The metathesis of *-*Hu*- and *-*Hi*- in PIE

1. 'Long diphthong roots' and laryngeal metathesis

1.1. In Pokorny's *Indogermanisches etymologisches Wörterbuch* (IEW) we find a category of roots where a long diphthong takes the place of the *e*-grade, e.g. *dāu-, dəu-, dŭ̄-* 'brennen', alongside roots with a final schwa *dheu̯ə-*, *dhi̯ā-*, *dhī-* 'sehen, schauen'. From a laryngealist perspective, the difference between these two root shapes must be in the position of the laryngeal: **deh₂u-* 'to burn' but **dʰeiH-* 'to see'. However, in Sanskrit, both verbs form a participle with a long root-vowel, viz. *dūná-*, *dhītá-*. On the surface, it appears that the form **dh₂u-nó-* is phonotactically identical to *dhīta-* < **diH-tó-*.

1.2. Winter (1965: 191-192) was the first person to discuss this concept in terms of the laryngeal theory. He noted pairs such as Hitt. *pahhur* ~ ToB *pūwar*, OHG *brāwa* ~ ToB *pärwāne*, and formulated three rules, namely that a metathesis of high vowels and laryngeals occurred when the laryngeal was not preceded by a vowel, was not word initial, and was followed by a consonant. In more simple terms, we can say that metathesis occurred between two consonants. This will be the null hypothesis in my paper.[1]

Mayrhofer (1986: 174) compares Skt. aor. *á-pāt*, caus. *pāyáya-*, Gr. imp. πῖθι. Since the Skt. root aorist must continue a root **peH-*, he assumes an *i*-extension in the other forms. To explain the long vowel in Gr. πῖθι < **ph₃-i-dʰi*, he assumes laryngeal metathesis. Several dissenting opinions have been voiced. Rasmussen (1989a: 264) assumes loss of laryngeal before a tautosyllabic stop, e.g. **peh₃i-t > *peh₃-t* and explains the long zero-grades as analogical. Lindeman (1997: 121) and Gerasimov (2006 passim)[2] both suppose dissimilatory loss of **i̯*. Of these solutions, only the last has merit. Gerasimov proposes a primary **peih₃-*, whose yod dissimilated to a yod-present (**peih₃-i-* > **peh₃-i-*). The new stem was subsequently analysed as an *i*-present to a root **peh₃-*, which was taken as the aorist stem.

While this solution works to some extent, it requires several additional assumptions: most notably the sound law **iHi* > **Hi*,[3] and the subsequent reanalysis within PIE. If we accept laryngeal metathesis, the various root shapes (**peh₃-*, **peih₃-*, **peh₃i-*) can be considered essentially equivalent, while in Gerasimov's theory, they must represent different analogical formations and all must be projected back to PIE. This multiplies the number of entities we work with. Therefore, *Occam's razor* states that we must first exclude laryngeal metathesis before adopting such an alternative. Gerasimov's rejection of the theory is primarily based on the fact that "the context for its operation … is unclear". He also mentions several exceptions, which I will

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[1] Lubotsky (2011: 110) states that "it seems probable to me that [the metathesis] was operative in a prevocalic position, too. At least, I do not know of any evidence precluding this". In other words, Lubotsky believes that **CHI* unconditionally became **CIH* in Proto-Indo-European. This is conceivable, but in view of the great difficulty in distinguishing between these two sequences prevocalically in many branches, I have chosen to limit the current study to the inter-consonantal position. Besides, there is counter-evidence, e.g. Av. *zauruuan-* 'old age, decrepitude' < **grh₂-ur/uen-*, cf. γραῦς 'old woman', where the position of the laryngeal in the nominative (***gruh₂r-*) must have been restored after the oblique cases.

[2] I refer the reader to this paper for a summary and criticism of Lindeman's proposal.

[3] This dissimilation rule is contradicted by Hitt. *pe-i̯ē-* 'to send (away)' < **h₁poi-h₁ieh₁-*.

discuss in the following. His theory cannot explain the same patterns which we find in nominal roots of the type Hitt. *pahhur* ~ ToB *pūwar*.

Special pleading is also required to explain Hittite yod-presents such as *ishai-^{i}*, *dai-^{i}*, etc. This effort is nullified by A. Kloekhorst's article of the same year (2006). According to him, PIE *i*-presents show ablaut in the suffix, not the root. This is the situation we find synchronically in Hittite *pai-^{i} / pi-* < *h_1p-(o)i-* 'bind', Skt. *kṣéti*, 3pl. *kṣiyánti* 'dwell' < **tḱ-(e)i-*, Old Prussian *turei*, 3pl. *turi* 'have' and Latin *pariō*, *parītum* (Kortlandt 1987, 1989: 109, de Vaan 2011).

1.3. Lubotsky (2011) brings into the discussion the Sanskrit roots of the type *sī́vyati,* ptc. *syūtá-* which show the shape *Cīv-* (i.e., *CiHu̯-*) before a vowel or *-y-* and *Cyū-* (i.e., *Ci̯uH-*) before a consonant. This alternation is synchronically automatic within Sanskrit, and can hardly have any analogical source. The distribution is matched by Go. *siujan*, Lith. *siū́tas*, and can be posited for PIE. This evidence is important for the theory of laryngeal metathesis, and cannot be adequately explained within any of its protractors' frameworks.

Lubotsky (l.c.) concludes that these verbs are ultimately denominalizations of *u*-derivatives of **CH-ei*-roots, which are in turn derived from roots of the shape **CeH-*. He offers the following examples:

> **deh₂-* 'to distribute: Skt. *dā-* → **dh₂-ei-*: Skt. *dáyate*, Gr. δαίεται 'to divide' → **dh₂-i-u-*: Skt. *dī́v-*, *dyū́-* 'gambling, play' → * *dh₂-i-u-*: Skt. *dīv-* 'to play dice, gamble'
>
> **ǵʰeh₂-* 'to gape': Gr. χάος → **ǵʰh₂-ei-*: Lat. *hiō,* OCS *zijati*, ToB *kāy-* 'open one's mouth' → **ǵʰh₂-ei-u-*: ToB *koyn* 'mouth'[4] → **ǵʰh₂-i-u-e/o-*: SCr. *zijèvati*, OHG *giwēn* 'to yawn'
>
> **gʷeh₃-* 'to tend': Gr. βόσκω → **gʷh₃-ei-*: Lith. *gýti* 'to heal' → * *gʷh₃-i-uo-* 'alive': Skt. *jīvá-*, Lat. *vīvus*, Lith. *gývas* → * *gʷh₃-i-u-e/o-*: Skt. *jīv-*, Lat. *vīvo,* Lith. *siū́ti* 'to sew'
>
> **seh₂-* 'to fasten, fetter': Skt. *sā-* → **sh₂-ei-*: Hitt. *ishai-^{i}* 'to bind' → **sh₂-i-u-*: Skt. *syū́-* 'seam, cord' → **sh₂-i-u* -: Skt. *sīv-*, Go. *siujan,* Lith. *siū́ti* 'to sew'
>
> **speh₁-* 'to be full to the rim': Skt. *sphātí-* 'abundance' → * *sph₁-ei-*: Hitt. *ispai-^{i}* 'to be satiated', Skt. *sphāya-* → **sph₁-i-u-* → * *sph₁-i-u-* 'to spit': Skt. *ṣṭhīv-*, Lith. *spjáuti*, Lat. *spuō*

1.4. In addition, Lubotsky derives *i*-perfects from **CeH*-roots:

> **peih₃-* 'to swell with milk': Skt. *pīpā́ya*, Lith. *pýti* 'to give milk' ⟵ **peh₃-* 'to drink'
>
> **dʰeih₁-* 'to consider': Skt. *dīdhaya* ⟵ **dʰeh₁-* 'to put'
>
> **deh₁i-* 'to suck' < **dʰh₁-ei-* < **dʰeh₁-* 'to suckle'

1.5. I have collected some other examples below:

– **bʰh₂eu-* 'to come into being' < **bʰeh₂-* 'to appear'[5]

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[4] I rather analyse SCr. zȉjev 'muzzle', etc. as deverbal, see §2.2.2.3, but this does not affect the overall proposal.

[5] An alternative way of connecting the verbs goes back to Rix (2003: 366), who assumed a full-grade **bʰueh₂-* was simplified to **bʰeh₂-* in PIE. The most troubling aspect of this etymology is Rix's assumed preservation of **u* in the 'Lindemann-variant' **bʰuu̯eh₂-* (cf. Lat. *fuās*), which would imply the loss was phonetic and automatic, not phonemic, and unlikely to have had the far-reaching effects implied by Rix.

The verb **b^{h}eh$_2$u-* is attested in Skt. *bhav^{i}-* 'become, come into being', Gr. φύομαι 'grow, arise, become', perf. 'exist', Go. *bauan* 'live', Lith. *bū́ti*, OCS *byti* 'be', Lith. *bùvinti*, Ru. *bávit'* 'linger'. It seems rather attractive to derive it from the root **b^{h}eh$_2$-*. This verb is usually glossed as 'to shine' (e.g. LIV 'glänzen, leuchten, scheinen') on the basis of Skt. *bhā-* 'shine, be bright', Gr. φάος n. 'light, daylight' and derivatives. However, several forms exist meaning 'to appear', e.g. φάε 3sg.aor. 'appeared' Gr. φαίνω 'show', med. 'become visible, appear', Alb. *bëj* 'do; appear', Skt. *uṣás- vi-bhātī́* 'the dawn appeared'. Presumably both meanings existed alongside one another in PIE.[6] A *u*-verb **b^{h}h$_2$-eu-* 'to come into being' seems to represent the same non-volitional semantics argued by Lubotsky (2011: 120f) for *i*-perfects.

– **b^{h}reiH-* 'scratch (off), chafe' < **b^{h}erH-* 'overpower'

A root **b^{h}reiH-* is reconstructed on the basis of Skt. *bhray^{i}-* 'injure, hurt', YAv. *brī-* 'shave, shear', CS *briti sę* 'shave', OIr. *-bria* 3sg.subj. 'damage', Lat. *friō* 'pulverize, crumble', *fricāre* 'rub, chafe'. Already in Pokorny (IEW: 135), it was connected with **b^{h}erH-*, as seen in Lat. *forō* 'bore through, pierce', ON *berja*, OHG *berjan* 'beat', Alb. *bie* 'fall, lay down, beat', Lith. *bárti* 'scold, accuse, forbid', Ru. *borót'* 'overpower, throw to the ground', *boroná* 'harrow'. In LIV^{2}: 80, following Pokorny, the root is glossed as 'mit scharfem Werkzeug bearbeiten', but I would perhaps go for 'to beat down, overpower'. A connection is possible, but the exact semantic path is unclear to me.

– **g^{w}euh$_2$-* 'to sing, wail' < **g^{w}eh$_2$-* 'to sing'

Alongside Skt. *gav$^{(i)}$-* 'call, sing praises', OHG *gichewen* 'call', OCS *govoriti* 'make a noise, talk', we find Gr. γοάω 'groan, weep' ~ βοάω 'cry', which alternation suggests an old labiovelar (cf. Beekes 2010: 280). Evidently, this word can be connected with Skt. *gā-* 'sing', YAv. *fragāθra-* 'prayer', Ru. *gájat'* 'talk, curse', pointing to < **g^{w}eh$_{2/3}$-*.

– **keuh$_1$-* 'to be wary of' < **keh$_1$-* 'to make aware'

A root **keuh$_1$-* can be reconstructed on the basis of Skt. *kav^{i}-* 'to intend', OCS *čuti* 'sense, notice', Lat. *caveō* 'take care, beware', Gr. κοέω 'pay attention'. I propose to derive it from the root **ḱeh$_1$-*,[7] attested as an *s*-present in Skt. *śās-* 'teach, command; punish', Av. *sāh-* 'teach', To. *kāṣ-* 'scold', Go. *hazjan* 'to praise', Alb. *thom* 'say'. Forms without *-s-* are OP *θātiy* 'declare' and Alb. ptc. *thënë* / *thãnë*. The original meaning might be 'to make aware'.

– **leuh$_1$-* 'set free' < **lh$_1$-eu-* < **leh$_1$-* 'let, allow'

The root **leh$_1$-*, seen in Hitt. *lā-^{i}* / *l-* 'loosen, release', Alb. alb. *lë* / *lã* 'let', OCS *lětъ jestъ* 'it is allowed', was extended with **-u-* in Gr. λύω 'loosen, liberate', Lat. *solvō* 'release, set free', Skt. *lav^{i}-* 'cut (off)', OIr. *as-loí* 'escape', Cz. *leviti* 'alleviate, diminish', etc. (IEED s.v.).

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[6] Perhaps the identical root **b^{h}eh$_2$-* 'to say' also represents a specialized use of this verb, cf. Gr. φημί 'say, explain, argue'. Words for 'explain' are frequently derived from 'bright, clear', cf. Lat. *dēclārō*, OCS *ob-jasniti*, Lith. *áiškinti*, etc. (cf. Beekes 2010: 1567) However, none of the other languages seem to have preserved a trace of the meaning 'explain', however, and rather point to a meaning 'to tell tales' or 'say magic chants' (Lat. *fātum* 'prophecy', *fābula* 'rumour, tale', OE *bōn* 'to brag', Ukr. *bájati* 'tell, practise sorcery', OCS *balii* 'physician').

[7] Most likely, laryngeals caused depalatalization already in IE (Kortlandt 2010). In the *satəm* languages, the plain velar was generalized from the full grade **kh$_1$-eu-*, and then the root was reshaped after the metathesized zero grade **kuh$_1$- > *keuh$_1$-* before laryngeal aspiration was phonemicized.

– *$neih_1$- 'to churn' < *nh_1-*ei*- < *$sneh_1$- 'to twist, turn'

A barely attested root 'to churn' is seen in Lv. *nīt* 'to churn, thread (a needle)', Lv. *pa-nijas* 'buttermilk', Shughni *nay-, nid*, Talysh *niyə* 'to churn', Skt. *náva-nīta*- 'fresh butter'. It is possibly an *i*-extension of the root *$*(s)neh_1$- in Gr. νέω, Lat. *neō*, OIr. *sniid* 'spin, weave'.

– *$preiH$- 'to satisfy, please' < *$perh_3$- 'to provide'

This verb is attested in Skt. *pray^{i}*- 'to please, satisfy; to be pleased, enjoy', OAv. *friiąnmahī*- 'to satisfy', OCS *prijati* 'take care of', SCr. *prìjati* 'please, be of benefit'. We also find the derived adjective *$priH$-*o*- Go. *freis*, OBret. *rid* 'free', Skt. *priyá*- 'dear, desired'. This family has been connected with πρᾷος 'soft, gentle, mild' (Hamp 1984: 52), however the original meaning 'to satisfy, please', can rather be derived from *$perh_3$- 'to provide (with what is desired)', seen in Skt. *par^{i}*- 'to give, grant', πορεῖν 'provide, donate, grant', OIr. *ernaid* 'bestow'.

– *$treuH$- 'to wear down' < *$terh_1$- 'to drill'

Rather clearly, the root *$treuH$-, represented by Gr. τρύω 'wear down' and CS *tryti* 'rub' must be related to Lat. *terō* 'rub', *terebra* 'drill', OE *þrāwan,* OHG *drāen* 'twist, turn', Lith. *trìnti* 'rub, grind', Gr. τετραίνω 'pierce, perforate' < *$terh_1$-. Regarding the meanings 'to drill, twist, rub', note that primitive drills were operated by twisting a stick rapidly by means of a rubbing motion with the hands.

– *$uleiH$- 'to crush, compress' < *h_2uelh_1- 'to dominate'

This Indo-Iranian verb, attested in Skt. *vlay^{i}*- 'crush, compress, collapse', YAv. *uruuīnant*- 'compressing' is without etymology. Nevertheless, it seems quite attractive to connect it with Hitt. *hulle-^{zi}* / *hull*- 'smash, quash, defeat', which reflects the root *h_2uelh_1-. The root has tended to become 'to rule' in various languages (OIr. *follnadar*, Lith. *valdýti*, OCS *vlasti*), suggesting an original meaning 'to dominate'.

Another word worth mentioning here is *$g^{w}rih_3$-*ueh*$_2$- in Skt. *grīvā*- 'neck', Ru. *gríva* 'mane', Lv. *grīva* 'mouth of a river', which Rasmussen (1985) derives from *$g^{w}erh_3$- 'to swallow', cf. Gr. βιβρώσκω 'devour', Skt. *gar^{i}*-, Lith. *gérti* 'drink'.

Implications of laryngeal metathesis

1.6. While the reality of laryngeal metathesis in PIE is fairly frequently assumed, several papers, particularly from Leiden, and most of all those from Frederik Kortlandt (e.g. 1975, 1981, 1986, 1988a), have argued that this metathesis is a post PIE development. Kortlandt has pointed out several environments where he believes a contrast between **HI* and **IH* sequences has been preserved between consonants. Other papers, however (e.g. Rasmussen 1989a, Lubotsky 2011), present a good case to consider laryngeal metathesis a PIE phenomenon.

If laryngeal metathesis did indeed occur in PIE, it would result in the effective merger in the zero grade of four distinct root shapes (**CHEI*-, **CEHI*-, **CEIH*- and **CIEH*-). In such circumstances, we might well anticipate that speakers would occasionally make the 'wrong' choice of full-grade or innovate new full-grade forms. While most scholars appear to assume a direction **CEHI*- > **CIH-C*- > **CEIH*- for innovation,[8] from a logical standpoint, the opposite is just

[8] e.g. Lubotsky (2011: 110) "the root-final position of the laryngeal was then generalized in the full-grade"

as conceivable, as there is just as much analogical basis to create a full-grade **CEHI-* on the basis of a zero-grade **CIH-*. We may take any alternation in the position of laryngeals in a root as evidence for metathesis.

If we are to accept the idea of laryngeal metathesis for PIE, we must (a) identify cases where a particular metathesis must reasonably be dated to PIE (the "evidence"), (b) account for the evidence adduced by Kortlandt and other scholars for a reflex of PIE **CHIC* (the "counterevidence"). If we conclude that laryngeal metathesis did not occur in PIE, we must then provide a reasonable phonetic explanation for the phenomena attributable to it in each branch.

2 Evidence for the position of laryngeals

2.1 General Observations

We can assume that laryngeals already had a colouring affect on the adjacent vowels in PIE, therefore in **-Hei-* and **-eHi-* we find colouring, and in **-eiH-*, colouring should not occur. Another Indo-European development appears to be the depalatalization of velars before a laryngeal (Kortlandt 2010: 38, 2013: 14), exemplified by PSl. **gǫsъ* 'goose' < **ǵʰh₂-ens-* as against Lith. *žąsìs* < **ǵeh₂-ns-* (with analogical accentuation), where only the laryngeal can explain depalatalization in Slavic.

As a brief illustration of the methodological issues involved in ascertaining the regular reflexes of laryngeal diphthongs, I offer the following case study:

> IE 'husband's brother' is generally reconstructed as **deh₂i-uer-* on the basis of the long vowel in Gk. δᾱήρ and Arm. *taygr*, yet the *Verscharfung* in OHG *zeihhur*, OE *tacor* points unequivocally to **deih₂-u(e)r-* (see §2.2.7.1), while Iranian evidence (Oss. *tiw / tew*, Pash. *lewár*, etc.) may point to **dh₂ei-uer-* (see §2.2.3.1). In Lat. *lēvir/laevir*, the position of the laryngeal is ambiguous.

All things being equal, it is quite clear that the Lat. word cannot be used as evidence for the regular outcome of IE **-eh₂i-* in this language, any more than it can be used as evidence for the outcome of **-h₂ei-* or **-eih₂-*. As a result, we may simply state that the position of the laryngeal in Latin is unknown (however, see §2.2.5.1. for another account).

In the following study, I will limit myself to identifying *oppositions* present within the daughter languages. External evidence may only be invoked in determining whether a root possessed a laryngeal, while the position of the laryngeal will be determined on the basis of internal evidence alone. Where no opposition is found, the position of the laryngeal must be viewed as ambiguous. Of course, since this approach eliminates most sources of counter-evidence, we must be very careful when assessing the positive evidence, taking due account of sources of analogy and alternative analyses.

In order to determine the behaviour of the laryngeals in each of the relevant languages, I will examine the regular reflexes of the following clusters: **CHV, *VHIC, *VIHC, CIHC* and **CHIC*.

2.1.1 Nasal Presents

Rasmussen (1999: 425) noted that IE nasal presents are consistently formed to the metathesized stem, Skt. *dunóti* 'kindle, burn' < **du-n-h₂-* alongside Gr. δαίω, Gr. κρῑ́νω < **kri-n-h₁-* + **-ie/o-* < Slav. **kràjь* < **kreh₁i-*. Further, we have Skt. *dhinóti,* OIr. *denait* < **dʰh₁-ei-* 'to suck', OHG *ginēn* <

ǵʰh₂-ei-, Skt. *sināti* < **sh₂-ei-*, Lat. *sinō,* < **sh₁-ei-* and Skt. *lunāti* < **lh₁-eu-*, for which reconstructions see above.

The only exception I can find is Gr. γάνυμαι 'brighten up, be glad' < **(ǵ)h₂-n-u-*? Perhaps it is better explained as a *nu*-present to a root **(ǵ)eh₂-*, seen in γη-θέω 'rejoice'. However, a *u*-extension is also probably seen in the form γαίων 'rejoicing?' < **(ǵ)eh₂u-ie/o-* as well as Lat. *gaudeō* 'be glad, rejoice', which makes this solution quite uneconomical. Nevertheless, it appears that these nasal presents, which are in principle formed to the zero grade, must have post-dated the metathesis. The result of this is that a nasal present of the shape **CI-n-H-* cannot, as is traditionally assumed, provide evidence for a *seṭ* root-shape.

2.2.1 Anatolian

2.2.1.1 *CHV

In a series of publications (2010, 2013, 2015, 2016), Kloekhorst has argued that the distribution of signs in Hittite spelling reveals a three-way distinction between fortis, lenis and glottalized (ejective) stops, the latter of which reflect **TH-*. For example, *dai-ⁱ* 'to put' reflecting **dh₁-oi-* (cf. Kloekhorst 2006), is consistently spelled with the sign DA-, while words such as the conjunction *ta,* reflecting **to*, are consistently spelled with TA- (Kloekhorst 2010: 203). Further, initial KE/I- is used in all periods to represent PIE **k-* while GE/I- is used to represent PIE **g⁽ʰ⁾-*. In one word, *kǐnu-ᶻⁱ*, *ginu-ᶻⁱ* 'to open up', we find both spellings. According to Kloekhorst (2010: 216), this points to a MH glottalic stop [kˀ-], which was in NH simplified to lenis [k-], <GE/I>. This is supported by the reconstruction **ǵʰh₂-i-nu-* and connection with Lat. *hīscō* 'open up, yawn', OCS *zěvati* 'yawn'.

In Kloekhorst 2015, it is pointed out that the distinction between /t:/ and /tˀ/, as observed in the spelling, remains intact in the MH and NH periods. However, word initial /t:/ appears to undergo lenition throughout MH and NH (idem: 13). On the other hand, /k:/ is only distinct from /kˀ/ in OH, with the latter merging with lenis /k/ in later times (cf. 2010: 216). While PIE **TH* regularly yields /tˀ/, in post-consonantal position we find only /t:/ (2015: 8). An example is *ḫaštai-*, *ḫaštiḭa-*, which should reflect **h₃estH-* in view of the failure of *-ti-* to assibilate to expected ***-zi-*. However, *-t-* might easily have been restored from the strong cases.

The table below summarizes the cuneiform signs used to represent the three different phonemes in Hittite. Note that Kloekhorst 2015 discusses a number of details about the spelling in post-consonantal and word final positions, but as glottalized stops are not attested in these positions, they need not concern us here.

	Word initially		Word Medially
	T	K	T
fortis	TA- (> DA-)	KE/I-, KA-; GA /_R	°T-TA-, °N-TA-
lenis		GE/I-, GA-(?)*	V-ᴰ/ₜA-, °N-ᴰ/ₜA-
glottalized	DA-	KE/I- (> GE/I-)	°T-ᴰ/ₜA-, °N-DA-

*Neither of the examples supporting GA- < **ǵ⁽ʰ⁾o-* provided in Kloekhorst (2010: 210) are probative.

The sequence **sh₂V-* gives PAnat. *shːa-* (cf. Hitt. *išḫai-ⁱ* 'to bind, wrap' < **sh₂-oi-*) while in **sh₁V-*, the laryngeal is simply lost (*ša-ⁱ* 'impress, seal' < **sh₁-oi-*). PIE **RHV-* gives PAnat. **R:V-* (*ārr-ⁱ* 'to wash' < **h₁órh₁-*, *ḫarra-ⁱ/ḫarr-* 'to grind, splinter up' < **h₂orh₃-*). At least orthographically, this **R:* merges with **R* word initially, cf. *mai-ⁱ* 'to grow' < **mh₂-oi-*.

2.2.1.2 **VHIC/*VIHC*

With *h_2 the regular outcomes are PIE *-*eh₂u-*, *-*eih₂-*, *-*euh₂-* > PAnat. *-*ah:u-*, *-*eh-*, *-*oh-*, cf. Hitt. *pahhur* 'fire' < **peh₂ur*, *lahhu-* 'container' < **leh₂u-*; *mēhur* 'period, time' < **meih₂-ur*; *sūhh-* /soH-/ 'flat roof' < **seuh₂-* and *-*oh₂u-* > *-*āhu-*, cf. *lāḫu-*^{i}. With other laryngeals, we get PIE *-*eHu-*, -*e/oiH-*, -*euH-* > PAnat. *-*eʔu-* (> Hitt. -*ū-*), -*eʔ-*, -*oʔ-* , cf. *karū* 'early' < **ǵʰreh₁u*; *hēus* 'rain' < **h₂eih₃-u-*, *sūus* 'full' < **seuh₁/₃-u-* (see Kloekhorst 2008: 96-97). The only difficulty might to be distinguish between *-*eh₁/₃u-* and *-*euh₁/₃-* which both seem to give Hitt. /ū/, it is likely the situation would be the same with IE *-*i-*, however I am aware of no examples.

2.2.1.3 **CIHC/*CHIC*

Evidence for laryngeal metathesis is limited. An important case is Hitt. *suhha-*^{i} / *suhh-* 'to scatter', which is used interchangeably with *ishuu̯ai-*^{i} / *ishui-* (Kloekhorst 2008: 773). The verbs must reflect **suh₂-* and **sh₂u-oi-* respectively. The absence of ablaut in the former verb suggests that the original strong stem was replaced. Most likely *suhha-*^{i} is a metathesized variant, which under my formulation could have arisen e.g. in the 1pl. and 2pl. forms **sh₂u-ue-*, **sh₂u-te-* and in the 3sg. preterite **sh₂u-s*. Unfortunately, none of these forms are actually attested. Melchert (2011: 129) sees a parallel example in Hitt. *lāhu-*^{i} 'to pour', CLuw. *lā(h)u-* < **loh₂/₃-u-* 'to wash' and CLuw. *lūu̯a-* 'to pour' < **luh₂/₃-*.[9]

The spelling of the verb *kǐnu-*^{zi}, *ginu-*^{zi} 'to open, break open' (2010: 216) points to /kʔīnu-/, i.e. **ǵʰh₂i-nu-* without metathesis. However, the verb is most likely a recent *nu*-causative of a more primary **kāi-*^{i} / *ki-* (like *huinu-*^{zi} < *huu̯ai-*^{l} / *hui-*, *zinu-*^{zi} < *zai-*^{i} / *zi-*). It is conceivable that the phoneme /kʔ/ was generalized in forms where metathesis did not occur, e.g. 3sg. **ǵʰh₂oi-ei*, as consonantal alternations are generally not permitted in Hittite. The plene spelling in several of the oldest attestations – 3sg.imp.act. *ki-i-nu-ud-du* (OH/MS), 3sg.pres.act. *ki-i-nu-z[i]* (MS), part. *ki-i-nu-an-t-* (MS) – could rather point to a phonetically long vowel which must have arisen by metathesis.

Kloekhorst (2010: 64) shows that Hittite exhibited a lowering of */u/ > */o/ in the vicinity of *-*H-*. Thus *lu-u-ri-* /lóri-/ 'disgrace' might reflect **luh₁-ri-* alongside *lu-ú-ri-* > *leh₁u-ri-* (ibid.: 75); similarly. A further potential example of metathesis is the broken attestation *[t]i*^{ʔ}*-i̯-iš-te-ni* (OS) 2pl.pres.act 'to put' < **dʰh₁-i-ste-*.

The best counter evidence is after *s-: *ishiman-* 'string, line, cord, rope', *ishiske/a-* impf. 'to bind, wrap', which clearly show **sh₂iC-*. Since the key example of metathesis (namely *suhha-*^{i} / *suhh-*) also has initial **s-*, we cannot argue for a phonetic explanation. We must assume analogy to the verb *ishai-*^{i} / *ishi-* 'to bind'. Additionally, Kloekhorst (2010: 797) assumes that "a laryngeal metathesis has taken place" in the two homonymous verbs, *suu̯e/a-*^{zi} 'to fill' and *suu̯e/a-*^{zi} 'to push away' because a reconstruction **suH-ie/o-* would be in conflict with his rule **VHiV* > *ViV* (in *huu̯anzi* 3pl. 'to run' **h₂uh₁-i-enti*). However, his metathesis **suH-* > **sHu-* is completely unmotivated and the opposite development from what we observe elsewhere. We might assume that both of these formations postdate the loss of the laryngeal, or posit **sHu-ie-* and assume that metathesis did not take place before *-*i-*.

[9] I will leave aside the debate as to whether this root contained *h_2 or *h_3, see Melchert (2011), and footnote 44, below.

To summarize, it appears that laryngeal metathesis did occur in Anatolian, but analogical developments have obscured much of the evidence.

2.2.2. Balto-Slavic

2.2.2.1 **CHV*

We only find distinct reflexes in the velar series, namely in Slavic **x*, which can reflect PIE **ḱH-*. The key example is ORu. *soxa* 'wooden plough', cf. Skt. *śā́khā* 'branch'. Probable examples include Ru. *xápat'*, Sln. *hâpati* 'seize', cf. Lat. *capiō* (REW: III 230)[10] and Ru. dial. *xájat'*, SCr. *hȁjati* 'to care' < **ḱ(e)h₂-*, cf. Skt. *kā-* 'to desire, like' (Pronk 2013: 299, against Bičovský 2008: 17). OCS *sěrъ*, Cz *šěrý* 'grey' could be borrowed from Germanic, cf. ON *hárr* 'id.', but could reflect **ḱh₁oi-ro-* (Lubotsky 1989: 56). This is particularly attractive in view of the potential connection with Lith. *šývas* 3 'light grey' < **ḱih₁-uo-*. The corresponding reflex in Baltic is *k*, cf. Lith. *šakà* 'branch'. In my view, the phoneme **k*^{h} > **x* only need be supposed for Pre-Proto-Slavic. I do not see any necessity in projecting a phoneme **k*^{h} back to PBS.

2.2.2.2 **VIHC/*VHIC*

The difference between **VIHC* and **VHIC* has sparked much debate. Illič-Svityč (1963: 80f) concluded that the Balto-Slavic retraction of the stress onto an acute syllable, which resulted in fixed radical stress (Hirt's law) did not operate if the laryngeal was preceded by the second element of a diphthong (as in **VIHC*), cf. Lv. *tiêvs* < **tenh₂-uó-*, cf. Gr. ταναός, where the Lv. broken tone points to an originally unstressed acute. Examples of Hirt's law are Lv. *ilgs* 'long', cf. Skt. *dīrghá-* < *dlh₁g*^{h}*-ó-*, Lith. *dúona* 1 'bread, corn, grain', Lv. *duõna* 'slice of bread' < **doH-neh₂-*. This has important consequences for the PIE reconstruction of certain words, e.g. Lith. *káulas* 1, Lv. *kaũls* 'bone, stem', cf. Gr. καυλός 'stem, pole', must be reconstructed **keh₂u-ló-* in Balto-Slavic.

2.2.2.3 **CIHC/*CHIC*

Kortlandt (1975: 3-4) argues that Hirt's law did not apply in the sequence **CHIC-*. However, this would be incompatible with the theory of laryngeal metathesis, where **CHIC-* would have already merged into **CIHC-* in PIE. Therefore, Lubotsky 2011 suggests that the laryngeal metathesis was reversed in Proto-Balto-Slavic. This indeed appears to be the case: roots for which we find only zero-grade forms always show reflexes of **CIHC*: Slav. SCr, *dȉm*, Lith. *dū́mai,* Lv. *dũmi* 'smoke', cf. Skt. *dhūmá-*, SCr. *lȉko* 'bast', *mȉš* 'mouse', *pȉr* 'spelt', cf. Lith. *pū́ras,* Lv. *pũrs* 'corn measure', Gk. πῡρός 'wheat', SCr. *žȉla*, Lith. *gýsla* 1, Lv. *dzîsla* 'vein'[11]. Note particularly SCr. *nȉt*, Lith. *nýtis*, Lv. *nĩtis* 'thread', Lv. *grũts* 'heavy', SCr. *šȉti,* Ru. *šíla*, Lith. *siū́ti*, Lv. *sũt* 'to sew', which must represent metathesized forms of the roots in Gr. νέω 'to spin', Skt. *gurú-* Hitt. *išḫai-*^{i} 'to bind' (for the latter reconstruction, see Lubotsky 2011: 109f), a fact Kortlandt does not account for. Ru. *kivát'* 'to nod' must be seen as an extended zero-grade intensive to **kъv-* < **kuh₁-*, and cannot reflect **kh₁u-*, pace Derksen (2008: 267).

It appears to me that *nýtis*, *siū́ti,* Lv. *grũts* are best analysed as archaisms, thus we may envisage the following scenario: (1) the sequences **CIHC* and **CHIC* first merge into PBS **CIʔC*,

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[10] Slavic should represent an extended-grade **kh₂ēp-*, cf. the full-grade in ORu. *xopiti*, Cz. *chopiti* 'strike'. Derksen (2008: 202) does not mention this etymology, preferring to see it as an onomatopoeic variant of **gabati* (Bel. *habáć*, Cz. *habati* 'seize').

[11] Broken tone by secondary association with *dzît* 'to heal'?

(2) at a certain stage (prior to Hirt's law), PBS no longer tolerates such root alternations, therefore **buʔ-tei, *pluʔ-tei, *giʔ-tei, *piʔ-tei, *uiʔ-tei* are replaced by *bʔu-tei, pʔi-tei* etc. on the analogy to the full-grades **baʔui-, *ploʔu-, *gʔoi-, *pʔoi-, *uʔei-*, cf. Ru. *bávit', plávat'*, SCr. *gòjiti*, *pòjiti*, Lith. 3sg. *vẽja*, (3) Hirt's law takes place, leaving restored *bylá*, *plylá*, *žilá*, *pilá*, *vilá* exempt.

Both for my point (2), and also for Kortlandt's original theory to be correct, we should not expect to find any metatheses of laryngeals synchronically in Balto-Slavic. In view of this, I would like to make the following modifications to the reconstructions provided in Derksen 2008 and 2015:

(a) Slav. **kvâsъ* 'fermented drink' in view of **kỳsati* 'turn sour', Lv. *kûsât* 'boil'[12] < **kuʔs-*, should be reconstructed **kuaʔas*, as **kuʔās-* would yield OCS ⁺*kъvasъ*. (b) SCr. *zìjati, zjàti* 'yawn, shout' must reflect **źiʔ-aʔ-* and not **źʔ-iaʔ-* which should have given PSlav. ⁺*žàti*.[13] Lith. *žióti* 'gape' (not *žijóti*) must reflect a full-grade **źiaʔ-*. Ru. *zev* 'snout' must point to **źáiʔ-uo-* with schwebeablaut, while SCr. *zìnǫti* 'gape, yawn' points to **źiʔ-*. It would appear that inherited **źiʔ-* innovated different full-grades in Baltic and Slavic independently. (c) Slav. *sijàti* 'shine' suggests **śiʔ-aʔ-*, Lv. *seja*, *seĩja* 'face' cannot reflect **śeʔia* (> ⁺*sēja*), but points to **śeiʔ-(i)aʔ-*. Therefore SCr. *sjȅn* 'shadow' must go back to a barytone **śóiʔ-no-*, or have been influenced by **těnь* 'id.'. (d) In view of the numerous forms pointing to **ʔi* (Ru. *glína, glíva*, SCr. *glísta*, Lith. *gléinė*, *gléivės*), Slav. **glьjь* 'clay, loam' (Ru. dial. *glej*, SCr. *glêj*) must be formed after **klьjь* 'glue'. It cannot reflect IE **glh₁i-o-* directly, as this would give PBS ⁺*gilʔio-*, Ru. ⁺*žol'*. (e) It appears that original **-ejǫ* (< **-eiH-ōm*) in the present of several verbs in Slavic was replaced by *-ějǫ*, cf. OCS *lějǫ*, *smějǫ*, *zějǫ* to *lijati*, *smijati*, *zijati*, but Lv. *leju*, *smeju*; perhaps by analogy with e.g. *sějǫ*, *dějǫ.* I do not believe that these are old.

A small number of forms still present problems: the acute of SCr. *žȉto* 'corn, wheat', OPr. *geits* 'bread' seems to require **geiʔ-to-*, which does not match the **gʔi-* in Ru. *žilá* 'lived'. I think it is quite possible that the word for 'grain' was not associated with the word for 'live' already in PBS. Slav. **sъlnьce* 'sun', with non-acute diphthong, must be the result of levelling: the laryngeal was probably lost early in obl. **sʔuen-*. Slavic generalized **su-* in the strong cases resulting in **sul-*. In Lith. *žąsìs* < **ǵʰeh₂-ns-* as opposed to Slav. **gǫ̑sь* 'goose' < **ǵʰh₂-ens-* (Kortlandt 2013: 14), the accentuation of the weak cases must have spread to the strong ones. SCr. *krâj*, gen.sg. *krȁja* 'end, edge' is difficult to reconcile with *krȍjiti* 'to cut', Lv. *krijât* 'to skin' which point to **kr(o)iʔ-*. Apparently, **kraʔi-* is an archaism which had lost its association with the verb **kriʔ-* in Proto-Balto-Slavic.

To conclude, *siū́ti*, *nýtis,* Lv. *grũts* and Slav. **zijàti* represent metathesized roots from IE **sh₂iu-*, **nh₁i-*, **gʷrh₂-u-* and **ǵʰh₂i-* respectively. I therefore conclude that metathesis of laryngeals indeed did occur in Balto-Slavic, but its effects were reversed wherever a model was available. Since this rule appears to work with remarkable consistency, I do not think Rasmussen's idea (1985) of an analogical spread of mobility has much merit.

2.2.3 Indo-Iranian

2.2.3.1 **CHV*

[12] An intensive formation with broken tone.
[13] Via ⁺*zjàti*, compare Ru. *ževat', žúju,* Bulg. *žuna* 'lip' = Lith. *žiaúna* 'jaw' < **ǵieuH-*.

Indo-Iranian provides the key source of evidence for post-consonantal laryngeals. We find aspiration of PIE *tenuae* at least after **h₁* and **h₂*, cf. YAv. nom.sg. *paṇtå̊-*, abl.sg. *paϑō* < **pnt-H-és* 'path', *tíṣṭhati* 'to stand' < **sti-sth₂-*, 2pl. athematic primary ending Skt. *-tha*, Gr. -τε < **-th₁e*, Skt. *sákhi-*, YAv. *haxi-* 'companion' < **sokʷ-H-oi-*.[14] See further Mayrhofer (2005: 110). There seems to be no foundation to the widespread idea that only **h₂* can aspirate (cf. Beekes 1988: 87f, Rasmussen 1999: 490-504). A potential example for **h₃* is *phéna-* 'foam', where the *o*-vocalism in Lat. *spūma*, Nw. *feime*, OCS *pěna* might point to **h₃*.[15] This matter is complicated, however, by *píbati* < **pi-ph₃-* 'to drink', which seems to imply that **h₃* had a voicing effect. Lubotsky (2011: 115) argues instead that the word for 'foam' belongs with **speh₁-* 'to be full to the brim'.

There is some limited evidence for a similar effect on PIE *mediae* in Skt. *duhitar-* 'daughter' ~ θυγάτηρ 'daughter', *mah-* 'great' ~ μέγα and *sádhiṣ-* 'seat, abode' < **sed-h₁-s-*, cf. Lat. *sēdēs* 'id.'. A counter-example is *vadⁱ-* 'speak, talk' = Gr. αὐδάω < **h₂uedH-*, where the absence of aspiration is difficult to explain (so **h₃*?).

Kümmel (2012) observed a distribution between the root variants *maz-* and *mas-* 'big' in YAv.: *-s-* is only found in positions immediately preceding a laryngeal (e.g. gen.sg. *masō* < **meǵ-h₂-és*), while *-z-* is found elsewhere (e.g. nom.sg. *maza*; comp. *maziiah-*). The same distribution can be observed in e.g. *daδąmi* < **dʰe-dʰeh₁-mi* and ptc. *daθat-* < *dʰe-dʰh₁-ent-*. He concludes that a laryngeal had a devoicing effect in Iranian.

Other examples include YAv. *vaēθă̊* 'I know' < **uoid-h₂e*, alongside *vaēδ-*, and relevant to the present study: Kurd. *tʰī*, Osset. *tiw / tew*, Pashto *lewár* 'husband's brother' < **θai-uar-* and Sogd. *θw-*, Khot. *thū-*, Khwar. *θw-* 'to burn' **θau-* as against Skt. *devár-* and *dav-*. Kümmel (idem) argues for a morphological conditioning, with the rule only affecting restored **H* at morpheme boundaries. More probably, a post-consonantal laryngeal was lost in the zero-grade of ablauting paradigms, and subsequently restored after the oblique cases.

2.2.3.2 **VIHC/*VHIC*

Lubotsky (1995) showed that the laryngeal was lost in **-VHI-* already in PIIr., with the hiatus only restored at morpheme boundaries. The reflex of **VIHC* is only distinct with **u*, viz. **euHC* > *aviC*, cf. *pavītár-* 'purificator' < **peuH-tor-*, *asāvīt* 3sg.aor.act. 'to impel' < *h₁e-seuH-t*, but **eHuC* > *oC*, cf. *óhate* < **h₁e-h₁ug⁽ʷ⁾ʰ-*.

2.2.3.3 **CIHC/*CHIC*

The two sequences merge in **CĪC*, e.g. Skt. *īṣa-* = Hitt. *hissa-* 'carriage pole' < **h₂ih₁-so-*, Skt. *pā-* < **peh₃-* 'to drink', ptc. *pītá-* < **ph₃i-tó-*.

Lubotsky (1988: 50ff, 1992) demonstrates the tendency for Indo-Iranian *i-* and *u*-stems to become oxytone if a laryngeal follows the vowel in the root. Among the few exceptions, we find *dhű-ti-*, *bhű-mi-*, *bhű-ri-*, *sé-tu-*. After excluding *dhű-ti* as unreliable, Lubotsky concludes that the other words were not subject to this rule as their laryngeal preceded the vowel, viz. **bʰh₂u-*, **sh₂ei-*. However, we find oxytonesis in *bhū-tí*, as well as *pī-tí-*, *jī-rí-* < **ph₃i-*, **gʷh₃i-*. Thus, the evidence for a distinction between **CIHC* and **CHIC* is limited to two forms, *bhűmi-* and *bhűri-*.

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[14] cf. also Lat. *socius*. This IIr. word might be a derivative of the adverb seen in *sácā* 'also; at hand, together with', *hacā* 'from, out', where the palatalization implies **h₁*.

[15] If the word is indeed an *mn*-stem, as proposed by Matasović (2004: 126), we should expect *e*-grade.

Particularly the former, which is matched by Av. *būmī-* 'earth', must be old. Analogy looks to be "out of the question" (Lubotsky 1992: 268), however one might suppose earlier **bhómi-* < **b^{h}h$_2$éu-mi-* was replaced by *bhū́mi-* in line with the prevailing zero-grade attested in the verb and derivatives.

2.2.4 Greek

2.2.4.1 **CHV*

Any discussion of laryngeal aspiration in Greek must start with the form οἶσθα, 2sg. 'to know', whose ending matches Skt. *véttha*, Hitt. 2sg.pret. *-tta*. To me, the most plausible explanation goes back to Cowgill (1965: 171-173), who analyses the suffix as **-sta*, and assumes that the aspirate was generalized from stems in **-C* (but not **d*, **t*, where we would not find aspiration), as in ἐφθός from ἔψω + -τός. Problematic, however, is that none of the potential sources of this analogical spread he proposes are actually attested. Thus, Gr. -θα remains difficult to account for convincingly (Beekes 1969: 181, de Decker 2011).

There are very few other cases of laryngeal aspiration. In most of the words where we would expect it etymologically, it is absent, cf. πλατύς, Skt. *pṛ́thú-*; πάτος, Skt. *pathás*; μέγα, Skt. *mah-*; θυγάτηρ, Skt. *duhitā́-*.

Other connections are highly uncertain. Either the distribution and semantic field imply we are dealing with likely loanwords, e.g. κόγχη 'mussel, cockle', which in view of variants κόχλος, κάχληξ can only be connected to Skt. *śaṅkhá-* 'mussel' as a *Wanderwort* (see Beekes 2010: 728); similarly, πτόρθος, πόρθος 'sprout, shoot, branch' and Arm. *ort^{c}* 'vine' (cf. Martirosyan 2013: 115). Several words can be accounted for by Siebs' law (Siebs 1904), e.g. σφάλλω 'bring down, ruin' < **sg^{wh}l-ie/o-*, cf. Skt. *skhálate* 'stumble, stammer', Arm. *šelim* 'go astray', σθένος 'strength, power' < **sg^{wh}-én-o-*, cf. Skt. *saghnóti* 'to be a match for' (cf. Beekes 2010: 1325).[16] Other etymologies bring up additional phonetic issues, e.g. the comparison of καθαρός 'clean, spotless' with *śithirá-* 'loose, unrestrained', aside from not being semantically obvious, requires the dissimilatory loss of **r* in both branches.

Two examples are phonetically and semantically plausible: ἀσκηθής 'unscathed', if < **n-skeh$_1$t-h$_2$-ēs*, cf. Go. *skaþis* 'damage', but also note OIr. *scís* 'tiredness' < **skeh$_1$t-tu-*, which if related cannot derive from a form with laryngeal (Rasmussen 1989b: 154). Second, σχάζω 'tear open, let flow, release' might be connected to Skt. *chyati* 'cut open, skin'. We can also adduce σχίζω 'to split' (Lat. *scindō*, Skt. *chinátti*), which shows σχ- from **sk-*. Here, I again would not exclude an anlaut **sg^{h}-*.

In conclusion, the only good example of laryngeal aspiration is the perfect ending –(σ)θα, which has to be explained otherwise.

2.2.4.2 **VIHC/*VHIC*

[16] Despite Lubotsky (1995), who showed that Skt. knew no distinction between **sḰ-* and **sK-*, we cannot *a priori* assume that **sK^{w}-* also merged with these sequences. Woodhouse (2014) argued that the rarity of the sequence **sK^{w}-* in IE is exactly what we should expect statistically, taking into account the overall rarity of labiovelars when compared to palatovelars. Besides, such a sequence is found in Gr. πρέσβυς/Cret. πρεῖγυς < **preis-g^{w}h$_2$(e)u-* and Skt. *uccā́* < **ud-s-k^{w}e-h$_1$*.

In **VHIC*, the laryngeal is lost, colouring the vowel, e.g. ποιμήν 'shepherd' < **poh₂i-men-*, cf. Skt. *pāyú-* 'guard, protector', ναῦς 'ship' < **neh₂u-* cf. acc.sg. νῆα (see Beekes 1969: 173). Beekes (2010: 232) states that the circumflex in βοῦς points to a lost laryngeal, however Olander (2007: 5) would rather see the circumflex as regular in monosyllables with a single consonant in auslaut (note also σκῶρ, μῦς, where no laryngeal was present), however his explanation of Ζεύς < **diēus* as analogical after the βασιλεύς type and of θήρ as analogical after nouns in –(τ)ήρ both leave something to be desired. Therefore, I would rather side with Beekes in assuming that the circumflex represents a lost laryngeal.[17] Lubotsky (1988: 123) suggests that a pre-form **t(u)eh₂us* could have been rendered as disyllabic ταΰς, however Beekes (1010: 1456) states that the "disyllabic pronunciation [of this form] is far from certain".

For **VIHC*, the question is whether the laryngeal was vocalized. Where **I* = **u*, this seems quite likely on the basis of examples such as Myc. *re-wo-te-re-jo* /lewotreios/, 'epithet of bathtubs', and metathesized Hom. λοετρόν < **leuh₃-tro-*, and κρέας 'meat' = Skt. *kravíṣ* 'raw flesh' < **kreuh₂s*. For **i* the situation is much less clear. Kortlandt (1992: 237) and van Beek (2011: 134) raise the example of 3sg. thematic optative -οι < **-o-ih₁-t*. The form is scanned disyllabic, so Kortlandt (l.c.), proposes that the vocalized laryngeal assimilated to the preceding **i.* This explanation is *ad hoc*, but it is difficult to justify metathesis (> **-o-h₁i-t*) in a thematic form, thus I have no alternative. A counter-example might be δεάτο 'seemed' < **deiH₂-to*, which Kortlandt dismisses as secondary (cf. van Beek l.c.). Therefore, we can only be sure that **VIHC* was regularly reflected in Greek as **VIHC* where **I* = **u*.

2.2.4.3 **CIHC/*CHIC*

On the basis of Gr. φυτός, φύσις, φυτήρ, against φῦμα, φῦλή, φῦσί- (all < **bʰh₂u-* 'to become'), Schrijver (1991: 512-525) convincingly argued that the vowels going back to **CHIC* remained short in pretonic position, but metathesized in stressed position, thus confirming the hypothesis originally put forward by Kortlandt (1975: 76). He observed a parallel pattern in λύω (λυτός, λῡσί-) and ειλύω (ἄλυσις, ἔλῡμα), which he reconstructs as **lHu-* and *uelH-u-*, respectively. We must note however, that the present tense of these forms can only reflect a metathesised root: φύομαι < **bʰuh₂-e/o-*, as opposed to ⁺φάομαι. Schrijver (l.c.) states that present has been restructured after the aorist φῦναι, (cf. also Beekes 2010: 1597). We may then ask ourselves whether the nominal derivatives might also reflect a 'restructured' ablaut.

Indeed synchronically, we find similar patterns in verbs containing no laryngeal, e.g. δύω : δῦμα : δύσις : ἐν-δυτήρ (< **deu-*[18]), and in roots with final laryngeal, θύω : θῦμα : θυτήρ (< **dʰeuh₂-*, cf. Hitt. *tuḫḫae-*), τρύω : τρῦμα : τρῦσις : τρυσί- (< **treuH-*, cf. OCS *tryti*, SCr. *tròvati*). Further, we find preservation of a long vowel in archaic formations like ῥῡ-τήρ 'rein, rope', which can hardly be analogical after pres. ἐρύω. None of the Greek formations are certainly old: φῦμα 'growth, tumour, swelling' is not attested in Homer and semantically too distant from Skt. *bhū́man-* 'earth, world, being' to warrant a direct comparison; Gr. φύσις 'growth, character, being',

[17] The word for 'cow' is almost universally reconstructed without a laryngeal, however **gʷēh₃us*, acc.sg. **gʷh₃ēum*, gen.sg. **gʷh₃(e)ués* accounts not only for the Greek circumflex, but also for the absence of Brugmann's law in Sanskrit (Lubotsky 1990: 133-134).

[18] This etymology is quite possibly incorrect. Beekes (2010: s.v.) connects δείελος 'of the evening'. Skt. *upādútya-* probably rather belongs with *dav-* 'to kindle, burn' (Mayrhofer EWA I: 707).

Skt. *bhū́ti-*, *bhūtí-* 'being' are productive deverbal formations, and need not be old. Finally, φυτήρ, φυτόν, φυτός and φῦλή were almost certainly inner-Greek formations.

What is the origin of this quantitative ablaut? It seems rather obvious that it simply follows the pattern of roots with **CeHC-/*CHC-* ablaut, cf. ἀρόω : ἄρωμα : ἄροσις; βῆμα : βάσις : βατός; σχέσις : σχῆμα, etc.

Another key argument is πῦρ, gen.sg. πυρός. Yet there is again a likely source of analogy, namely the model of ὗς, ὑός 'swine' (cf. Simms 2009: 304 who argues that the genitive is old), μῦς, μυός 'mouse', and possibly πούς, ποδός 'foot', compare the equally secondary δρῦς, δρυός 'tree, oak'. Even Beekes (2010: 1260), who in principle accepts the hypothesis of pretonic shortening, believes the quantitative ablaut in πῦρ to be secondary.

Next, σκῦτος, κύτος, ἔγκυτί: with Schrijver (1991: 239) and de Vaan (2008: 154), we can probably distinguish two separate roots, **skuHt-* 'skin' (whence σκῦτος 'leather') and **kut-* 'bag, scrotum'. There is no semantic necessity, but it is otherwise phonetically difficult to account for the short reflex in Lith. *kutỹs* 'purse'. We can probably further connect W *cwd* 'bag, scrotum', OHG *hōdo*, OFr. *hōtha* 'testicle' (< **kout-*, see Kroonen 2013: 217), Lat. *cunnus* 'vagina', Gr. κύτος 'rounding, vault, vessel, body', κυσός 'vagina, buttocks, bladder'. Gr. ἔγκυτί · παρὰ τὸ κύτος[19] 'close to the body' is certainly derived from κύτος.

This leaves the derivatives of **sh₂i-men-* (cf. Hitt. *išḫiman-*, ON *sími* 'rope'): Here we find short ἰμάς, -άντος 'leather strap; thong; beam' (also attested long in Homer), ἰμαῖος 'song while scooping water' but long ἰμονιά 'well-rope' (Beekes 2010: 589; Schrijver 1991: 519). Zair (2012: 130) dismisses this example as too unclear. By way of an explanation, we may note that the meanings of the words with a short vowel tend to diverge rather dramatically (cf. also the almost unique suffix -άντ-)[20], so we might imagine a substrate word was secondarily confused with inherited ἰμον-, although this explanation is not particularly satisfactory.

In conclusion, the evidence for pretonic shortening in Greek rests on ἰμάς, ἰμαῖος alone. All other examples are the result of productive analogical patterns.

2.2.5 Italic

2.2.5.1 **CHV*

Schrijver (1991: 270) offers two likely examples: *laevus* 'left' (cf. Gr. λαιός) and *spūma* 'foam' (cf. Skt. *phéna*, with aspiration). The position of the laryngeal cannot be confirmed with the Italic data.

One trace might be found in *lacrima* 'tear', *lautia* 'state reception' vel sim., *lēvir* (also *laevir*) 'husband's brother' if these reflect **dh₂eḱ-ru-* (cf. Gr. δάκρυ), **dh₃-eu-* (Skt. *dúvas* 'gift, homage') and **dh₂ei-uer* (see §2.1.3.1). Traces of these words with *d-* (*dacrima* in Andronicus *Odyss.* frag. 19.1, *dacrima* and *dautia* in Paul. *ex Festo*) may be hypercorrections after Gr. δάκρῦμα (Hdt., Aesch.), Lat. *dāre*. This phonetic explanation is slightly preferable to inter-dialectal

[19] As glossed in *Etymologicum Gudianum*. It is generally used in conjunction with the verb κείρω 'to cut the hair', e.g. ἐγκυτὶ κεκαρμένος 'close shaven'.
[20] Also in ἀνδριάς, -άντος 'statue'.

borrowing, of which there is no evidence (cf. Weiss 2009: 475 fn. 59). Note *lingua* 'tongue' for older *dingua* is clearly secondary after *lingō* 'to lick', and does not belong here.[21]

2.2.5.2 ***VIHC/*VHIC**

Again, important is evidence for a vocalic laryngeal in **VIHC-*. Schrijver (1991: 285-288) provides just two clear examples. The first is Lat. *cūdō* 'to strike, beat', which he derives via **keu̯ad^{h}o-* (< **keuH-d^h-*) to avoid the expected vocalism to ***caud-* and preserve the equation with Toch. *kaut-/kot-* 'to split'. He is then forced to explain Lat. *ūber*: since in view of *vacuus*, *iacere, vannus* (idem: 318-319)[22], he expects **HuHC- > *vaC-*, he must posit a full-grade form. He concludes that the 'udder' represents *o*-grade where the laryngeal was lost, which is an *ad hoc* solution. On balance, the old formation *ūber* carries more weight than *cūdō*, which may be recent: Latin **kuh$_2$-d-* and Toch. **keh$_2$u-d^h-* may continue different extensions (see de Vaan 2008: 161).

A much better example is *lavāre* 'to wash'. Here, Schrijver (1991: 397) reconstructs **lava-ē-*, consistent with Cowgill's (1973) interpretation of *stāre* < **sta-ē-*. He assumes that the disyllabic root **lava-* arose in pre-consonantal position, cf. the instrument noun *lābrum* 'basin' which must derive from **lava-ðro-* < **lo̯u̯h$_3$-d^{h}ro-*. This example seems fairly decisive in favour of vocalization. The dearth of evidence overall can be put down to the fact that the Latin syncope often causes the evidence for vocalization to be lost. We have found no examples for vocalization with **-i-*, so it is possible that only **-u-* triggered vocalization, as in Greek.

2.2.5.3 ***CIHC/*CHIC**

Schrijver (1991: 248) claims that pre-tonic shortening took place in constellations of **CHIC* but not in **CIHC*. The evidence for this rule is meagre, see the table below:

probably pre-tonic	**unclear**
vir 'man' < **uiH-ró-*	*puter* 'rotten' < **puH-tr-i-*
cutis 'skin' < **kuH-tí-*	*su-bulcus* 'swineherd' < **suH-*
futāre < **bh$_2$u-tó-*?	*lucrum* 'gain, profit' < **lh$_2$u-tlo-*
putus 'clean' < **ph$_2$u-tó-*	*culex* 'gnat' < **ḱuHl-ik-*

For the position of the laryngeal in **uiH-ró-* and **kuH-ti-*, cf. Lith. *výras* 1 and *kiáutas* 3, *kẽvalas* < **keuH-*. Lat. *putus*, *putāre* 'to prune' may be related to *paviō* 'to thump, pound', although it is semantically closer to *pūrus* 'clean'. Both etymologies presuppose a laryngeal. Lat. *fŭ-, sŭ- in futāre, futūrum* and *su-bulcus* may have been generalized from antevocalic position (thus de Vaan 2008: 239). Lat. *bŭ-bulcus* 'who ploughs the oxen' is probably analogical after *subulcus* (Schrijver 1991: 239). Finally, *culex* is of uncertain value due to its limitation to Italo-Celtic.[23]

The short reflexes in Lat. *vir*, *puter, futāre*, *cutis* match those of OIr. *fer*, *othar*, *buith,* W *cwd*. Other strong cases are *lucrum* and *putus*. However, numerous counter-examples are available: *vīvus* 'alive', *fūmus* 'smoke', *sūtum* ppp 'to sew' < **g^{w}h$_3$i-uó-, d^{h}uh$_2$-mó-, sh$_2$iu-tó-*, cf. Skt. *jivá-,*

[21] Lat. *oleō* 'to smell' beside *odor* 'smell' and *solium* 'seat' beside *sedeō* most likely also represent a separate development.

[22] The etymology of *vannus* is doubted on formal and semantic grounds by de Vaan (2008: 653). The initial laryngeal of *vacuus* is entirely dependent on Gr. ἐάω 'to let go, leave alone' (Nussbaum 1998: 73f), which is uncertain (εὖνις cannot be cognate, Beekes 2010: 481). Thus, the sound law rests on *iacere* alone.

[23] The connection with Skt. *śū́la-* 'spear' is uncertain.

dhūmá-, sūtá-.[24] In addition, we find several formations with long vowels where we would morphologically expect oxytonesis: *hīscō* 'to yawn', *invītus* 'reluctant', *pūrus* 'clean', *trītus*, *solūtus, rūtus*. While analogy can be invoked for *trītus* and *solūtus*, it is more difficult for the isolated *invītus*.

Kortlandt (1981) supposed that the short reflexes in Latin reflect cases where the laryngeal preceded the resonant. In reality, the examples and counter-examples both encompass several cases of *-*HI*- and of *-*IH*-. With the former we find *vīvus, hīscō*, *sūtum* but *pŭtus*, *lŭcrum*, while with the latter we have *fūmus*, *invītus*, *rūtus* but *vĭr, cŭtis, pŭter*. To account for *vĭr*, Schrijver (1991: 343) adapts an idea of Dybo (1961) that all long vowels underwent pre-tonic shortening in Italic before a resonant. To explain *pŭter*, Schrijver (1991: 236-237) proposes a law **RHTC*- > *-*RTC*-. As noted by Zair (2012: 131-132), the latter law could equally account for *lŭcrum*. Thus, the original pretonic shortening law only possibly accounts for *pŭtus*, which is hardly enough. I conclude that Kortlandt's proposal has not stood up to scrutiny.

Dybo's law still encounters exceptions. Although, *vīvus* might be analogical after *vīvō*, *fūmus* can hardly be analogical after much rarer *fūlīgō* (Zair 2012: 144, pace Schrijver 1991: 342). With non-high vowels, we have *ŭlna*, *sĕrēnus*, *fĕrus*. The IE word for 'elbow' is difficult. The long vowel in Gr. ὠλήν, Arm. *uln*, Lith. *úolektis*, Skt. *ā́rtnī-* and short vowel in Gr. ὀλέ-κρᾰνον, Arm. *oł*n, Lith. *alkū́nė*, Skt. *aratní-*, Lat. *ulna*, Go. *aleina*, OIr. *uilen* can hardly reflect anything except *Heh_3-l-* beside *Hh_3-el-* (Lubotsky 1990: 132).[25] The presence of a laryngeal in *serēnus* 'clear, unclouded', ξηρός 'dry, arid' is in conflict with the short vowel in ξερόν 'dry land'. The connection with OHG *serawēn* 'to dry out' is in any case best put on hold in view of the potential rule **Ks*- > PGm. **sk*- (see Kroonen 2013: 91).

Thus, the only certain example of shortening of a non-high vowel in Latin is *ferus* 'wild, savage'. An important case which is accounted for by Dybo's law in Italic is Umb. *pir* 'fire', abl.sg. *pure-to*. Here, the oblique cases, which attest a short vowel, must be attributed to pre-tonic shortening.

I make the following conclusions: Kortlandt's law of **CHICV́*- > **CĬCV́*- should be abandoned. Dybo's law has an important exception (*fūmus*) but accounts for three important cases of shortening: *vir, ferus,* Umb. *pure*. Schrijver's laryngeal deletion law explains *puter* and *lucrum*. I think that the problem of *fūmus* can be solved by limiting the application of Dybo's law in Italic to liquids (or perhaps just **r*).[26] Despite its morphology, *pūrus* was probably barytone, in view of the long vowel in OIr. *úr*. Neither law can account for *cŭtis* or *pŭtus*. I am therefore tempted to derive Lat. *cutis* 'skin' and MW *cwd* 'scrotum' from **kut*-, with no laryngeal.[27] I regard the origin of *putus* 'pure' as unclear.[28]

2.2.6 Celtic

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[24] Note that Lat. *vīrus* 'venom, poison' rather reflects **ueis-o*- in view of the short vowel in Skt. *viṣá-*,

[25] The *n*-stem attested in most branches is in each case secondary: cf. Go. *-ein-* < *-īn-* does not match Gr. -ήν, Skt. *-atní-*. The suffix *-*n*- was productive in body parts (cf. Pronk 2015).

[26] Under this formulation, we could also accept Dybo shortening in *serēnus, ulna,* and *culex*. For the latter two, such a possibility is perhaps worth pursuing.

[27] The Latin meaning 'skin' is difficult to derive from the root **kut*- 'leather bag', cf. §2.2.4.3 on Greek. Thus, we may have to reckon with the merger of original **(s)kuHt*- 'skin' and **kut*- into a single lexeme.

[28] Since the original meaning of Lat. *putō* is not 'to reckon', but 'to prune', I do not think we can seriously consider the old connection with OCS *pytati* 'examine, scrutinize', Cz. *ptáti se* 'ask, inquire' (IEW: 827).

2.2.6.1 **CHV*

No reflex of the laryngeal is found. Hamp's reconstruction (1972) of OIr. *aub*, MW *afon* 'river' with the 'Hoffman' suffix **h₂ep-h₃en-* is circular (**h₃* is reconstructed only to account for the Celt. **b*). Furthermore, the evidence for the 'Hoffman' suffix in Proto-Indo-European is essentially restricted to the word for 'young', **h₂iu-Hn-*, where the colour of the laryngeal is unclear (Pronk p.c.).

2.2.6.2 **VIHC/*VHIC*

As in other branches, there is debate as to whether the laryngeal should have vocalized in **VIHC*. The evidence is very clearly laid out in Zair (2012: 225-240). There are a couple of convincing examples of vocalization after **u*: OIr. *loathar* 'trough, vat, tub' < **leuh₃-tro-*, cf. Gr. λοετρόν, OIr. *cuär*, MW *cawr* 'giant, hero' < **ḱeuh₁-ro-*, cf. Skt. *śū́ra-* 'strong, powerful, heroic'. After **i* we only have root etymologies: OIr. *biáil* 'axe' OW *bahell* 'axe' < **bʰeiH-* 'to strike', MW *gwialen* 'rod, twig, withe' < **ueih₁-* 'to wind'.

Where we find a monosyllabic reflex, we cannot exclude a word-internal laryngeal by metathesis in e.g. OIr. *cían* 'long, enduring, far' < **kʷeih₁-/kʷeh₁i-*, MW *mwyn* 'tender, mild' < **meiH-/meHi-*, OIr. *dían* 'swift, rapid' < **deiH-/*deHi-*. A word internal laryngeal must, however, be excluded in MW *bwyt, bwyd* 'food, nourishment' < **gʷeih₃-to-*, cf. SCr. *žȉto* 'corn, wheat'[29] due to the absence of colouring by the laryngeal. Another interesting case is disyllabic OIr. *riäthor*, OW *réátir* 'torrent' < **h₃reiH-tro-* as against OIr. *rían* 'the Rhine; sea, ocean' < **h₃reiH-no-*. Here again **h₃reHi-* is not possible to exclude, but is made much less attractive by the co-occurrence of a different full-grade within Celtic.

Joseph (1980: 375) pleads that the laryngeal was regularly lost and supposes secondary suffixes **-ano-*, **-atro-*, etc. to account for the aberrant forms, this view seems to have been followed by Matasović (2009: e.g. 314). As an example, the suffix in *lo-athar* may be analogical after * *ar-athar* 'plough'. However, it is notable that we never find this particular suffix applied to roots without a final laryngeal. Zair (2012: 242) argues that the laryngeal was only lost before a single plosive, however he is forced to suppose an *ad hoc* additional rule to account for *dían*, *rían,* MW *mwyn*.

In view of the exceptional case in Slavic also (§2.2.2.3), I do wonder whether the similarity of IE **gʷeiH-to-* 'food' to the word for 'live' might not be coincidental. A reconstruction of **gʷeh₁i-* would much more easily account for the forms in both branches. All in all, it is difficult to decide whether the evidence points more towards vocalization or laryngeal loss in this environment.

2.2.6.3 **CIHC/*CHIC*

In view of counter-examples such as OIr. *lán*, W *llawn* 'full' < **plh₁nó-* (cf. Skt. *pūrṇá-*, Lith. *pìlnas*), OIr. *grán* 'grain' < **ǵrh₂-nó-* (Lat. *grānum*, Lith. *žìrnis*) and OIr. *gnáth* 'known' < **ǵnh₃-tó-*, I am not convinced that the law was operational in the case of resonants other than **i* and **u*. In my view, the examples given in favour of Dybo's law in these environments can be divided into the following groups: (1) neo-*aniṭ* forms which may have been extracted from nasal presents: OIr. *rath* 'virtue' ~ *ernaid* 'bestow', OIr. *mrath* 'deceit' ~ *marnaid* 'betray', OIr. *flaith* 'sovereignty' ~ OIr. *follnadar* 'to rule', OIr. *srath* 'valley' ~ *sernaid* 'broaden' (2) speculative etymologies: MW

[29] OIr. *biäd* 'food' might be from **gʷih₃-eto-* (Schrijver 1995: 246).

ffraeth 'fluent, lively' (compared to Gr. σφαραγέομαι 'crackle, hiss', Skt. *sphū́rjati* 'break up'), OIr. *glan* 'clean, bright' (Gr. χλωρός 'greenish'), OIr. *cladaid* 'to dig' (Lith. *kálti* 'to strike') and (3) roots which may not contain a laryngeal: OIr. *braigid* 'to fart' might be from **b*^{h}*reǵ-* 'to break' (LIV^{2}: 91, Lat. *frangō*, Go. *brikan*), rather than to Lat. *fragrō* 'to smell'. For OIr. *raith* 'fern', the Baltic forms may be metatonical.[30] Finally, I would not give too much mind to the short reflex **gnato-* attested in modern Welsh compounds (*yn-gnad* 'judge', *dir-nad* 'comprehension'), in view of the long reflex attested everywhere else, cf. MW *gnawt* 'known', W *gnaw* 'custom'.[31]

The table below shows the good examples and counterexamples of Dybo's law with the high vowels in cases where the vowel is morphologically likely to be in pre-tonic position (after Matasović 2012):

Short reflex	**Long reflex**
OIr. *béo*, MW *byw* 'alive' (Skt. *jīvá-*, Lith. *gývas*)	OIr. *ro-bíth* 'struck' to *benaid* 'strike'
OIr. *fer*, W *gwr* 'man' (Skt. *vīrá-*, Lith. *výras*)	OIr. *ro-críth* 'bought' to *crenaid* 'buy'
OIr. *buith* 'being' (Skt. *bhūtí-*)	
OIr. *othar* 'ill' (Lith. *pū́ti* 'to decay')	
OIr. *guth* 'voice' (Skt. *hū-* 'to call')	
OIr. *suth* 'offspring' (Skt. *sū́-* 'to give birth')	

On W *cwd* 'scrotum', see the discussion in §2.2.4.3. In reference to OIr. *ro-bíth, ro-críth*, Matasović (2012: 132-133) notes the *ā*-stem verbal noun OIr. *críth* 'buying', W *prid* 'price' and argues that the long vowel was generalized from a baritone collective formation **k*^{w}*rī́tā* formed to the participle **k*^{w}*rītó-*. The same is argued for *ro-bíth* (cf. OIr. *bíth* 'striking', W *bid* 'lopped hedge'). While these explanations are relatively weak, the positive evidence for Dybo's law, in my view, carries more weight than these words, which could have been formed at any time within Celtic. While in view of the probability of Italo-Celtic unity, it would be attractive to propose a variant of Dybo's law which encompasses both branches, this does not seem possible at this time.

2.2.7 Germanic

2.2.7.1 **CHV*

I am not aware of any proposed reflexes of the laryngeal in this position.

2.2.7.2 **CVHI/*CVIH*

Kroonen (2013: 22 after Mahlow 1879: 29-34) states that **-eh*$_{2/3}$*u-* and **-oHu-* give PGm. **-ō-* in open syllables, but **-au-* (with Osthoff's law) in closed syllables or word finally, cf. Go. *fon* 'fire' < **peh*$_2$*ur* **-eh*$_2$*u-*, *ON stórr* 'big' < **steh*$_2$*u-ro-*; but ON *naust* 'boathouse' < **neh*$_2$*u-sth*$_2$*-o-*, Go *ahtau* 'eight' < **h*$_3$*eḱt-eh*$_3$*u*. In other cases of **CVHI and *CVIH*, the laryngeal is simply lost, cf. Go. *flaiza,*

[30] Lith. *papártis* 1, Lv. *papar̂de*, alongside Lith. *papar̃tis* 2, *papartỹs* 3^{b}. It seems reasonable to presume that *papártis* replaces **papárdis*, similar to the Latvian form (and Cz. *kaprad'*, Slk. *paprad'*), and has its acute from Winter's law. A reconstruction without laryngeal would also be supported by the usual derivation from **pter-* 'wing feather', Gr. πτέρις. The origin of the *d*-variants remains enigmatic.

[31] I have no explanation for this phenomenon, but it is probably better explained within Welsh, rather than at a proto-Celtic level.

maiza 'more' < **ploh₁-is-on-*, **meh₂-is-on-*; Far. *deymur* 'strong smell' < **dʰouh₂-mo-*,[32] cf. Skt. *dhūmá-* 'smoke, vapour'.

Worthy of note here is the Germanic sound law (Austin 1946, Kortlandt 1988b: 356), which supposes **Hu̯* in post-sonorantal position became PGm. **kw* (per Kortlandt, the change was **ʔu̯* > **ʔkw*). The most convincing example of this is OE *tācur*, OHG *zeihhur* 'brother-in-law', which are clearly cognate with Skt. *devár-*, Gr. δᾱήρ, Arm. *taygr* 'id.', yet exhibit an unexpected **k*. We can propose that the origin of the **k* is in a zero-grade form, e.g. Asg.**dih₂-uér-m* > **tikweran,* whence it spread to the rest of the paradigm. Other clear examples include the dual oblique personal pronoun Go. *ugkis*, ON *okkr* < **n̥h₁u̯-e*, cf. Skt. *āv-ám* and ON *kvikr*, OE *cwicu* 'lively' from **gʷih₃-uó-*, cf. Lat. *vīvus*, Lith. *gývas* (pace Gąsiorowski 2007).[33]

2.2.7.2 ***CIHC/*CHIC**

Both sequences merge into **CĪC*. There is a lot of evidence for pretonic shortening of the high-vowels before resonants, exemplified by Go. *sunus* 'son', *wair* 'man', *qiwana* 'alive' < **suHnú-*, **uiHró-*, **gʷh₃i-uó-* (Schrijver 1991: 351-357). The evidence for the shortening of non-high vowels is much less conclusive: OE *delu* 'teat' can reflect **dʰh₁i-leh₂-*. On Go. *aleina* 'cubit, ell' and OHG *serawēn* 'to dry', see on Latin *ulna*, *serēnus*, above (§2.2.5.3). That the short vowel in ON, MoE *egg* is due to shortening is dependent on the derivation of 'egg' from 'bird', which is a hypothesis full of phonetic problems.[34] It appears this shortening only occurred after a resonant, cf. OE *hȳd* < **hūtí* 'skin, hide'.

2.2.8 Tocharian[35]

Lit. Winter 1965, Pinault 2008 *Chrestomathie tokharienne* (Entrance 5)

2.2.8.1 ***VHIC/*VIHC**

The laryngeal is vocalized in **VIHC*; compare To. *kau-* ~ *ko-* 'to kill' < **keh₂u-*, *ko* ~ *keᵤ** 'cow' < **gʷeh₃u-*, on the one hand and To. *ləwa-* 'send' < **leuh₁-*, *waya-* ~ *wā* 'lead' < **ueih₂-* on the other.

2.2.8.2 ***CVHI/*CVIH**

The reflex of **CIHC* in Tocharian has drawn a lot of attention from scholars (Winter 1965: 190, see Adams 1988: 31, Ringe 1996: 22). The *communis opinio* appears to be that **h₂* and **h₃* are vocalized to **a* (as with other resonants), while **h₁* is lost causing compensatory lengthening (as with vowels). The evidence for this dual reflex is rather strong, despite the number of examples being small: To. *swāre* ~ *swār* 'sweet' point to PTo. **swáro-* < IE **su̯h₂d-ro-*, to the root of Gr. ἡδύς, Skt. *svādú-* 'sweet'. The verb *śāw-* 'to live' probably reflects **gʷi̯h₃u-* as in Lat. *vivō*, Skt. *jī́vati*, etc.

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[32] Or *dʰh₂ou-mo-*.

[33] Gąsiorowski mentions two issues with the related verb (Skt. *jī́vati*, Lat. *vīvō*, OCS *živǫ*): baritone stress in a zero-grade syllable (only evident in Sanskrit) and the rarity of verbs derived directly from nominal stems.

[34] Not least the fact that we find no trace of **-u-* in YAv. *aēm*, SCr. *jáje*. The *-v-* in Lat. *ōvum* is a hiatus filler, while from **h₂ōu-iom* we should expect Lat. ***ōvium*. Besides the problem of *o*-grade, *vr̥ddhi* derivatives are an inner-Indo-Iranain phenomenon (Beekes & de Vaan 2011: 182). All in all, the data call for a reconstruction **Hōiom*. Perhaps this is a thematicization of a root noun nom-acc.sg. **Hōi*, gen.sg. *Hoi-és*?

[35] Notation: I will write Tocharian lexemes as B ~ A. Where only one form is listed, this means that the word is identical in the two languages. Words only attested in one language are marked ToA or ToB.

For *h_1 the best examples are To. *ikäṃ* ~ *wiki* 'twenty' < PTo. *wīkən* < *$h_1$ui h_1ḱmt[36] and the optative suffix ToAB *-i-* (with palatalization).

A note on the word for 'fire'

To. *pūwar* ~ *por* 'fire' was a key word in opening the discussion of laryngeal metathesis. Winter (1965: 190) derived the word from the zero-grade **puh₂r-* which contrasts with **peh₂ur* found in e.g. Hitt. *pahhur*. In my view, this reconstruction is untenable. ToB *pūwar* clearly points to phonological |pə́war|, with the *-ū-* representing a stressed schwa in this position. I do not believe it can simply be epenthetic.[37] Adams (2013: 421) attempts a derivation from a collective stem, following Schindler's view of *r/n* stems (1974: 10). However, his options, namely **puh₂ōr* or **peuh₂ōr*, both extracted from the metathesized zero-grade, can probably not give the attested ToB form, either. The evidence for PIE **ō/*oH* > PTo. **a* is very limited. It appears that in a final syllable at least, **-ō* gave **-u* > Ø in *okt* ~ *okät* < **h₃eḱteh₃* 'eight' or *-u* /əw/ (perhaps only after **w*), cf. *ku* 'dog' < *ḱuōn*, *wu* 'two' < **duō*, *(w)u* pf. participle **-uōs*.[38] Therefore I would expect **p(e)uh₂ōr* to give PTo. **(pʲ)ə(w)əwr*, perhaps > ToA *por*, but hardly *pūwar*.

I think Adams (l.c.) is correct in assuming that the ToA and ToB forms cannot reflect a single preform. However, I think that his reliance on the purported collective stem is misguided. Go. *fon* is frequently also derived from the collective (cf. Schindler 1974), but is better derived from **peh₂ur* = Hitt. *pahhur* (see Kroonen 2013: xxv). Likewise, there is also no reason to derive To. *yasar* ~ *ysār* from **h₁esh₂-ōr* instead of **h₁esh₂-r* = Hitt. *ēshar*.[39] Thus there is no evidence for extended-grade collective forms except in the word for 'water' (Hitt. *uidār*, Gr. ὕδωρ). For the 'fire' word, we most likely have to depart from a NAsg. **peh₂ur*, obl. **puh₂n-* > PTo. **paur*, obl. **pwar* (with elimination of heteroclisy). This opaque ablaut led to different levellings: ToA generalized the nominative-accusative stem, while ToB might have generalized the weak stem, later creating a new strong stem |pə́war| to |pwár-|, as |yə́sar| 'blood' to |ysár-|. Whatever the details, the ToB word must represent a metathesized form.

2.2.9 Armenian

2.2.9.1 *CHV

Various phenomena have been suggested to show laryngeal aspiration in Armenian: (1) cases where **t* avoids lenition after a resonant, as in Arm. *yaɫtʿ* 'wide, large, broad' < **i-falt^{h}u-* < **plth₂-u-*, cf. Skt. *prthú-* 'id.', and more doubtfully *ortʿ* 'calf' < **fort^{h}u-* < **port-h₂-u-*, cf. Gr. πόρις, πόρταξ f. 'calf, heifer'; (2) cases where **t* is lost after **n*, as in *-sun*, in e.g. *ere-sun* 'thirty' < **-sunt^h* < **-h₁ḱomt-h₂*, cf. Gr. -κοντα, Lat. *-ginta*, *hun* 'ford' < **funt^h-* < **pont-H-*; (3) cases of *x* < **kH-*, mainly *cʿax* 'branch, twig', dial. *cʿakʿ*, cf. Skt. *śā́khā-* 'id.', ORu. *soxa* 'wooden plough', also *xacanem* 'bite, sting', cf. Skt. *khād-* 'chew, bite'.

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[36] This word is problematic in every branch where it is attested, but the analysis as from < **dui dḱmt-* is probably correct, which means the second laryngeal can be identified as **h₁* (see Kortlandt 1983: 98). I prefer to assume univerbation post PIE in view of the short reflex of OIr. *fiche,* etc.

[37] Despite Pronk (2009: 88): *pūwar* differs from all the other cases of sporadic epenthesis in ToB. First, the proposed epenthetic vowel is stressed. Second, the epenthesis is within the root, not on a morpheme boundary.

[38] M. Peyrot (p.c.) informs me that *tāno* 'grain' might be a borrowing from Iranian.

[39] In fact, judging by the 'water' collective **ud-ōr*, we would expect root zero-grade **h₁sh₂-ōr* > ToB ***sār*. This makes the reconstruction of a collective for To. 'blood' even less attractive.

In some environments, it is possible that we see *kH > $c^{\text{ʿ}}$, however, cf. Arm. *$c^{\text{ʿ}}awł$* 'stem, stalk' < *c^haul- < *kh_2eu-lo-, cf. Gr. καυλός, Lat. *caulis* 'id.'. Arm. *$p^{\text{ʿ}}ul$* 'fall, ruins' might be derived via PArm. *$p^hōl$- from *h_2po-h_3lh_1-, although the details are difficult (see Martirosyan 2010: 653).

All in all, there is not a great deal of evidence for laryngeal aspiration in Armenian, but it does help to explain a number of otherwise unexplained anomalies.

2.2.9.2 **CHIC/*CIHC*

The main debate is whether we find laryngeal "breaking" with *h_2 and *h_3 (Olsen 1999: 770-773, against Clackson 1994: 41-49). I will leave this debate aside, since it is not relevant for the purposes of this study. I have to say that very few of Olsen's collected examples have any plausibility at all, and in the vast majority of cases, the colour of the laryngeal is unknowable. As an example of metathesis, Martirosyan (2010: 324) mentions Arm. *xayt$^{\text{ʿ}}$* 'sting, bite' < *kh_2eid-to- ~ *xit$^{\text{ʿ}}$* 'pain' < *kh_2id-to-, but there are numerous other variants of this word which cannot be accounted for in PIE terms.

2.2.10 Albanian

Due to the small number of available etymologies, we cannot really use Albanian data to determine the position of laryngeals. Perhaps one could argue that a similar Dybo shortening to Germanic before resonants took place in Albanian, however all the examples are rather speculative root etymologies.[40]

2.3 Initial Conclusions

2.3.1 **CHV*

Evidence for **CHV* can be drawn from: (a) Hittite spelling, gemination of resonants, and direct reflex after *s- (b) Indo-Aryan aspiration, (c) Iranian secondary voicing, (d) Armenian aspiration, (e) Slavic *x. No secure evidence is available in Baltic, Greek, Italic, Celtic, Germanic and Tocharian.

2.3.2 **VIHC/VHIC*

The two sequences are distinct (a) always in Tocharian and perhaps Celtic, (b) in Balto-Slavic pre-tonic syllables, (c) only with *h_2 in Hittite, (d) only with *u in Greek and Sanskrit, and perhaps Italic. The sequences merge completely in Germanic. However, it should be noted that the two sequences can often be distinguished in pre-vocalic position.

2.3.3 **CIHC/CHIC*

A difference between these two sequences has been argued for in relation to (a) Hirt's law in Balto-Slavic, (b) the Indo-Iranian stress shift in *i*- and *u*-stems, (c) vowel shortening in Greek, Italic and Celtic. In assessing all of these theories, I have found that for (c) there simply is not enough evidence and for (b) the evidence consists of a single root, but is admittedly difficult to account for. For (a), I found that while the evidence appears to support Kortlandt's idea in principle, we

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[40] *burrë* 'man, husband' < *b^huh_2-$ró$-, *brumë* 'dough, paste' < *b^hruh_1-$mó$- (Lat. *ferveō* 'to boil'), *lë-kurë* 'skin, hide' < *kuh_1-$ró$- , *shurrë* 'urine' < *suH-r-$nV́$-. Compare the long reflexes in *di* 'to dawn' < *dih_2-, *shi* 'pig' < *suH-, *mi* 'mouse' < *$muHs$.

must make adjustments to account for exceptions. The distinction between these root shapes must therefore post-date PIE.

There is hardly any compelling evidence that these sequences were distinct in any branch of Proto-Indo-European. It therefore seems highly probable that these two sequences had merged already at a PIE date. See the final conclusion for a more detailed discussion.

2.3.3.1 Dybo's law

Throughout the study above, I have proposed various laws for pretonic shortening laws in Greek, Italic, Celtic and Germanic. I did not find enough convincing evidence for Greek. While in Germanic, the shortening seems to have affected (at least) the high vowels before resonants only, in Celtic, the law seems to have affected all pre-tonic high vowels. In Italic, the law must have affected all vowels, and appears to have only operated with liquids.

Of course, reconstructing three different pre-tonic shortening laws is not particularly attractive, particularly since Italic and Celtic may have formed a single branch (Cowgill 1970, Weiss 2012). However, these shortening rules could well have post-dated Italo-Celtic unity.

3 Roots which show laryngeal metathesis

3.1 Verbal stems

In the following, with no attempt at exhaustiveness, I will provide some representative examples of Indo-European roots and words in which we find alternations in the position of the laryngeal. In each case, I will conclude that metathesis is the most plausible explanation for such alternation. I will avoid discussing words which have been dealt with in detail either above, or in Lubotsky 2011.

3.1.1 *b^hh_2eu- 'to become'

This root has been discussed extensively in the literature (Kortlandt 1986: 90f; Rix 2003, Jasanoff 1997 and others). I will simply discuss the evidence for the position of the laryngeal in this root. As I have argued under the respective sections above, none of the evidence listed by Kortlandt (l.c.) can prove a zero-grade *b^hh_2u-*C*-: all relevant developments arose independently within the individual branches.[41]

A full grade *b^heh_2u- is evident in Ru. *báviti*, Go. *bauan* 'live, dwell', OIr. 1/2sg. pret. *-bá* (Kortlandt 1986: 90-92). Av. perf. *buuāuua*, Skt. imper. *bodhi* (secondary acc. to Jamison 1997) can equally reflect *b^hh_2eu-. A metathesized full-grade *b^hueh_2 is probably seen in the Lat. imperfect suffix *-bā-*, Osc. *fufans* (Rix 2003: 365, pace Rix, Lat. *fuās* is rather from *b^huh_2-eh_2- and not a 'Lindemann variant'). An alternative full-grade *b^heuh_2- is seen in Skt. fut. *bhaviṣyáti,* intens. *bobhavīti*; *bhavítra* 'creature, being'.

Note the potential connection with *b^heh_2- 'to appear' (see §1.5). We find several forms with *-*i*-: most notably Lith. dial. Zietela, OLith. 3pret. *bìt*, *bìti* 'was' which is completely isolated and must be archaic. It is possible that *bit* represents *biH-t*, with shortening of final acute syllables (Leskien's law) as in *tù* < **tuH*, while thematicized Lv. *biju* 'I was' suggests *biH-, OPr.

[41] i.e. the Balto-Slavic accent: Lv. *bût*, Ru. *bylá* (analogical after full-grade **bàviti*); short vowels in Italic (analogical from pre-vocalic position), and Celtic (pre-tonic shortening); the Gr. short vowels (analogy). Note also IIr. **bhūmi*, which perhaps replaces older **bhHeumi*-.

bēi, *be*, OCS imperfect *bě*, SCr. *bjèh* might represent a derived stative formation *b^hi-eh_1- (Stang 1966: 380f). Lat. *fīō* 'happen, become', OIr. *biid* rather point to a preform without laryngeal (Kortlandt 2007: 136), OE *bēo* 'I am' is ambiguous.

It seems probable that we are dealing with an old suppletive paradigm with *b^heh_2u- alongside *b^hei-. Alternatively, we could propose two different root extensions *b^hh_2-*eu*- and *b^hh_2-*ei*-, but in this case, we are obliged to explain the laryngeal loss in the individual branches (as attempted by Kortlandt l.c. for Italo-Celtic). Pace Lühr 1981, Rix 2003, and others, I think it unlikely that any of these forms ever contained a *-*u*-, and such an idea cannot be maintained without an ad hoc rule of the type *b^huV > *b^hV (Rix 2003). As we will see in the following, finding *u*- and *i*- extensions side by side is by no means infrequent, cf. *deh_2u-, *$ǵ^hneiH$-, *$leuh_3$-

3.1.2 ***deh₂u*- 'to kindle, burn'**

An old form is probably the reduplicated perfect Gr. δέδηε, ptc. δεδαυμένος, Skt. gram. *dudāva* < *de-deh_2u-. We find a non-metathesized zero-grade before yod in Gr. δαίω, MW *deifyaw*, OBret. *deuu* 'kindle, burn' < *dh_2u-*ie/o*- (Matasović 2012: 92), and pre-vocalically in δάος < *dh_2u-*o*-. Skt. *dāvá*- 'forest fire' must reflect *dVh_2u-*ó*-. Metathesized **douh₂-o*- is impossible as the laryngeal would block Brugmann's law (Kuryłowicz 1927).

The metathesized zero-grade is found regularly in the nasal present *dunóti* (for *$dun\acute{a}ti$, cf. LIV²: 104, and §2.1.1.) and ptc. *dūná*- (AV+). Later participles *duna*- (ŚrSū.), and *duta*- (AĀ) are neo-aniṭ forms built from the nasal present. The passive *dūyate* must be secondary like *sunóti*, pass. *sūyate* 'press out (Soma)', since the expected form is **divyate* < *dh_2u-*ie/o*-. MHG *zŭscen* 'burn' represents a *sk*-present < *duh_2-*ske/o*-.

Also worth mentioning is the possible link with **deh₂i*- 'to shine', seen in Skt. *dīdā́ya*, ptc. *dīdiyant*-, *su-dītí*- 'shining beautifully' < *dih_2-, Gr. δῆλος < *δέαλος 'clear' δέατο 'seemed' < *$deih_2$-. Lv. *daĩļs* 'refined, elegant', Lith. *dáilyti*, *-inti* 'refine, smoothen', if related, can point to *$déih_2$-, or *deh_2i-. The meanings 'shine' and 'burn' are often interchangeable, cf. Gr. φλέγω trans. 'ignite, burn, light', intr. 'burn, flame, blaze, shine'. In this case, we are dealing with different extensions, viz. *dh_2-*eu*- 'to kindle', *dh_2-*ei*- 'to shine' to an original root *deh_2-.

3.1.3 ***ǵʰeuH*- 'to call, invoke'**

The Skt. athematic middle *hūmáhe* 1pl. 'call upon, invoke' points to *$ǵ^huH$-, a full-grade seṭ-form is inf. *hávītave* (RV), but this need not point to *$ǵ^heuH$-, cf. inf. *srávitave* (RV) from the aniṭ-root *srav*- 'stream, flow'. More probative is the intensive *jóhavīmi* (RV+), but cf. *yáṃyamīti* (RV) < *yam*-. The latter formation is perhaps matched by Gr. καυχάομαι 'boast, be proud', if < *$ǵ^hh_2eu$-$ǵ^hh_2eu$-*e/o*-, however the semantics are not ideal. Other cognates are OIr. *guth* 'voice' (cf. §2.2.6.3.), ToB *kwā*- 'call out to, invite' < *$ǵ^huh_{2/3}$, OCS *zъvati*, *zovǫ* < *$ǵ^h(o)uH$ or *$ǵ^hh_2eu$-?

All forms except the Greek can reflect a seṭ-root, so the claim of metathesis depends on this word, whose appurtenance is uncertain. On the other hand, a connection with *$ǵ^heh_2$- 'to gape' is conceivable. One might imagine a connection between καυχάομαι 'boast' and χαῦνος 'slack, bloated', and the connection between 'open one's mouth' and 'call out' is obvious.

3.1.4 ***ǵʰneiH*- 'to rot, grind' / *$ǵ^hneh_3u$- 'to gnaw, grind'**

Here I will mention the possibility of connecting these two roots. The first is seen in SCr. *gnjȉti* 'rot', Ru. f. *gnilá* 'rotten' < **ǵʰneiH-*,[42] and probably also Ru. *znijáť, znéjat'* 'smoulder' < **ǵʰn(e)iH-*, Gr. Hesych. χνίει 'drips, breaks into pieces' < **ǵʰniH-*. With a dental extension, we have OE *gnīdan* 'rub' < **ǵʰn(e)iH-dʰ(h₁)-*. The second root is seen in Gr. χναύω 'to gnaw (off), nibble' < **ǵʰneh₂u-*, ON *gnúa* 'to rub' < **ǵʰnoh₂u-*. All the meanings seem to have some connection with gradual deterioration or wear, nevertheless it is uncertain that all these words belong together.

Nevertheless, if there is at least some crossover between the two roots, which seems likely, we can then operate with *i-* and *u-* extensions of an older **ǵʰenh₂-* or **ǵʰneh₂-*. The *i*-present has undergone metathesis.

3.1.5 **keh₂u-* 'hew, forge'

A full-grade **keh₂u-* is attested in To. *kau-* ~ *ko-* 'kill', Lith. *kâva* 'fight, battle',[43] while Lv. *kaût*, ON *hǫggva* point to **kouH-* (the latter may also reflect **kHou-*). Lith. *kū́jis* 1, RuCS *kyi* 'hammer' show a zero-grade **kuH-*. Lat. *cūdō* probably also represents a zero-grade, cf. §2.2.5.2.

3.1.6 **leuh₃-* 'wash, pour'

If Melchert (2011) is correct in supposing **h₃* for Anatolian, then a full-grade **loh₃u-* is found in Hitt. *lāhu-ⁱ / lahu-* 'pour, cast', CLuw. *lā(h)un(a)i-* 'wash'.[44] A metathesized **luh₃-* is found in CLuw. *lūu̯a-* 'to pour' (§2.2.1.3). Continuing a metathesized full-grade are Gr. λοέω 'wash' < **λεϝόi̯ω < **leuh₃-*, Lat. *lavō* 'wash, bathe', Arm. *loganam* 'bathe, wash the body' < **louh₃-*, and perhaps To. *Ĺəw-* ~ *lyā-* 'rub, wipe away' < **leuh₃-*, although with divergent meaning. The metathesized form and the meaning 'to wash' seems already to have been generalized in 'core' PIE.

A related *i*-extension is probably seen in OCS *liti, lijǫ*, Lv. *liêt* 'pour', *lît* 'flow, rain' < **l(e)h₃i-*, if the Slavic vocalism is secondary. A zero-grade may be seen in Go. *leiþu* 'fruit wine', OIr. *li(a)e* 'flood'.

3.1.7 **peh₂i-* 'guard, herd'

To a root **peh₂-*, e.g. Skt. *pāti* 'to protect, keep', To. *pāsk-* ~ *pās-* 'guard, protect', Lat. *pascō* 'feed, pasture' < **p(e)h₂-sk-*, we find several traces of an *i*-present: Skt. *nṛ̊-pā́yi̯ya-* 'protecting men', Arm. *hayim* < **peh₂i-*, Av. *ni-paiiemi* 1sg.pres.act. 'protect', Sogd. *p'y* 'protect, observe, watch over', OP *paya-* 'to care for' < **ph₂-ei-e/o-* (cf. Kulikov 2012: 83 on *gāyati*), but most notably Skt. *pāyú-* 'guard, protector' ~ Gr. πῶυ 'flock of sheep' < **poh₂i-u-*[45] and Gr. ποιμήν 'herdsman; guardian' ~ Lith. *piemuõ* 'sherpherd'. Forms with metathesis include *nṛ́̊-pīti-* 'protection of men', *go-pīthá-* 'protection'.

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[42] The depalatalized initial is probably from **gnôjь* 'rot'. A zero-grade **ǵʰnHi-*, analogical after **gnôjь* (then < **ǵʰnH-oi-*?) is less likely, as we would expect the nasal to vocalise, and we would also expect a plain velar before syllabic nasal, cf Kortlandt (2013: 14).

[43] This form is a little problematic, as it seems to show metathesis within Balto-Slavic. This word, along with Lith. *kovà*, might represent an extended-grade deverbal formation, in which case the Lv. broken tone would be analogical after the verb.

[44] We may alternatively posit two separate roots: **leh₂u-* 'to pour' and **leuh₃-* 'to wash', and we might connect the former with Slavic **liti* (see below). In view of the Luwian meaning 'to wash' and the *u*-extension in Anatolian, this seems unattractive, not to say that it isn't correct.

[45] These words may not be related directly. As Lubotsky (2011: 106 fn. 3) has pointed out, there seems to have been a general tendency to derive *u*-nouns from stems in *-i-*. The Gr. word has more claim to being archaic since its meaning is more distant both formally and semantically from the synchronic verbs (see van Beek 2016).

Most interesting here is the connection of Gr. Πάν 'pastoral god' and Skt. *Pūṣán-* 'god who protects and augments the herds', which can go back to an ablauting **péh₂us-ōn*, **puh₂s-n-és*. The word is probably derived from the active participle suffix plus an individualizing *n*-suffix (Pronk 2015: 327f).

3.1.8 **pieh₂u-* 'strike, knock'

Several forms can be mentioned here, not all of which are necessarily cognate. We find full-grade Lith. *pjáuti* 'cut' < **pieh₂u-*, a yod present without metathesis: Gr. παίω 'strike, hew, hit', πταίω 'nudge, crash into, stumble', Lat. *paviō* < **pih₂u-ie/o-*. The *-i-* was probably lost regularly in Latin (cf. Hackstein 1992; I would rather keep ToB *pyāk-* 'strike' separate.). With metathesis, we find Lith. *pjū́klas* 1 'saw', and slightly more speculatively CLuw. *pūu̯a-* 'pound, crush' < **piuh₂-ie/o-*?

3.1.9 **terh₂u-* 'overcome'

The verb is attested in Hitt. *tarhu-zi* 'prevail, conquer' and Skt. *tū́rvasi* 2sg.act. 'to overcome, overpower'. Here I would simply like to point to the form *tarūṣas-* 'superior' which appears to represent a metathesized **teruh₂-*.

3.1.10 **ueh₁i-* 'wrap, wind'

Despite LIV²: 695, and others, there is no evidence for a full grade **uieh₁-*. Skt. 'cover, wrap, veil, envelop' only attests the zero-grade: pres. *vyáyati* < **uih₁-éie-*, aor. *á-vyat* < **uih₁-e/o-*,[46] ptc. *vītá-* < **uih₁-*. The Iranian forms like Sogd. *pr-w''y-* 'wrap up', Sariqoli *par-wɛy-* 'cover, veil' clearly show a full-grade **ueih₁-*, **ueh₁i-* or **uh₁ei-*. Lith. *výti*, 3pres. *vẽja*; Lv. *vît* 'twist, wind' are best reconstructed as **uh₁(e)i-*, cf. also CS *povojъ* 'fascia'. OCS *věja* 'branch', where Sln. *vẹ̑ja* speaks against a laryngeal, might have extended-grade, viz. **wʔēi-aʔ-*. Note that a pres. *-ẽja* to an infinitive in *-ýti* is a rare pattern in Lith. so is likely old.[47] A secondary full-grade is found in Lith. *víesulas*, Lv. *viẽsuls*, ORu. *vixъrь* 'whirlwind', SCr. *vȉhār* < **ueh₁i-*.

Other than the Skt. forms, we also find metathesis in Gr. ἴτέα, Hesych. γιτέα 'willow', and the gloss γίς 'belt', if related. Lat. *vieō* 'plait, weave' probably stands for **uih₁-eh₁-ie/o-*, and OIr. *imm-fen* 'hedge round, enclose' might stand for a nasal present **ui-nh₁-*.

3.2 Metathesis in nominal ablaut

3.2.1 **deh₂i-uer-* 'husband's brother'

Although this word was already discussed in §2.1, I think it is worth reiterating the facts here. To **deh₂i-uer-* point Gr. δᾱήρ, (cf. also late dat.sg. δαιρί), Arm. *taygr*, Lith. *díeveris* 1, Lv. *diẽveris*, SCr. *djȅvēr*. Forms such as Lith. *dievèris* 3ª, *-ỹs* 3ᵇ, and Sln. *dẹvẹ̑r* nevertheless point towards accentual mobility. The Germanic forms OHG *zeihhur*, OE *tacor* require **deih₂-*. They point to an older **taikwer* where laryngeal hardening took place in **RHu̯-* (§2.2.7.2). NP (dial.) *(h)ēwar*, Oss. *tiw / tew* and Pashto *lewár* may point to **dh₂ei-* (§2.2.3.1), as might Latin. *lēvir* (§2.2.5.1). We must therefore conclude that PIE possessed an ablauting paradigm, e.g. nom.sg. **déh₂i-ur,* acc.sg. **dih₂-uér-m,* gen.sg. **diuh₂r-és*.

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[46] In these two forms, I cannot exclude a non-metathesized **uh₁i-eie-*.

[47] I have only found the homonym *výti*, *vẽja* 'to pursue', which can easily be analogical, and *šlýti*, dial. *šlẽja* 'incline, lean'. The productive pattern is nasal presents in this type of verb, cf. usual *šlỹja*, and *gýti*, *gỹja*, 'recover, heal', *lýti*, *lỹja* 'pour', *pýti, pỹja* 'become wet, give milk', all of which have, dialectally, variant presents in *-ija* and *-yna*, but none in *-eja*.

3.2.2 ***dh₃-eu-** 'gift' or 'to give'

The full-grade is found in Lat. *lautia* 'state reception', which most simply reflects **deu̯h₃-t-*-with **-eu̯-* > *-au̯-* (Vine 2006), but if my theory **dH-* > **l* in Latin is correct (§2.2.3.1), we may consider **dh₃eu-et-*. Similar is OIr. *dúas* 'gift, reward' < **deh₃u-/dh₃eu-t-teh₂-*. A different full-grade is seen in the Baltic *n*-stem *dovanà*, *-enà*, Lv. dâvana, *dãvâna* 'gift'. A metathesized form is seen in Skt. *dúvas-* 'gift, oblation, reverence', which implies the existance of an original paradigm containing **duh₃-s-*.

There are also a number of verbal forms, e.g. Lv. *dãvât*, OCS *-davati* 'give', Lat. *duim*, Fal. 3sg. subj. *douiad*, U 3sg.ipv. *purtuvitu*, whose derivational history I suspect is heterogenous to the noun above. Nevertheless, the Italic forms seem to imply metathesized **duh₃-*.

3.2.3 ***ǵerh₂-ou-** 'crane'

Besides the *n*-stem in Gr. γερηv, Co. *garan*, Oss. *zærnyg*, Pash. *zā́ṇa*, all 'crane', we find an ablauting *u*-stem noun with nom.sg. *ǵerh₂-ōu* and gen.sg. *ǵrh₂-u-és* in OCS *žeravь*, Lith. *gérvė*,[48] with a metathesized Lat. *grūs* < **gruh₂-s* and perhaps Arm. *krunk* 'crane', cf. Martirosyan 2010: 377. The Latin metathesis is important it must have been formed post-PIE, bus still have pre-dated that vocalization of **r*. Less impressed is Gąsiorowsky (2013).

3.2.4 ***gʷrh₂-u-** 'heavy', ***gʷreh₂-u-n-** 'millstone'

Gr. βαρύς, Skt. *gurú-*. Go. *kaurus** 'heavy' reflect **gʷrh₂-u-*. As with metathesis we should expect nom.sg **gʷruh₂-s*, the nom. was probably analogically reshaped after the oblique cases **gʷr̥h₂-eu-* (see the conclusion, below). ToB *krāmär*, Skt. *garimán-* 'heaviness' rather reflect a compound suffix than the vanishingly rare **-mr/n-*. With metathesis, we find Lv. *grũts*, Lat. *brūtus* 'heavy' and perhaps Skt. *agrū́-* 'virgin, unmarried woman' < **n-gʷruh₂h₂* (Lubotsky 2013).

With an *i*-suffix, we have Gr. Hesych. βρί 'great, strong, fierce' and βριαρός 'strong' < **gʷrih₂-er-ó-*, βρί́θω 'be laden with', which connection Beekes (2010: 239) rejects on formal grounds, without considering the possibility of metathesis. Skt. *grīṣmá-* 'midsummer' might also belong here (Rasmussen 1989a: 95). All these forms clearly demonstrate that the metathesis pre-dated phonemic syllabification.

3.2.5 ***h₂erh₃-u-** 'ploughed (field)'

A *u*-stem noun is seen in Lat. *arvus* 'ploughed' < **h₂erh₃-uo-* or **h₂rh₃-eu-o-*, and potentially OCS *ravьnъ* 'even' (otherwise to **h₂er-*, Pronk 2013: 295) while a derived *r/n*-stem is seen in OIr. *arbor*, *arbe* 'grain, cereal', Skt. *urvárā-* 'arable field', etc. Probably, PIE had a further *s*-stem with obl. **h₂ruh₃s-*, and secondary full-grade **h₂reuh₃-(e)s-* in Lat. *rūs* 'country, land', OIr. *róe* 'level field', Av. *ravah-* 'space, distance'.

3.2.6 ***h₃bʰruh₁-** 'eyebrow'

Besides the prevailing zero-grade in the word for (eye)brow – Skt. *bhrū́-*, ὀφρῦς, OIr. *for-brú*, OE *brū*, Lith. *bruvìs*, ToB *pärwāne* etc., we find a possible full-grade in ON *brǫ́*, *brá* 'eyelid', OHG, OS *brāwa* < **h₃bʰreh₁u-*, which points to metathesis in the zero-grade. The word for 'bridge' may

[48] I presume a BSl. paradigm nom. **gérʔōw*, obl. **grʔw-*, with depalatalization before **r* in the zero-grade. The Iranian forms prove a palatovelar in this word.

ultimately be the same word, cf. ON *brú* 'bridge', and derived *bryggja* 'pier, quay, bridge' < *h_3b^hruH-ieh_2-, cf. full grade Gaul. *brīva* 'bridge'. Perhaps also here is *briaunà* 'edge, crust', Lv. *braũna* 'scale, flake'. I do not think it can be definitively excluded that the full-grade forms derive from nom. *$h_3br\acute{e}uH$-*s* (Beekes & de Vaan 2011: 209).

3.2.7 ***iuHs*-'broth, soup'**

The Indo-European word for 'soup' is attested in Skt. *yū́ṣ*- 'soup, broth, stock', OPr. *juse*. Ru. *uxá*, Cz. *jícha*, SCr. *júha* 'soup, broth' all point to a circumflex, i.e. *$iHeus$-eh_2-.[49] Lat. *iūs* 'broth, sauce' is ambiguous. As I will argue elsewhere, I do not believe that Lith. *jū́šė* is native to this language. We can reconstruct a paradigm nom.sg. *$iH\breve{e}us$, gen.sg. *$iuHs$-*és*.

3.2.8 ***keh*$_2$*u-el*-'hernia, lump' / ***keh*$_2$*u-lo*-'stalk, bone'**

An old *l*-stem must be reconstructed for Greek, κήλη 'tumour, rupture, hernia' < *keh_2u-*el*- and Att. κάλη < *kh_2u-*el*-. ON *haull,* OE *hēala* most simply reflects *kh_2eu-*l*-, but the implied Schebeablaut can perhaps be avoided (Kroonen 2013: 216), besides, ON *hóll* apparently reflects *keh_2u-*lo*-. The metathesized zero-grade is seen in Lith. *kū́la(s)* 1 dial. 'lump, hernia', CS *kyla*, SCr. *kȉla* 'hernia, outgrowth'. The PIE paradigm is comparable to that of 'sun'. The semantic side of the connection with *keh_2u-*lo*- 'stalk' is not very strong. Lith. dial. *kū́la(s)* 'stalk, leaves' is probably secondary to 'lump'.[50]

Lith. *káulas* 'bone', Gr. καυλός 'shaft, stalk' is a classic example of Hirt's law (§2.2.2.2), unequivocally pointing to *keh_2u-*lo*-, with which Lat. *caulis* 'stem, stalk', OIr. *cúal* 'faggot' are consistent. However, Arm. *cʿawł* 'stem, stalk', as discussed in §2.2.9.1, might instead reflect *kh_2eu-*lo*-. Alternatively, it can represent a form with *s*-mobile. Neither solution is particularly attractive.

3.2.9 ***ḱieh*$_1$- 'dark, grey'**

In §2.2.2.1, I argued that RuCS *sěrъ*, OCz. *šěrý* 'grey' might reflect *$ḱh_1oi$-*ro*- (after Lubotsky 1989: 56) and be cognate with (i.e. not borrowed from) ON *hárr,* OE *hār* 'grey, hoar'. Perhaps this full-grade is secondary to the more frequent *$ḱieh_1$-, with a *mo*-suffix in Skt. *śyāmá*- 'black, dark-coloured', Lith. *šémas* 'ash-grey, blue-grey', and a *uo*-suffix in Skt. *śyāvá*- 'dark-brown, dark', and possibly OE *hǣven* 'blue, azue, purple'. The metathesized zero-grade is found in Lith. *šývas*, OPr. *sijwan*, SCr. *sȉv* 'grey' < *$ḱih_1$-.

3.2.10 ***seh*$_2$*u-l*/*n*-'sun'**

The original heteroclite is best preserved in Go. *sauil*, dat. *sunnin* < *seh_2u-*el*, *suh_2-*n*́- (with pretonic shortening). Variants of the nom.sg. are preserved in Lith. *sáulė*, Lv. *saũle* < *seh_2u-*l*-, Gr. ἥλιος < *seh_2u-*el*- Italo-Celtic has preserved a hysterodynamic *l*-stem nom.sg. *sh_2u-*ōl* > Lat. *sōl*, obl. *suh_2l- > OIr. *súil* 'eye'. Indo-Iranian preserved generalized the zero-grade, cf. OAv. *huuarə̄*, gen.sg. *$x^vəṇg$ < *suh_2-*l̥*, *sh_2u-*en*-*s*.

3.3 Final Conclusions

[49] Proposing two root-variants as per Derksen (2015: 216) is clearly much less attractive. It is nevertheless possible we are dealing with an ablauting neuter *s*-stem, viz. *$iHeu$-*s*, *iHu-*és*.

[50] Only in the phrase *į kū́las/kū́lus išeĩti*, which is said of a plant which has produced leaves, branches, instead of the desired product (e.g. cabbage, swede). LKŽ glosses *kūla* as 'stiebas, lapas' = "stem, leaf", but *kūlas* as "gumbas" = 'lump', with the example *Kopūstai į kū́lus išejo*. Clearly, this is the same word.

To me, the evidence in favour of laryngeal metathesis is conclusive. I have yet to encounter any examples which cannot be explained with the rule **CHIC* > **CIHC*, and there is no convincing counter-evidence. On this basis, I feel we can safely posit such a rule for PIE. Several forms, e.g. Lv. *grũts*, Lat. *rūs*, *grūs*, show that the metathesis must have pre-dated phonemic syllabification. Other forms, e.g. Gr. πῦρ 'fire', *huuarā* are post-PIE forms, and suggest that metathesis was still automatic at the time of their formation. These facts demonstrate that laryngeal metathesis was an automatic phonetic rule during all of PIE.

Metathesis did not appear to occur before PIE **-i-*, cf. Skt. *sīvyati*, Gr. δαίω, Hitt. *suu̯e/a-zi*. I also wonder whether it occurred after **-i-*, too. I have provided one such example above in **iuHs-* (§3.2.7), but a counter-argument is Hitt. *mēhur* gen.sg. *-unas*, whose inflection points to an old static noun (Kloekhorst 2008: 567) **meih₂ur/n-*. Under my formulation, we should expect metathesis to **meiuh₂-*, and as an isolated static noun, there would be no model for restoration. Nevertheless, the noun need not be dated to PIE, as it has no direct cognates. It could therefore have been formed within Anatolian to a hypothetical verbal root **meih₂-* (acc. to Kloekhorst l.c., here belongs Lat. *meō* 'proceed').

Potential counter evidence is found in *u-* and *i-* stem nominals derived from laryngeal-final roots, such as **gʷrh₂-u-* 'heavy' (§3.2.4), **tnh₂-u-* 'thin', **plth₂u-* 'wide', **plh₁-u-* 'many'. In each case, we should expect metathesis in the strong cases, viz. **gʷruh₂s*, **tnuh₂s*, etc. Which we generally do not find. However, restoration most likely occurred in the daughter languages on the basis of the oblique cases, where metathesis did not occur. Also note that metathesis would not have occurred in feminine forms with an *i*-suffix, e.g. Skt. *prthivī*, Gr. Πλαταία. Occassionally, traces of the metathesized strong case-forms have been left, e.g. Skt. sup. *purūtáma* << **pluh₁-tmH-o-* and Skt. *tanū́-* 'body, self', if derived from **tnh₂-u-*.

I therefore conclude that laryngeal metathesis was indeed a PIE phenomenon and should be duly taken into account in future etymological treatments.

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