in Latin, Old Irish and Greek.

3.13 *karH- *'to annouce'* (*Eichner 1988: 32 f.*)

Gr. κήρυξ, Aeol., Dor. κάρυξ, Myc. pl. *ka-ru-ke* 'herald, messenger; trumpet-shell', Skt. *kar^{i}-* 'to commemorate, praise', *kīrtí-* 'fame', *kārú-* 'singer, poet', with *Schwebeablaut* OHG *hruom* 'fame', OE *hrēð* 'glory'. Beekes (2003: 112 ff., 2010: 690) objected to the etymology of the Greek word, which provides the evidence for *a*-vocalism, because the etymology does not explain the Greek suffix -ῡκ- and because the Hesychian gloss κορύγης· κῆρυξ. Δωριεῖς would speak in favour of two independent Greek borrowings of the same word from another language. The *Lexikon der indogermanischen Verben* is cautious about the connection between Skt. *kar^{i}-* and the other forms, referring to Forssman's proposal to account for Gr. κήρυξ and Skt. *kārú-* by assuming dissimilation of an older **kreh$_2$-ru-*, with the same ablaut variant **kreh$_2$-* underlying the Germanic forms. This is phonetically possible, but a suffix **-ru-* would be unique. Clearly, the etymology of Gr. κήρυξ cannot be used as an argument in the discussion of PIE **a*. I wonder whether Skt. *kar^{i}-* 'to commemorate, praise' is not better connected with Hitt. *kalliš-^{zi}* 'to call, evoke', Gr. καλέω 'to call, name', Lat. *calō* 'to summon, announce', OHG *halōn* 'to fetch, call' < **kelh$_1$-* 'to call, evoke'. The alternative reconstruction **kleh$_1$-* for this root, preferred by LIV^2, is based on OE *hlōwan* 'to low, moo'. In view of its semantics, this Germanic verb is a post-Indo-European derivative (cf. Kroonen 2013: 231), if at all related. The ablaut grade **kelh$_1$-* is suggested by OHG *halōn* and perhaps Hitt. *kalliš-^{zi}* (Kloekhorst 2008: 430), as well as Lith. *kalbà* 'language' (Derksen 2015: 220). Oettinger (1979: 197), followed by Weiss (2009: 41), reconstructed PIE ****kalh$_1$-***, but forms like Gr. καλέω, Lat. *calō* and Hitt. *kališšanzi* can be, and often are, explained from **kl̥h$_1$-* (e.g. by LIV^2).

3.14 *ḱas- *'hare, grey'* (*Mayrhofer 1986: 170, NIIL 410, Ringe 2017: 12*)

Skt. *śaśá-*, W *ceinach*, OHG *haso*, OPr. *sasins* 'hare', Lat. *cānus* 'white, grey (of hair)', OE *haso* 'grey'. Lubotsky (1989: 56 f., followed by Schrijver 1991: 91, Lipp 2009, I: 74) reconstructed an *s*-stem **ḱh$_1$-es-* and explained the Germanic and Latin forms from the zero-grade **ḱh$_1$-s-*. This reconstruction allows a connection with PIE **ḱh$_1$-e/oi-ro-* 'grey' in ON *hárr* 'hoary', OIr. *cíar* 'dark', RuCS *sěrъ* 'grey' < **śěrъ* < **xairo-* (with regular **ḱH-* > Slavic **x-*, cf. Kortlandt 2011: 176, Pronk 2013: 300) and Lith. *šývas* 'grey (of horses)' < **ḱh$_1$-i-uo-* with regular metathesis to **ḱih$_1$uo-*. There are no compelling reasons to prefer a reconstruction **ḱas-* over **ḱh$_1$-es-*.

3.15 *kṷath$_2$- *'to form bubbles'* (*Mayrhofer 1992: 420, LIV², Ringe 2017: 12*)
Skt. *kvath-* 'to boil', Goth. *hvaþjan* 'to foam', OCS *vъkyse* 'became sour', *kvasъ* 'leaven'. The basis for reconstructing **a* is unclear to me. The Slavic forms must be left aside in any case, because they require **ku*(*o*)*HTs-* or **ku*(*o*)*Hḱ-* if they are of Indo-European origin. A laryngeal is required to account for the acute intonation of the root (Derksen 2009: 266).

3.16 *mad- *'to be*(*come*) *wet'* (*Mayrhofer 1986: 170, LIV², NIIL 455f.*)
The reconstruction with **a* is based on the *a*-vocalism of Gr. μαδάω 'to loose hair', Lat. *madeō* 'to be wet, soaked', Skt. *mad-*, YAv. *maδ-* 'to become intoxicated' and OIr. *maidim* 'to break, burst, gush'. Beekes (1988: 29) reconstructed **mh$_2$d-*, with regular vocalization to **mad-* in Greek and Italo-Celtic (see 3.23 below on Gr. ἄστυ), while Lubotsky (1981: 135 f.) listed the Indo-Iranian words as possible examples of loss of a laryngeal before a media followed by another consonant (Lubotsky's law, see 3.8). The Greek verb is often translated as 'to be moist', but it only has this meaning in connection with a disease in fig-trees (Theophrastus) and as a medical term describing wounds. Its original meaning appears to have been 'to shed', mainly of hair, which makes the connection with the Latin and Indo-Iranian verbs for 'to be soaked, to be intoxicated' unattractive. The connection with OIr. *maidim* 'to break, burst, gush' remains theoretically possible, but is not secure enough to play a role in the discussion about PIE phonology. Harðarson (1995) proposed a connection between μαδάω and μεστός 'satiated', but this etymology has nothing to recommend itself.

We are thus left with the etymon reflected in Lat. *madeō*, Skt. *mad-* and YAv. *maδ-*. Apart from reconstructing **mad-*, this correspondence can be explained in three ways:

1. the root was **meh$_2$d-*, with loss of the laryngeal in Indo-Iranian (Lubotsky 1981: 135 f., see 3.8);
2. the root was **med-*, with Latin *madeō* reflecting a secondary zero-grade stative **m$_ə$d-eh$_1$-*, a process described in detail by Kuryłowicz (1956: 174–180), e.g. for *rapiō* 'to seize' < **r$_ə$p-*, cf. Gr. ἐρέπτομαι 'to feed on' < **h$_1$rep-*, and *pateō* 'to be open' < **p$_ə$t-*, cf. Gr. aor. ἐπέτασ(σ)α 'spread out' < **peth$_2$-*;
3. the root was **med-* and Latin *madeō* reflects a secondary *o*-grade stative **mod-eh$_1$-*, as in *lūcēre* 'be light' < **louk-eh$_1$-*, with **mo-* > **ma-* in open syllables. The latter development is also found in *mare* 'sea' < **mor-i* (cf. OIr. *muir*), *marītus* 'husband, wedded' < **mori-h$_1$-to-* (cf. W *morwyn* 'girl' and, for the morphology, Lat. *aurītus* 'listening' to *auris* 'ear', Weiss 2009: 293), and perhaps in *malleus* 'hammer' < **molH-lo-*, *manus* 'hand' < **mon-u-* and *manēre* 'to remain' < **mon-eh$_1$-* (Schrijver 1991: 454–474, followed by

Meiser 2006: 84). Vine (2011) explained *ma-* in these forms from a prevocalic syllabic zero-grade **mR̥-* and argued against the development **mo-* > **ma-* in open syllables on the basis of the counterexamples *monīle* 'necklace', *mola* 'millstone; ground barley', *mora* 'delay', *modus* 'measure, manner' and *molestus* 'irksome', for which Schrijver gives alternative explanations. Schrijver's sound law offers the most plausible explanation for *mare*[6] and *marītus*, while Vine's reconstructions gen.sg. **mr̥(r)-és* and ins.sg. **mr̥(r)-i-h₁* respectively are not supported by the comparative evidence and require additional unfounded assumptions to arrive at the required proto-forms. It therefore seems safe to assume that *-o-* could be unrounded by a preceding labial consonant under certain, if not entirely uncontroversial conditions.

To conclude, there are various scenarios that explain the attested forms without the help of a PIE **a*. The second scenario—explaining Lat. *madeō* as a form with secondary zero-grade—seems the most likely one to me.

3.17 *magʰ- *'to be able'* (*Klingenschmitt 1982: 260, fn. 1, LIV², Mayrhofer 2004: 11*)

Skt. *mah-* 'to be able, bring about', Goth. *magan*, OCS *mošti* 'to be able', Lith. *magéti* 'to please, interest', *mėgìnti* 'to try', Latv. *mêgt* 'to be able, accustomed to', Gr. μηχανή 'contrivance, machine', μῆχος 'means, expedient'. Gr. μηχ-, Doric μᾱχ- can only be connected under the assumption that they continue a variant **māgʰ-*, because the other branches rule out a root **meh₂gʰ-*. All non-Greek forms point to **(H)megʰ-* or **(H)mogʰ-* (Pokorny 1959: 695), cf. especially Germanic and Balto-Slavic **mag-*, which clearly continue an old perfect and therefore favour a reconstruction **mogʰ-*. There is no indication that the root etymology of the Greek words is correct, as has already been pointed out by several scholars (cf. Derksen 2015: 297 f.). Skt. *maghá-* 'gift, reward' almost always shows lengthening of a preceding vowel in compounds: *áśvāmagha-*, *citrā́magha-*, *tuvímagha-*, *śatā́magha-*, *śrutā́magha-*, *sahásrāmagha-*. This suggests that the Indo-European root started with a laryngeal, which means that the connection with Gr. μηχανή, μῆχος is formally impossible. Van Beek (*apud* Beekes 2010: 887) has drawn attention to the similarities between μηχανή and μάγγανον 'charm, potion, device'. The two can only be connected if it is assumed that both are borrowings into Greek.

6 Unless *mare* is a non-Indo-European loanword, as some scholars have suggested (cf. Szemerényi 1989: 79, fn. 124).

Szemerényi (1989: 29 f.) derived Lat. *macte* in *macte virtūte*, *macte estō* 'be blessed!' from **mag^{h}ti-* 'power' (cf. Goth. *mahts*, OCS *mošt*ь), but this is just one of a number of possible etymologies for this word (de Vaan 2009: 357).

3.18 *masd- *'to be fat'* (*NIIL 461 f., LIV^{2}: "*[*m*]*it* a *wegen gr.* μαζός *'Brustwarze'* < *masdó-*, vgl. Klingenschmitt 218^{74}, und alb.* madh *'mit Fett bereiteter Maismehlbrei'"*)

The connection between Skt. *médyati* 'to be(come) fat' and Gr. μαζός (also attested as μαστός and therefore probably a loanword, Beekes 2010: 912) is gratuitous and has no bearing on the reconstruction of PIE phonology.

3.19 *mat^{h}- (*Narten 1960, Oettinger 2017*)

The reconstruction with *-a-* is based on the alleged connection between Skt. *mathnáti* 'to rob, snatch away' and the Greek theonym Προμᾱθεύς, which was proposed with due caution by Narten (1960: 135, fn. 40) and accepted by Watkins (1995: 256, fn. 3). The Greek name would originally have meant 'fire-robber' in accordance with the myth about Prometheus stealing fire from the gods. The semantics of this etymology are of course appealing, but the formal side is difficult. Most importantly, there is insufficient evidence to support the sound law **th$_2$* > Greek θ that is required for this etymology (cf. De Decker 2011). Also, Προ- cannot be a reflex of the word for 'fire', PIE **peh$_2$ur*. It could eventually go back to a preverb **pro-*, but this is very speculative as the required underlying verb is unattested in Greek. Vedic *pra-math-* hardly supports the etymology, because there is no indication within Indo-Aryan that *pra-math-* is an old formation. Moreover, there is a better etymology available for Skt. *math-*, viz. the traditional connection with the Skt. root *manth-* 'to stir' < PIE **m*(*e*)*ntH-*. The two verbal roots are synchronically distinct in Vedic, but the etymological connection between them is supported by the semantics of the Tocharian and Slavic cognates: ToB *mänt-* 'to stir, destroy' (cf. Adams 2013: 486 f.), Cr. *mésti* 'to mix, disturb, trouble'. Skt. *mathnáti* 'to rob, snatch away' can be explained from an earlier 'to disturb, destroy', or even more directly from 'to stir' if it refers to a quick movement of the hand, as in English *to whisk away* 'to snatch away'. The forms with a preverb that Narten discusses, like *vi-math-* 'to tear apart, pull back and forth', all fit this semantic development. The zero-grade root **mn̥tH-* is expected in the *nā*-present, cf. Skt. *skabhnáti* to *skambh-* 'to support'. The aorist *mathīt* and perfect *mamátha* must be inner-Indo-Iranian or inner-Indo-Aryan innovations based on this present. Προμᾱθεύς, like his brother Ἐπιμᾱθεύς, thus remains without etymology. It may well be a substrate name, like e.g. Ὀδυσ(σ)εύς and Ἀχιλ(λ)εύς with the same suffix (cf. Beekes 2014: 161–163; the attempts by e.g. Bader (1999: 44) and Nikolaev (2007) to provide Ἀχιλ(λ)εύς with

an Indo-European etymology require *ad hoc* solutions to account for the formal problems). If Προμᾱθεύς does consist of Indo-European elements, which now seems unlikely, there is no need to assume that any of those elements contained PIE **ā*.

3.20 **nas-, *nās- 'nose' (Mayrhofer 1986: 170, Eichner 1988: 32, Rasmussen 1989: 260, Griepentrog 1995: 346–351, Melchert 2016a)*

Skt. *nā́sā*, gen. *nasóṣ*, Lat. *nāris*, OHG *nasa*, OE *nosu*, Lith. *nósis*, CS *nosъ*. The alternative reconstrution of the word without **a* is as a feminine ablauting *s*-stem **(H)neh$_2$-s*, **(H)nh$_2$-es-m* (Schmidt-Brandt 1967: 103, Kortlandt 1985: 119, Lubotsky 1989: 60, Petit 2004: 35 f., Kapović 2008: 228, Beekes 2011: 198, Woodhouse 2011, the exact reconstructions sometimes differ). The *s*-stem is paralleled by the *s*-stems for 'ear' and 'mouth', which are, however, neuters. Griepentrog (l.c.) objected to the reconstruction with a laryngeal on the basis of Skt. abl. *nastáḥ* and gen. *nasóḥ*, which cannot reflect **(H)nh$_2$sos* directly. The expected outcome would be **āsas*. It is of course not surprising that the irregular stem allomorphy **nās-*, **ās-* would be resolved by introducing a secondary weak stem **nas-*, probably from the acc.sg. **(H)nh$_2$esm* > **nasam*, so Griepentrog's objection is invalid. The Germanic zero-grade **nus-* in Old English *nosu*, Old Frisian *nose* reflects a secondary zero-grade **nus-* for earlier **nas-* < **(H)nh$_2$s-* (cf. **namōn-* < **h$_3$nḭ$_3$men-*, Kroonen 2013: 382),[7] which had merged with the full grade **nas-* < **(H)nh$_2$es-*. This seems more likely to me than the explanation for **nus-* as analogical to the root **neus-* 'to sniff' (*pace* Griepentrog 1995: 335). An argument in favour of an internal laryngeal is the acute intonation of the Baltic forms, Lith. *nósis*, Latv. *nãss*, which cannot be explained from a lengthened-grade vowel (Pronk 2012 with references to the relevant literature). Further, a paradigm with **(H)nās-* in the strong cases and **(H)nas-* in the weak cases would show a type of ablaut that cannot be demonstrated to have existed in any other noun. Griepentrog (1995: 349 f., fn. 40) adduced Gr. μῆχαρ 'means, expedient' to the root **mag^h-* (see 3.17) as support for the existence of **ā/a-*ablaut, as it would reflect an *r/n*-stem ****māg^h-r***, ****mag^h-n-***. Gr. μῆχαρ, first and mainly found in the works of Aischylos, appears to replace the better and earlier attested synonymous *s*-stem μῆχος. Because μῆχαρ appears to mean 'remedy, solution, cure', its -αρ could easily be due to contamination with ἄλκαρ 'defence, remedy'. As

7 Unlike Neri (2016: 12), I do not think that this phonetic development is contradicted by OHG *unst* 'storm', which would reflect **h$_2$nh$_1$-sti-*. The idea that this noun derives from the root PIE **h$_2$enh$_1$-* 'to breathe' is not compelling. Even if it does, it would be an inner-Germanic derivative because there are no exact cognates outside Germanic and the suffix *-sti-* can hardly be reconstructed for Proto-Indo-European.

Griepentrog (l.c.) himself points out, the older form μῆχος can hardly be from **māgʰ-os* for morphological reasons. For the idea that μῆχος derives from the verbal root **magʰ-* 'to be able' see 3.17 above. The only other noun that would be a static noun with **ā/a*-ablaut is the word for 'salt':

3.21 *sal-, *sāl- (*Mayrhofer 1986: 170, Sihler 1995: 44, NIIL 486ff., Melchert 2016*)

Gr. ἅλς, ἁλός, Lat. *sāl*, *salis*, OIr. *salann*, Latv. *sȁls*, OPr. *sal*(*i*), OCS *solь*, Goth. *salt*. The alternative reconstruction of this word without **a* is as a masculine ablauting *l*-stem nom. **sēh₂l*, acc. **sh₂elm* (Schmidt-Brandt 1967: 102 f. (whose nom. **saH$_e$l* stands for **seh₂l*), Kortlandt 1985, Lubotsky 1989: 60, Petit 2004: 51 f., Smoczyński 2006: 188, Kapović 2008: 228 (nom. **seh₂ls*), Beekes 2011: 198). I am inclined to reconstruct the nom. as **sh₂ēl* to account for the non-acute intonation of Latv. *sȁls*. The accentual mobility of the word for 'salt' in Slavic (e.g. Sln. *sǫ̑l*, gen.sg. *solî*) speaks against the reconstruction of an acrostatic paradigm in Proto-Indo-European. The reconstruction of an acrostatic paradigm for the word for 'nose' is similarly contradicted by the accentual evidence, cf. the final stress of Skt. loc.sg. *nasí* and gen.du. *nasóḥ* and the mobile accentuation of Slavic **nosъ* (e.g. Sln. *nǫ̑s*, gen.sg. *nosû*). There is thus no reason to prefer the reconstruction with **ā/a* over that with a laryngeal for either 'nose' or 'salt', while their accentuation favours the reconstructions with a laryngeal.

3.22 *saus̯o- *'dry'* (*Mayrhofer 1986: 173, Ringe 2017: 13*)

Gr. αὖος, Lith. *saũsas*, OCS *suxъ*, OE *sēar*, Skt. *śúṣka-* 'dry'. A reconstruction with an internal laryngeal, i.e. **seh₂uso-* (thus Smoczyński 2006: 165), does not account for the short *-u-* of Skt. *śúṣka-* or for the circumflex intonation of the Lithuanian root. Lubotsky (1985) argued that Gr. αὖος points to earlier **ahuhos* and analyzed the adjective as **h₂(h₁)s-us-*, the perfect participle to the root **h₂eh₁s-* 'to (be) dry' that is reflected in Lat. *āreō* 'to be dry', ToB *osotär* 'dries out'. The Balto-Slavic and Germanic forms reflect **h₂(h₁)sous-* and have a secondary full grade that was probably introduced from the deadjectival causative **h₂(h₁)sous-eie-* (Ved. *śoṣáyati*, OCS *sušiti*) that appears to have been formed already within Proto-Indo-European (LIV²: 285). Lubotsky's etymology received a rather scathing review from Berg and Lindeman (1992), who were nevertheless unable to offer a more convincing explanation for the Greek form. They proposed that original **sauso-* > **hawho-* may have escaped the expected metathesis to **hahwo-* "due to the dissimilatory influence of the initial **h-*" (1992: 181), but failed to produce any evidence in support of this rather unusual blocking rule. In short, a reconstruction **saus-* does not offer a better explanation of the data than does Lubotsky's **h₂(h₁)s-us-*.

3.23 *u̯astu- (*Klingenschmitt 1982: 260, fn. 1, Ringe 2017: 13*)

Skt. *vā́stu-*, Gr. ἄστυ 'town', Myc. *watu* 'settlement', ToA *waṣt*, ToB *ost* 'house'. Beekes (1988) argued that the Greek word reflects **u̯h̥₂stu*, with regular Greek vocalisation of the laryngeal between an initial resonant or glide and a following occlusive, as in ἄγνυμι 'to break' < **u̯h₂ǵ*)-, μέτρον 'measure' < **mh̥₁tro-* (if not with Schindler (*apud* Mayrhofer 1986: 111) < **med-tro-*). Other examples of this development would be ἅγιος, ἁγνός, μακρός, μαδάω and perhaps μάσσω (see 2.1.1, 3.8, 3.16 and 4.12). Counterevidence to Beekes' rule is only provided by forms with the negating prefix **n̥-*, e.g. νήγρετος 'unwaking' < **n-h₁gr-* and νωδός 'toothless' < **n-h₃d-*. These are, however, easily explained as a result of restoration (or resyllabification) of **n̥-* (Beekes 1988: 42). Similar restoration took place within Greek in cases like ἀνελεής 'pitiless' for older νηλεής < **n-h₁leu-* and ἀνώνυμος for older νώνυμ(ν)ος 'nameless' < **n-h₃nh₃mn-*. The decisive advantage of Beekes' analysis is the fact that a reconstruction **uoh₂st-u* (Skt. *vā́stu-*), oblique **uh₂st-eu-* (Gr. ἄστ-, ToA *waṣt*, B *ost*) follows the well-known ablaut pattern of neuter *u*-stems like Skt. *dā́ru*, gen.sg. *dróṣ* 'wood' < **dor-u-*, **dr-eu-*. The evidence for the existence of acrostatic *u*-stems, even with other vowels than **a*, is very slim. The often cited PIE **h₂oiu-*, **h₂eiu-* 'lifetime', for example, was probably mobile, cf. OAv. gen.sg. *yaoš*.

For Gr. ἄστυ and ἄγνυμι, alternative analyses departing from a root without **a* have also been proposed. About Gr. ἄστυ, Griepentrog (1995: 349, fn. 40) writes: "[e]ine Umsyllabifizierung von **uH₂stu-* zu **u̯H₂stu-* in Analogie nach der starken Stammform **u̯áH₂stu-* müßte jedoch ohne weiteres möglich sein und stellt m. E. die bessere Erklärung dar." The old connection of Skt. *vā́stu-*, Gr. ἄστυ with PIE **h₂ues-* 'to spend the night' (Hitt. *ḫuišzi* 'lives', Gr. ἄεσα 'spent (the night)' etc.) seems to be impossible, because Gr. ἄστυ and Myc. *watu* rule out an initial laryngeal. Peters (*apud* Neri 2005: 208, fn. 32) proposed a metathesis **h₂ues-* > **ueh₂s-* to maintain this old connection, in which case Gr. ἄστυ 'settlement' "continua probabilmente un allomorfo debole **u̯á*(*h₂*)*stu̯-*". This is unlikely to be correct in a neuter *u*-stem. LIV² prefers to analyze ἄγνυμι "mit erneuerter R(z) **u̯ag-* für ***ūg-* < **uh₂*(*ǵ*)- nach R(e) **u̯āg-*." Skt. *vájra-* 'Indra's thunderbolt', which Jasanoff (2003: 150fn.) adduces as evidence for a reconstruction ***u̯aǵ-**, can be derived from **uVh₂ǵ-ro-* with analogical full grade for **uh₂ǵ-ro-* and Lubotsky's law (see 3.8). Skt. *vájra-*, Av. *vazra-* must be an inner-Indo-Iranian derivative from an otherwise lost verbal root **va*(*H*)*j-* 'to split' because an inherited **u*(*V*)*h₂ǵ-ro-* should have produced **vágra-* as a result of Weise's law (Kloekhorst 2011).

4 **a* limited to the European branches of Indo-European (Italo-Celtic, Balto-Slavic, Germanic, Greek, Armenian, Albanian)

The following cases have been or could be claimed to contain PIE **a*. A list of words containing **a* that are likely to be borrowings from one or more European substrate languages is presented at the end of this paper.

4.1 *b^{h}ar(s)d^{h}-o/ah$_2$- *'beard'* (*NIIL 4f.*)

Lat. *barba*, OHG *bart*, OPr. *bordus*, Lith. *barzdà*, OCS *brada*. There are several irregularities, viz. Lat. *b-* instead of expected **f-* and the sibilant in East Baltic. There is no consensus on the age or potential secondary origin of **s*, which is only attested in part of the East Baltic cognates (cf. NIIL 5, Kregždys 2004). The Germanic forms can reflect either **b^{h}ard^{h}-* or **b^{h}arsd^{h}-*. The Slavic cognates cannot reflect **b^{h}arsd^{h}-eh$_2$*, because the sibilant would have been preserved before a dental occlusive, cf. OCS *prъstъ* 'finger' < **pirsto-*. Lat. *barba* probably cannot derive from a form with **s* in view of *turdus* 'thrush' < **trsd^{h}-*, cf. Lith. *strãzdas* 'thrush'.

Van Beek (2013: 240, fn. 947) suggested that the word for 'beard' is a derivative from the PIE verbal root **b^{h}erd^{h}-* seen in Gr. πέρθω 'to raze, pillage, cut off' under the assumption that its original meaning was 'to shear, lop' and that the original meaning of the word for 'beard' was '(hair)cut'. However, as van Beek himself observes, this etymology leaves Latin *barba* (and the East Baltic forms with *-z-*) unexplained. Kroonen (2011: 149–151, 2013: 54) argued that the Latin and Balto-Slavic words are borrowings from Germanic **barzda* 'beard; edge, brim', which would be cognate with OHG *brart* 'edge' < **brazda* and *brort* 'spear, edge' < **bruzda*. This scenario does not account for the *-b-* of Lat. *barba*. The assumption that the Germanic word was borrowed into East Baltic before **-z-* was rhotacized also poses chronological problems. It seems most likely to me that we are dealing with independent borrowings of a word for 'beard' from an unknown adstrate or substrate language (thus Schrijver 1991: 488, Derksen 2015: 82). In any case, the word provides no evidence for PIE **a*.

4.2 *b^{h}ask- (*Kapović 2008: 226*)

Lat. *fascis* 'bundle', W. *beich* 'burden, load'. The word is limited to Italo-Celtic, so it cannot be shown to have existed in Proto-Indo-European (Schrijver 1991: 103).

4.3 *$d^{h}alh_1$- *'to flourish, sprout'* (*Mayrhofer 1986: 127, NIIL 83 f.*)

Gr. θαλερός 'blooming, fresh, stout', θάλος 'sprout', Alb. *dal* 'to sprout', Arm. *dalar* 'green, fresh'. A reconstruction **$d^{h}elh_1$*- was argued for by Driessen (*apud* Hackstein 2002: 221, with additional discussion) and followed by LIV², *addenda et corrigenda*. The reconstruction **$d^{h}alh_1$*- must be given up.

4.4 *dap- *'to sacrifice'* (*Kapović 2008: 224, 2017: 41*)

Gr. δάπτω 'to consume', Lat. *daps* '(sacrificial) meal', *damnum* 'expense', ON *tafn* 'sacrificial meat', Arm. *tawn* 'feast'. The connection with Hitt. *tappala-*, a functionary who works in the palace kitchen, is very uncertain (Tischler 1991: 113 f.). ToA *tāpā-* 'to eat', first connected to this etymon by Fraenkel (1932: 7), probably does not belong here in view of the expected development PIE **d* > Tocharian *ts*. The alternative reconstruction **d*(*e*)*h_2p*- (thus, e.g., LIV², de Vaan 2009: 161) also accounts for the data.

4.5 *h_3u̯ath$_2$- *'to wound'* (*LIV²*)

Gr. οὐτάω 'to wound', ὠτειλή 'wound' < **ou̯t-*, **ou̯at-* (cf. Peters 1980: 60 f.)? Extra-Greek cognates are uncertain. The often cited connection between Gr. ὠτειλή and Lith. *votìs* 'ulcer', Latv. *vâts* 'wound' (Pokorny 1959: 1108) is only possible if one reconstructs **h_3u*(*e*)*h_2t*-, because the Baltic forms cannot reflect **h_3u̯ath$_2$*-. A "vr̥ddhi" variant **h_3u̯āth$_2$*- would be morphologically unexpected and would not account for the acute intonation of the Baltic root. The etymology leaves Gr. οὐτάω isolated, as it cannot reflect **h_3u*(*e*)*h_2t*-. An alternative analysis of ὠτειλή is as **$h_2$ouh$_2$-t*- from the root of Gr. ἀάω 'to damage' (Pokorny 1959: 1108), cf. ἄτη 'damage' < **h_2*(*e*)*uh$_2$-t*-, which leaves it without cognates outside Greek and would also mean that ὠτειλή is unrelated to οὐτάω. None of these scenarios provides evidence for a Proto-Indo-European reconstruction with **a*.

4.6 *(ḱ)ag^{h}- *'to grasp, enclose'* (*LIV²: "auch *(ḱ)$h_2$eg^{h}- wäre möglich"*)

Lat. *caulae* 'railing or lattice barrier', MW *kae* 'hedge, fence', ON *hagi* 'pasture', OHG *hag* 'hedge, enclosure'. The noun for 'enclosure, hedge, fence' might be a derivative from the verbal root reflected in Umb. *ku-kehes* 2/3sg.fut. 'to take/get', MW *kehy* 'to receive', as suggested by, e.g. LIV², but this does not seem obvious to me. Combinations of a tenuis and a media aspirata are not normally found in inherited Indo-European roots, which makes it likely that the word for 'enclosure' was borrowed from a non-Indo-European language of Europe (de Vaan 2008: 123) and thus provides no information about PIE phonology.

4.7 *kamp- *'to bend'* (*LIV*²)

Gr. κάμπτω 'to bend', Lith. *kuñpti* 'to bend', *kañpas* 'corner, angle, handle', Latv. *kampis* 'curved piece of wood, hook', OCS *kǫtъ* 'corner' < **k(o/a)mp-to-*. The appurtenance of Lat. *campus* 'field' and Goth. *hamfs* 'maimed' is less certain because of their meanings. The most plausible cognates are limited to two branches, Greek and Balto-Slavic, both spoken in the centre of the Indo-European world. In spite of the obvious restrictions this puts on the value of the etymon in the present discussion, the connection remains rather attractive. A reconstruction **kh₂emp-*, which Beekes (2010: 632) mentions with due scepticism, should have produced initial **x-* in Slavic, while a reconstruction **keh₂mp-* would not account for the non-acute intonation of the Baltic words. Kroonen (2013: 207, 257) reconstructs **kep-* with a nasal present **ke-n-p-* under the assumption that the nasal in Greek is "secondary". A possible scenario would be to assume an ablauting paradigm **kemp-*, **km̥p-* (= Lith. *kuñp-*) > **kap-* >> Gr. καμπ-. A parallel case of levelling of this type is found in χανδάνω 'to hold' < **gʰn̥d-*, **gʰend-*. I find this scenario more attractive than a reconstruction **kamp-*, **km̥p-* or the idea that we are dealing with borrowings from the same or similar substrate languages (thus Beekes 2010: 632).

4.8 *kap- *'take'* (*Mayrhofer 1986: 170, Sihler 1995: 45*)

Lat. *capiō*, Goth. *haban* 'to have', *hafjan* 'to raise', Gr. κάπτω 'to gulp down'. LIV² reconstructs **keh₂p-*, but does not rule out **kap-*. The correct reconstruction of the root is rather **kh₂ep-* in view of CS *xapati* 'to seize' < iterative-intensive **kh₂ōp-eh₂-*, with *x-* < **kh₂-*, and the circumflex root of Latv. *kàmpt* 'to grab' < **kh₂e-n-p-*. Briand (1997) derived the word for 'billy-goat', Lat. *caper*, ON *hafr*, Gr. κάπρος 'wild boar', Ir. *caera* 'sheep', from this root as '(animal) that devours'. The animal name is often reconstructed as ****kapro-*** with PIE **a* (e.g. by Mayrhofer 1986: 170, Sihler 1995: 45, Kapović 2017: 41 and Ringe 2017: 170). As de Vaan (2008: 89) pointed out, a reconstruction **kh₂pro-* is equally possible, in which case Briand's etymology can be retained, but it seems more likely that the word is not of Proto-Indo-European origin at all, but rather a post-PIE loanword into the European branches (cf. OIr. *gabor* 'billy-goat', MW *gauar* 'goat').

4.9 *kapu- *'head'* (*Kapović 2008: 226, Melchert 2016a*)

Lat. *caput*, Goth. *haubiþ*, ON *hǫfuð*, OIr. *cúach*. There is no objection to a reconstruction **kh₂p-* (thus Kroonen 2013: 215, who discusses the Germanic vocalism), so the word cannot serve as evidence for PIE **a*. I cannot accept Oettinger's proposal to connect HLuw. (CORNU)*ki-pu-tà-* 'horn' (2016: 279, followed by Melchert 2016a), because *ē/a*-ablaut in a nominal root is unparalleled. Had the semantics of the etymology been better, the root might have been a

candidate for Eichner's law (*$k\bar{e}(h_2)p$-*ut*-, *kh_2p-*ut*-), but in that case, too, the unusual ablaut would require an explanation. Non-Indo-European origin of the European words was argued for by Beekes (1996: 218 ff.) and Boutkan (1998: 111).

4.10 *knauk- (*Strunk 1993*)

According to Strunk, Lat. (*non*) *nauci/nauco* '(not a) bit, straw, dime' is cognate with *nux* 'nut' < **knuk*-. This is based on the meaning 'shell' that is attributed to *nauci/nauco* by grammarians and glossators. Surprisingly, this proposed meaning is found later than Plautus's admission that he does not know the actual meaning of *nauci* (Most. 1042), and the explanations of the word as 'shell' often specifically refer to *nucis* 'nuts' (Strunk 1993: 426). One therefore gets the impression that the interpretation of *nauci/nauco* as 'shell' is due to folk etymology. I am not convinced by Strunk's etymology, but even it is correct, it does not go back to a PIE form with **a*, because the word for 'nut' cannot be reconstructed for Proto-Indo-European (cf. de Vaan 2008: 420 f.).

4.11 *lap- *'to lap, lick'* (*Kroonen 2013: 327, labelled as "European"*)

Lat. *lambō*, Gr. λάπτω, OE *lapian*, OHG *laffan*, Lith. *lapènti*, Ru. *lópat'* 'to gobble', Arm. *lap'em*. As de Vaan (2008: 324) observed, the root could also be reconstructed with *h_2. It is generally assumed that the verb is in origin onomatopoetic. The reconstruction is therefore difficult, as secondary distortions are to be expected. Cf., e.g., Arm. *lap'em* with unetymological *-p'-* (or < **-ps-*?). In any case, I consider it a possibility that there was a (late) PIE root **lep*-, with Lat. *lambō* < **lp-n-* like *pandō* 'to spread out' < **pt-n-* and Gr. λάπτω < **lp-ie/o-* with the expected zero-grade in a *ie/o*-present. An *e*-grade of the root is found in Latv. *lepêt* 'to slurp, gobble'. The other Balto-Slavic forms and perhaps Germanic would reflect an *o*-grade **lop*-. Guus Kroonen points out to me that the Germanic forms go back to an *ōn*-verb **lap*(*p*)*ōn*-, where one would expect zero-grade of the root (cf. Kroonen 2012: 275). The vocalism of **lap*(*p*)*ōn*- therefore points to **lHP-n*-, unless it was created secondarily on the basis of the long vowel preterit, cf. OHG *laffan*, pret. *luof*. The alternative to a reconstruction **lep*- is **lh_2b^h-/*lab^h-*, cf. Gr. λαφύσσω 'to gulp down', in which case the Balto-Slavic forms cannot be directly related. There are no compelling reasons to reconstruct PIE **a* in this etymon.

4.12 *maǵ- *'to smear'* (*Mayrhofer 1986: 170, LIV²*)

Gr. μάσσω 'to knead', OCS *mazati* 'to smear', perhaps also Arm. *macanim* 'to stick, congeal'. A connection with OE *macian* 'to prepare, make', ON *makr* 'easy to deal with; suitable' etc. is less likely from a semantic point of view. A reconstruction **$mh_2ǵ$*- would produce Gr. μάσσω (see 3.23 on Gr. ἄστυ) and probably

Arm. *macanim*, while a full grade **me/oh$_2$ǵ-* is required for Slavic acute **maz-*. An alternative etymology derives μάσσω from **mnk-* and connects it with Lith. *mìnkyti* 'to knead, mix' (see Beekes 2010: 910 f., Derksen 2015: 318 f.). In either case, the reconstruction does not contain **a*.

4.13 *mak- *'pouch'* (*Sihler 1995: 45*)

ON *magi* 'stomach', Lith. *mãkas* 'purse', OCS *mošьna* 'small bag', MW *megin*, MBret. *meguin* 'bellows'. The reconstruction with **a* is based on the Celtic cognates, the root of which is usually reconstructed as PCl. **mak-*, but a reconstruction PCl. **mokīnā* would also produce the attested forms through internal *i*-affection of *-o-* (Jackson 1953: 579–583). All forms can thus go back to a root **mok-*, with the possible exception of the Lithuanian dialectal form *mẽkeris* 'purse, pouch' < **mek-* (Derksen 2015: 301). Perhaps the original meaning of the word was 'pigskin', cf. OIr. *mucc*, W *moch* 'pig' < **mok-*.

4.14 *masd- *'mast'* (*NIIL 463*)

OHG *mast* 'stick, pole, mast' < **mo/asto-* or **mo/asdo-*, MIr. *maide* 'stick, pole, staff' < **ma(s)d$^{(h)}$i̯o-*. It cannot be ruled out that Germanic borrowed the word from Celtic or vice versa. Lat. *mālus* 'pole, mast' is also often connected with these words, in which case it might reflect **masdo-* with *l* < **d*. Another cognate is perhaps Slavic **mostъ* 'wooden paving placed over a stream or marshy land' < **mo/astu-*. It seems less likely that the Slavic word was borrowed from Germanic in view of its meaning (Pronk-Tiethoff 2013: 199) and the fact that it appears to have been a *u*-stem (cf. Ru. loc.sg. *mostú*, Sln. gen.sg. *mostû*, nom.pl. *mostȗvi*, etc.). If the Germanic, Middle Irish and Latin words are inherited, they must go back to a proto-form **masd-* or **mh$_2$sd-* (de Vaan 2008: 361). It is, however, conceivable that we are ultimately dealing with post-PIE borrowings from a non-Indo-European source.

4.15 *rad^{h}- *'to shine'* (*Schaffner 2010*)

Lat. *radius* 'ray of light, spoke', ON *rǫðull* 'radiant circle', OE *rador* 'ether, sky'. Schaffner reconstructs a verbal root, but the attested forms are all nouns. The connection of these words with the name of the Vedic demon *rāhu-* that Schaffner proposes is conjectural and can only be entertained if it has been shown that the etymology is formally possible. The Italo-Germanic connection, on the other hand, is conceivable, but weakened by the fact that it is limited to two branches. An alternative reconstruction to Schaffner's would be **HrHd^{h}-*. For the vocalization of the second laryngeal cf. Lat. *ratiō* 'reason', Goth. *raþjo* 'account' < **h$_2$rḗ$_1$-ti-*. Assuming that the etymology is correct, there is no compelling reason to prefer a reconstruction **Hrad^{h}-* over **HrHd^{h}-*.

4.16 *skab^{h}- *'scratch'* (*LIV^{2}, NIIL 621: "[o]der* *sk$h_2$eb^{h}-")

Gr. σκάπτω 'to dig', Lat. *scabō* 'to scratch', Goth. *skaban* 'to shave', Lith. *skõbti* 'to carve, hollow out', Ru. *skóbel'* 'scraper'. The long vowels of Lat. perf. *scābī* and Lith. pret. *skõbė* (and inf. *skõbti*) reflect a productive lengthened-grade vowel (cf. Meiser 2003: 156 on Lat. *scābī*). It cannot be used to reconstruct **ā/a*-ablaut. Schrijver (1991: 431) argued that Lat. *scabō* may go back to **skeb^{h}*-, ablauting with *scobis* 'filings' < **skob^{h}*-. However, Schrijver's sound law **ke* > Lat. *ca* remains uncertain due to a number of counterexamples (Meiser 2006: 82f.). De Vaan (2008: 541) also reconstructs the root as **skeb^{h}*-, with Lat. *scab-* from the zero-grade **skb^{h}*-, which received an epenthetic vowel in the adjective *scaber* 'rough' < **sk$_{ə}$b^{h}-ro*- (with expected zero-grade) as in *quadru-* 'four-' < **k^{w}$_{ə}$t-ru*-. If Gr. σκάπτω is cognate (which is not altogether certain, cf. Beekes 2010: 1342), it would have to reflect a form with a nasal infix: **sk-n-b^{h}*-. If the reconstruction **sk*(*e*)*b^{h}*- is correct, the root may also be reflected indirectly by the synonymous **skreb^{h}*- 'to scratch, scrape' (OE *sceorfan*, Ru. *skrestí*, Latv. *skrabt*), with initial **skr-* due to contamination with *(*s*)*ker-* 'to cut, shave, scratch' (Gr. κείρω, ON *skera*, Arm. *k^{c}erem* etc.). The alternative reconstruction **skh$_2$eb^{h}*- offered by LIV^{2} and NIIL looks somewhat unusual, but cannot be ruled out. A reconstruction **skeh$_2$b^{h}*- would not account for Lat. *scobis* 'filings', Lith. 3pres. *skãb*(*i*)*a* 'to carve' or Ru. *skóbel'* 'scraper'. There are no compelling reasons to prefer a reconstruction **skab^{h}*- over the alternative reconstructions.

4.17 *d^{h}ab^{h}-ro- *'skilful, craft-working'* (*Meiser 2006: 99, Vine 2002: 338*)

Lat. *faber* 'artisan', Arm. *darbin* 'smith'. The Armenian word is probably a borrowing, cf. Hurrian *tabrinni-* 'blacksmith' (Yakubovich 2009). Lat. *faber* has alternatively been linked with OIr. *gobae* 'smith' from a preform **g^{wh}ob$^{(h)}$*- (Blažek 2006). Because the unrounding of the vowel of **g^{wh}ob^{h}*- to **fab-* is not without problems, perhaps it is better to start from a preform **g^{wh}b^{h}-ro-* > **g^{wh}$_{ə}$b^{h}-ro-* > *faber*.

4.18 *stag- *'to drip'* (*Vine 2002: 339, Ringe 2017: 12*)

Gr. στάζω 'to shed drop by drop', Lat. *stāgnum* 'standing water, pool, pond etc.', OBret. *staer* 'river, brook'. The etymology is not compelling, but, if it is accepted, a reconstruction **sth$_2$*(*ǵ*)- for Greek and Breton and **steh$_2$*(*ǵ*)- for Latin seems preferable (De Vaan 2009: 585, Matasović 2009: 353).

5 Conclusion

For most of the examples discussed above, it turns out that a reconstruction without *a* is preferable even if one accepts the reconstruction of such a phoneme for PIE. Assuming that there was a PIE phoneme *a*, the words in which it could reasonably be reconstructed are the following (alternative a-less reconstructions in brackets):

1. *dap- 'to sacrifice' (*dh_2p-, only in European branches)
2. *$gras$- 'to devour' (*$grens$-)
3. *$ǵ^hans$- 'goose' (*$ǵ^hh_2ens$-, allowing the connection with *$ǵ^heh_2$- 'to gape')
4. *$(H)iaǵ$- 'holy' (*$(H)ieh_2ǵ$-)
5. *$Hrad^h$- 'ray of light' (*$HrHd^h$-, only Latin and Germanic)
6. *$ḱad$- 'to fall' (*$ḱeh_2d$- or *$ḱh_2ed$-)
7. *kai-ko- 'blind in one eye' (*keh_2i-ko-)
8. *$(ḱ)an$- 'to sing' (*$(ḱ)h_2n$-, *$(ḱ)e/onH$-)
9. *$(ḱ)apu$- 'head' (*kh_2pu-, only in European branches)
10. *$ḱas$- 'hare, grey' (*$ḱh_1es$-, allowing the connection with *$ḱh_1ei$-ro-, *$ḱh_1i$-uo- 'grey')
11. *$masd$- 'mast' (*mh_2sd-, only in European branches)
12. *$skab^h$- 'to scratch' (*$skeb^h$-, *skh_2eb^h-, only in European branches)

Several observations can be made. At the beginning of this paper, it was stated that only etyma that are securely attested in two, but preferably more, branches that are not adjacent can provide a basis for the reconstruction of a phoneme *a*. Only half of the etyma (2, 3, 4, 6, 8, 10 and perhaps 7) fulfil this criterion. There are no secure examples of ablauting *a* in this list. Unlike for e-, o- or zero-grade, no morphological category can be established which regularly took a-grade. The examples discussed above are all isolated cases and represent significantly less than 1% of the reconstructable Indo-European roots. None of them have reflexes in Anatolian. This may lead us to think that they are relatively recent borrowings. The semantics of these words do not, however, support this hypothesis. These are not predominantly concrete culture words or technical expressions. Also, no source for such borrowings has been identified to support the borrowing hypothesis. For these etyma, the alternative reconstructions given in brackets are therefore to be preferred.[8] There is not a single case in which a reconstruction with a lengthened grade *$ā$* is prefer-

8 The claim that *a* often occurs before or after a velar occlusive (Schmidt-Brandt 1967: 96–99, Mayrhofer 1986: 169 f.) would hold for eight of the examples above, but a sound law *e* > *a* in the vicinity of a velar (cf. Schmidt-Brandt 1967: 96–99, Meid 1988: 343 f.) cannot be set up because the number of counterexamples is clearly forbidding.

able over alternative reconstructions. We must conclude, with Lubotsky (1989), that the reconstruction of PIE **a* or **ā* is unnecessary for any stage of the proto-language, including the common ancestor of core Indo-European after Anatolian had split off.

The insight that Proto-Indo-European did not have a phoneme **a* provides us with a tool to identify post-Proto-Indo-European loanwords from substrate or adstrate languages. Of the potential "European substrate" words listed by Kuryłowicz (1956: 194f.), Schrijver (1997), Kuiper (1995), Beekes (1996, 1998, 2010), de Vaan (2008) and Kroonen (2013), **b⁽ʰ⁾ar(s)dʰ-* 'beard', **kagʰ-* 'hedge', **kapro-/*gabro-* 'billy-goat', **kapu-* 'head' and **masd-* 'mast' have been discussed above. Other such words containing **a* are **akr-* 'maple' (Lat. *acer*), **akʷ-* 'water' (Lat. *aqua*), **aig-* 'oak' (Lat. *aesculus*), **ag-* 'tree fruit' (OIr. *áirne*), **als-* 'alder' (Lat. *alnus*), **araksn-* 'spider' (Lat. *arāneus*), **bak-* 'stick' (Lat. *baculum*), **bʰabʰ-* 'bean' (Lat. *faba*), **bʰak-* 'lentil, bean' (Gr. φακός), **bʰars-* 'some type of grain' (Lat. *far*), **bʰas-* 'red, purple' (OIr. *basc*), **gʰabʰlo-* 'fork' (OIr. *gabul*), **gʰaid-* 'goat' (Lat. *haedus*), **gʰasdʰ-* 'goad' (Lat. *hasta*), **kaiko-* 'blind in one eye' (Lat. *caecus*, see 3.10), **kait-* 'heath, wood' (OW *coit*), **kapon-* 'harbour' (OIr. *cúan*), **kasn-* 'garlic' (MIr. *cainnenn*), **katt-* 'cat' (Lat. *cattus*), **magu-* 'boy, servant' (OIr. *mug*), **mark-* 'horse' (MIr. *marc*), **salik-* 'willow' (Lat. *salix*) and **tauro-* 'bull, aurochs' (Lat. *taurus*). These words are limited to Italo-Celtic, Germanic, Balto-Slavic, Albanian, Greek and probably Armenian. Some of them may contain **h₂* and be inherited from PIE, but, also in view of their meanings, most will be borrowings. A few "European substrate" words containing **a* show other irregularities that allow us to identify them as borrowings with more certainty: **kana/ip/b-* 'hemp' (Gr. κάνναβις), **auVǵ/ḱ-* 'oats' (Lat. *avēna*), **ar(ō)d-* 'heron' (Lat. *ardea*), **(a)m(e)sal-* 'blackbird' (MW *mwyalch*), **(p)sa(m)(a)dʰ-* 'sand' (Lat. *sabulum*) as well as **b⁽ʰ⁾ar(s)dʰ-* 'beard' (4.1) and **k/gap/bro-* 'billy-goat' (4.8) discussed above.

The conclusion that Proto-Indo-European did not have a phoneme **a* or **ā* also has implications for our reconstruction of the evolution of the vowel systems of the individual branches of Indo-European. The fact that the European branches of Indo-European borrowed extensively from one or more contact languages that had a vowel /a/ raises the possibility that these contacts played a role in the introduction of /a/ in the phonemic system of Italo-Celtic, Greek and Balto-Slavic (cf. Kortlandt forthc.), i.e. those branches which created two new vowels **a* and **ā* that were distinct from the reflexes of PIE **e*, **o*, **ē* and **ō*. In Greek, the rise of /a/ was preceded by the phonemic merger of **e* with the prop vowel that had developed in consonant clusters containing a laryngeal, e.g. **pʰ₂tēr* > **[pʰ₂ₔtēr]* > **pʰ₂etēr* > πατήρ. In Tocharian, the sequences **h₂e* (> PToch. **a*) and **eh₂* (> **ā* > PToch. **o*) and vocalized laryngeals (> PToch. **a*)

also remained distinct from PIE *e, *o, *$\bar{e}$ and *$\bar{o}$.[9] However, the fronting of PIE *o to PToch. *$æ$ is perhaps easier to understand if there was no short vowel *a yet before this fronting took place. In Germanic and Indo-Iranian, the PIE system with only two open vowels was preserved for some time and the position of a central open vowel was eventually occupied by PIE *o and PIE *e and *o respectively. In Germanic, the vowel /a/ in loanwords was borrowed with the timbre of the reflex of PIE *o, which was apparently an open vowel at the time of borrowing. The more open allophones of *e in the position after *h_2 and *h_3 also merged with this open vowel. In Indo-Iranian, /a/ and /ā/ developed regularly from PIE *e, *o, *$\bar{e}$ and *$\bar{o}$ and later also from the reflex of the syllabic nasals. In Anatolian, PIE *eh_2 merged with the reflex of *$\bar{o}$, which was apparently an open vowel, into *$\bar{a}$. PIE *h_2e became *$ḫa$, of which the vocalic part remained distinct from short *o.

The brief overview above shows that there is nothing in the evolution of the vowel systems of the individual branches of Indo-European that precludes the reconstruction of only two open vowels for the proto-language: one front vowel, approximately [æ], and one back vowel, approximately [ɒ].

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9 The distinction between PIE *eh_2 and *$\bar{o}$ was lost in non-final position. Their reflexes in final position are debated, cf. Fellner (2014: 13–14) and Jasanoff (2018) with references to the relevant literature.

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