The Development of Interconsonantal Laryngeals in Sanskrit

Dhamala, Anup

The Development of Interconsonantal Laryngeals in Sanskrit

Abstract

In interconsonantal positions, Proto-Indo-European laryngeals appear to have three reflexes in Sanskrit: *i*, *ī* and *Ø*. While there is clear agreement that the short vowel *i* is the main development here, the circumstances under which we see the other reflexes have not yet been fully understood. This thesis will survey the existing scholarly literature on the topic and try to explain the phenomena plausibly. Also explored on the side are other oddities related to the Sanskrit development – namely, the aspiration behavior of the interconsonantal laryngeal, and the exceptional status of the vocalization vowel *i*.

For my friends, family and teachers

Table of Contents

Abbreviations

1	(with sg./du./pl.) 1st person	ins.	instrumental
2	(with sg./du./pl.) 2nd person	iprf.	imperfect
3	(with sg./du./pl.) 3rd person	Lat.	Latin
abl.	ablative	loc.	locative
acc.	accusative	Luw.	Luwian
act.	active	M.	Mahārāṣṭrī
ADh.	Aṣṭādhyāyī	m.	masculine
adj.	adjective	midd.	middle
AMg.	Ardha-Māgadhī	n.	neuter
aor.	aorist	nom.	nominative
Arm.	Armenian	OAv.	Old Avestan
Aś.	Aśokan Prākrit	OIr.	Old Irish
Av.	Avestan	OP	Old Persian
AVP	Atharvaveda Paippalāda	opt.	optative
AVŚ	Atharvaveda Śaunaka	Pā.	Pāli
cf.	*confer*	pass.	passive
dat.	dative	pcl.	particle
du.	dual	PIE	Proto-Indo-European
e.g.	*exempli gratia*	PIIr.	Proto-Indo-Iranian
f.	feminine	Pkt.	Prākrit
fn.	footnote	pl.	plural
Gā.	Gāndhārī	Pre-In.	Pre-Indic
gd.	gerund	Pre-Ir.	Pre-Iranian
gen.	genitive	prf.	perfect
Goth.	Gothic	prs.	present
Gr.	Greek	pst.	past
Hitt.	Hittite	ptc.	participle
ibid.	*ibidem*	RV	Rigveda
id.	*idem*	sg.	singular
imp.	imperative	Skt.	Sanskrit
ind.	indicative	TochB	Tocharian B
inj.	injunctive	YAv.	Young Avestan

Symbols

*x	reconstructed form	V	any vowel (including $\underset{\circ}{R}$)
**x	unattested form	C	any consonant (T, R, H)
/x/	phonological form	T	any obstruent
[x]	phonetic form	R	any resonant (L, N, W)
<x>	orthographic form	L	any liquid
>	changes regularly to	N	any nasal
<	changes regularly from	W	any glide
>>	changes by analogy to	H	any laryngeal
<<	changes by analogy from	$\underset{\circ}{x}$	vocalic consonant x
→	changes to	Ø	zero, null
←	changes from	σ	syllable
~	corresponds to	.	syllable boundary
#	word initial/final position	S	short syllable
-	morpheme boundary	L	long syllable
°	partial form	X	short/long syllable
˘	short vowel marker	|	cadence marker
¯	long vowel marker	,	caesura marker
√	root marker		

A note on Sanskrit transliteration

I follow the ISO 15919 standard for the transliteration of Sanskrit into Roman script. Readers may be more familiar with the IAST scheme, which is a subset of the ISO 15919 standard for the most part. These differences are worth highlighting: use of $\underset{\circ}{r}$ to represent vocalic *r* (instead of the IAST $\underset{\cdot}{r}$) and *ṁ* for *anusvāra* (insead of the IAST *ṃ*).

अनन्तपारं किल शब्द-शास्त्रं
स्वल्पं तथायुर् बहवश् च विघ्नाः ।
सारं ततो ग्राह्यम् अपास्य फल्गु
हंसैर् यथा क्षीरम् इवाम्बुध्यात् ॥

anantapāraṁ kila śabda-śāstraṁ
svalpaṁ tathāyur bahavaś ca vighnāḥ |
sāraṁ tato grāhyam apāsya phalgu
haṁsair yathā kṣīram ivāmbudhyāt ||

Boundless indeed is the science of language,
but life is short and many are the difficulties.
So the essence is to be taken, leaving the rest,
like swans take milk from water.

– Pañcatantra 0.6, *translation mine*

1. Introduction

1.1 The triple reflex

It is well-known that PIE laryngeals yield the vowel *i* in Sanskrit, when occurring between two consonants (Beekes 2011: 147; Fortson IV 2010: 62; Byrd 2018: 2064). The behavior is attested for all three laryngeals, as exemplified by the following developments of some Ø-grade deverbal formations, made to PIE roots of type **CeH-*:

PIE **d^{h}**h**$_1$-tó-* ‘placed’	→ Skt. *hitá-*[1], *-dhita-*[2]	(Gr. θ**ε**τός, cf. Lat. *f**a**ctus* ‘made’ < **d^{h}h$_1$-k-*)
PIE **st**h**$_2$-tó-* ‘standing’	→ Skt. *sth**i**tá-*	(Gr. στ**α**τός, Lat. *st**a**tus*)
PIE **d**h**$_3$-ti-* ‘gift’	→ Skt. *díti-*[3]	(Gr. δ**ό**σις, Lat. *d**a**tiō*)

Such a “vocalization” of laryngeals is supported by a wealth of other correspondences[4]:

**ph$_2$-tér-*	→ *pitár-* m. ‘father’[5]	(Gr. πατήρ ‘id.’)
**ǵénh$_1$-tr-ih$_2$-*	→ *jánitrī-* f. ‘mother’	(Gr. γενέτειρα ‘id.’)
**ish$_1$-ró-*	→ *iṣirá-* adj. ‘strong, fresh’	(Gr. ἱερός ‘holy’ < **iherós*)
**kreuh$_2$-s-*	→ *kravíṣ-* n. ‘raw flesh’	(Gr. κρέας ‘id.’)
**plth$_2$u-ih$_2$-*	→ *pr̥t^{h}ivī́-* f. ‘earth’	(Gr. place name Πλαταιαί < **plataû̯ia*)

[1] In this thesis < **d^{h}h$_1$-ti-* (Skt. *-dhiti-*, Gr. θέσις), I utilize the PIE roots/lexemes laid out in *LIV*$_2$, *NIL* and *LIPP*, and follow the reconstruction conventions of Beekes (2011), unless otherwise noted. Similarly, I defer questions of Sanskrit etymology to *EWAia*, and word-meanings to *MWSE*. As for the Sanskrit attestations, I mainly rely on forms recorded as “occurring” in the *Vedic Grammar* by Macdonell (1910) – I have found Appendix I in the grammar’s student version (Macdonell 1916: 369-435) especially useful for the verbal forms. All cited forms are (Rig)vedic, if not marked differently. I verify the attestations as needed (e.g. for the metrical context), using the digital platforms of *VedaWeb* and *DCS*; the former was immensely helpful for the Rigvedic material, and I sometimes supplemented it with the physical Rigvedic concordance (Lubotsky 1997a) as well as the metrically restored text of Rigveda (*VNH*). In the case of conflict between any of these sources – in regards to a particular reconstruction/attestation – I note it down. For the bibliographical abbreviations used here, see §References.

[2] Attested as the second member of compounds like *sú-dhita-* ‘well placed’, *mitrá-dhita-* ‘contract of friendship’ (Lubotsky 1995: 139).

[3] As per *EWAia* I (715, 717, 724), this nominal form could also go back to PIE **dh$_2$-ti*, connecting it to Skt. √*dā-* ‘divide’ < **deh$_2$* – as attested in 3sg.prs.ind.midd. Skt. *dáyate* < PIE **dh$_2$-éie-te-i,* cf. Gr. δαίεται (*LIV*$_2$: 104, *EWAia* I: 700) – instead of Skt. √*dā-* ‘give’ < **deh$_3$*. Should this be the case here, the root-aorist forms of *dā-* ‘give’ can act as examples of PIE **h$_3$* → Skt. *i*: e.g. 2sg.midd. *ádithās*, 3sg. *ádita* ← *°dh$_3$t°*. The *i*-reflex is also attested in the isolated *s*-aorist form of the root: 1sg.midd. *ádiṣi* ← **h$_1$é-dh$_3$-s-h$_2$* (Mayrhofer 2005: 110). Similar examples from other roots are hard to come by, in part due to the relative paucity of roots with **h$_3$* (*LIV*$_2$: 703–709, 731–747).

[4] For more examples, see Beekes (1988a: 85–87; 1988b: 62–63) and Mayrhofer (2005: 106–110, passim).

[5] Going forward, I will not mark the examples utilized as PIE and Skt., except when it is ambiguous.

**temHs-ro-*	→ *támisrā-* f. ‘dark night’	(Lat. *tenebrae* ‘darkness’ < **temasrā*)
**h₁é-tērh₂-s-*	→ *átāriṣ- iṣ*-aorist stem ‘cross’[6]	(cf. Gr. τρᾱνής ‘clear’ < **trh₂-n-*[7])
**h₂énh₁-ti*	→ *ániti* 3sg.prs.ind.act. ‘breathe’	(cf. Gr. ἄνεμος ‘id.’)

All this is standard fare, presented on many a student’s initiation into laryngeal theory. Less well-known however is the fact that interconsonantal laryngeals also yield long vowel *ī* in Sanskrit[8], though the instances of it are not as frequent as that of *i*. Some examples:

**h₃emh₃-si*	→ *ámīṣi* 2sg.prs.ind.act ‘injure’	(cf. 3sg. *ámīti*, iprf. *ámīt*)
**h₁é-h₂enh₁-t*	→ *ā́nīt* 3sg.iprf.ind.act. ‘breathe’	(but *i* in prs. *ániti* above)
**h₁é-dʰh₁-médʰh₂*	→ *ádhīmahi* 1pl.aor.ind.midd. ‘place’	(but *i* in 3sg.midd. *ádhita*)
**ḱi-ḱh₃-té*	→ *śiśīte* 3sg.prs.ind.midd. ‘sharpen’	(but *i* in pst.pass.ptc. *śitá*)
**gʰrb-n-h₂-C°*[9]	→ *gr̥bhṇī-C°* prs. stem (IX) ‘seize’[10]	(cf. *punī-* √*pū-* ‘cleanse’ < **peuH-*)
**-ph₂-ti-*	→ *(nŕ̥)-pīti-* f. ‘protection (of men)’	(cf. *gopīthá-* ‘protection’, *°pīthya-*)
**gʷʰmbʰh₁-ló-*	→ *gabhīrá-* adj. ‘deep’[11]	(cf. *gambhīrá-* ‘id.’)
**h₁uerHmn-*	→ *várĭman* loc.sg.m. ‘expanse’	(but *i* in nom.sg. *varimā́*)

Even rarer in this context are the cases where the laryngeals do not vocalize and disappear altogether, without leaving any traces. As in:

**ǵenh₁-mn-*	→ *jánma* nom./acc.sg.n. ‘birth’, dat. *jánmane*	(but *i* in variant *jánima*)
**-dh₃-to-*	→ *devá-tta-* pst.ptc ‘given by the gods’	(but *i* in *díti-* above, cf. *-dhita-*)
**-senh₂-ti-*	→ *puru-ṣánti-* m. personal name	(but *i* in *sánitar-* ‘winner’)
**dʰe-dʰh₁-més*	→ *dadhmás(i)* 1pl.prs.ind.act. ‘place’	(but *i* in 1pl.prf.ind.act. *dadhimá*)

[6] Attested in 1pl.aor.ind.act. *átāriṣ-ma*, 3pl. *átāriṣ-ur* (Macdonell 1916: 387).

[7] PIE **CRh₂C* > Gr. *CRāC* (Beekes 2011: 151). The Greek form here could also come from **terh₁-* ‘pierce’, with secondary ᾱ for **ē* (Beekes 2009: 1499), but for our Sanskrit forms in *átāriṣ-*, the Hittite cognates in *tarḫu-*speak for **h₂* (*LIV₂* : 633; Kloekhorst 2007: 835–836).

[8] And so it was to my surprise that I learned about this *ī* reflex in Dr. Lucien van Beek’s IE morphology class, fresh off the heels of an earlier course on IE phonology. During a discussion on well-formed PIE roots, the form 3sg.prs.ind.act. *brávīti* ‘speaks’ ← **mléuh₂-ti* had come up, cf. 2sg. *brávīṣi*, iprf. *ábravīs*.

[9] The root assumed here is **gʰrebh₂-* and it is also sometimes reconstructed with **°bʰh₂* (Fortson IV 2010: 214; Beekes 1999: 15), but in the choice of **b*, I follow *LIV₂* (201).

[10] Preconsonantal weak stem of the ninth class present to √*grabh-*, as attested in 2sg.prs.imp.act. *gr̥bhṇī-hí*, 3sg.inj. *gr̥bhṇī-tá* (Macdonell 1916: 380).

[11] *EWAia* I (464–465) marks the etymon here as uncertain, but the presence of a laryngeal in this formation is commonly accepted (Nikolaev 2019: 192). For the etymology adopted, see Nikolaev (2019: 191, 198–202).

Thus, interconsonantal laryngeals appear to have three reflexes in Sanskrit: *i*, *ī* and *Ø*. The situation is perhaps best illustrated by the following 1pl.ind. verbal forms made to the root *dhā-* 'place' < **d^{h}eh$_{1}$-* (also listed as part of the examples above): prs.act. *dadhmás(i)*, prf.act. *dadhimá* and aor.midd. *ádhīmahi*[12], all descended from **°d^{h}h$_{1}$m°* and all attested in the Rigveda (*VedaWeb*; Lubotsky 1997a: 741, 747). Even more striking are the variants seemingly descended from the agent noun **péuH-tor-* 'purifier': *pótar-/potár-*[13] (RV, AVP), *pavitár-* (AVŚ, AVP) and *pavītár-* (RV) (Clayton 2022: 63–64; Lubotsky 1997a: 860, 918).

While there is clear agreement that the short vowel *i* is the main development here, the circumstances under which we see the other reflexes have not yet been fully understood. I will now briefly summarize the existing literature on the topic, which should also serve to introduce the kind of problems involved along with the various points of debate.

1.2 Past literature

The development of interconsonantal laryngeals has left indelible marks in the Sanskrit grammatical system, as evidenced by the extra *ĭ* vowel that creeps up in morpheme junctures after certain Sanskrit roots[14], or the vowel alternation of *ā* vs *ĭ* in the strong vs. weak forms of other roots[15]. Such effects of the laryngeal vocalization were already noted by the grammarians of ancient India, but in purely synchronic terms: Paṇini, in his monumental Sanskrit grammar

[12] For comparison, the parallel Greek forms here show a more uniform reflex of the vocalized laryngeal: prs.act. τίθε-μεν, prf.act. τεθήκα-μεν, and aor.midd. ἐθέ-μεθα (Crane n.d.). The Greek perfect form has the stem generalized from singular forms like τέθηκα; expected **τέθε-μεν does not seem to be attested, but cf. Homeric Gr. ἔστα-μεν < **se-sth$_{2}$-me* 'stand' (Sihler 1995: 573, 576).

[13] Via intermediate **pau-tar*, thus showing **H → Ø*. PIE diphthong **eu* was already **au* by Proto-Indo-Iranian times (Lubotsky 2018: 1878).

[14] Those going back to **CeCH-*, as in the nouns *jan-i-tár-* m. 'progenitor', *jan-i-trá-* n. 'birthplace' made to √*jan-* 'generate' < **ǵenh$_{1}$-*, in contrast to *man-tár-* m. 'thinker', *man-trá-* m. 'speech' from √*man-* 'think' < **men-*; also 3sg.prs.ind.act. *ám-ī-ṣi* √*am-* 'injure' < **h$_{3}$emh$_{3}$* vs. *yáṁ-si* √*yam-* 'reach' < **iem-*.

[15] Those going back to **CeH-*, as in the aorist forms of √*dhā* 'place': 3sg.act. *á-dhā-t* < **h$_{1}$é-d^{h}eh$_{1}$-t* vs. 3sg.midd. *á-dhi-ta* ← **h$_{1}$é-d^{h}h$_{1}$-te* (cf. 1pl.midd. *ádhīmahi*), or the stem alternation in the reduplicated presents: 1sg.act. *śi-śā-mi* vs. 1pl.act. *śi-śī-másі* √*śā-* 'sharpen' < **ḱeh$_{3}$-*.

Aṣṭādhyāyī, classified the roots that take the extra *i* as *seṭ* and those that do not as *aniṭ*[16], making special exceptions for roots/forms that take the long *ī*[17]. The alternation of *ā* vs. *ĭ* was also handled on a case-by-case basis[18], and in this context, some of the instances of the null reflex were described explicitly as well[19]. These early descriptions, while valuable, condition the variation of *i*, *ī* and *Ø* in morphological terms only, and their common phonetic origin was realized only in modern times, after the comparative study of Sanskrit in relation to other ancient Indo-European languages.

Studies set before the discovery (and acceptance) of PIE laryngeals traced the alternation under discussion to a vowel **ə* in PIE (Meier-Brügger 2013: 110, 114), which regularly became *i* in Sanskrit but was lost in contexts like second member of compounds or as part of reduplicated stems (e.g. *deva-tta*, *dadhmas*) (Wackernagel 1896: 17–19, 82–83). Apparent instances of **ə → ī* were all explained away as lengthening from an earlier **i*[20], but in these early works, some of the instances of Sanskrit *ī* – that we now attribute to laryngeal vocalization – were thought to simply reflect weak-grade of PIE **āi*, as extrapolated from synchronic alternations like 3sg.prs.ind.act.

---

[16] This extra vowel *i* is known as *iṬ* in Paninian terminology – thus roots that take it are termed *seṭ* (*sa-iṭ* 'with *iṬ*') and those that do not *aniṭ* (*an-iṭ* 'without *iṬ*') (Cardona 1997: 92–93; Meier-Brügger 2013: 108). Strictly speaking, this vowel is seen as an augment (*āgama*) to certain (mostly derivational) suffixes called *ārdha-dhātukas*, when approaching the *seṭ* roots – for more details on this as well as the *seṭ*/*aniṭ* division, see ADh. 7.2.8–78, specifically 7.2.35 and 7.2.10 (*Vasu* VII: 1360–1391; Aufderheide and Keydana 2016: 137–139; Cardona 1997: 92–99). **H → i* that appears as part of other (mostly inflectional) suffixes called *sarva-dhātukas* are handled on a case-by-case basis – e.g. for *ániti* in ADh. 7.2.76 (*Vasu* VII: 1390).

[17] For instance, see ADh. 7.3.93–98, which addresses the *ī* in aforementioned *brávīti* (7.3.93), *ámīti* (7.3.95) and *ā́nīt* (7.3.98) (*Vasu* VII: 1447–1449); similarly for forms of √*gra(b)h-* 'seize' like pst.pass.ptc. *gṛ(b)hītá-*, see ADh. 7.2.37 (idem: 1376).

[18] For instance, ADh. 7.4.40–45 handles the *ā/i* alternation in cases like *sthitá-* √*sthā-*, *(d)hitá-* √*dhā-* (*Vasu* VII: 1469–1470), while ADh. 6.4.113 deals with *ā/ī* of reduplicated present stems , cf. fn. 15 (*Vasu* VI: 1291).

[19] For the *ā/Ø* alternation (i.e. absence of *ĭ*) in the reduplicated present forms of √*dhā-* 'place' (e.g. 1pl.ind.act. *da-dh-mas*), see ADh. 6.4.112–113 (*Vasu* VI: 1291); similarly, for pst.pass.ptc. °*t-ta-* from √*dā-* 'give', see ADh. 7.4.47 (*Vasu* VII: 1471). As for the null reflex in verbal roots not ending in *ā*, Pāṇini allows some *seṭ* roots to take *aniṭ* forms as well – e.g. *kliṣ-ṭa-* vs. *kliś-ita-* in ADh. 7.2.50 without a difference in meaning (idem: 1381), or the forms *so-tā-*/*sav-i-tā-* √*sū-* 'impel' in ADh. 7.2.44 echoing *potā-*/*pavitā-* in §1.1 (idem: 1378–1379). Note that Pāṇini allows some *aniṭ* roots to take *seṭ* forms too, and these *seṭ* as well as *aniṭ* roots that take the *i* optionally are called *veṭ* (*vā-iṭ* 'with optional *iṬ*') – for more details on these, see Aufderheide and Keydana (2016: 139–140). The existence of the *veṭ* class suggests that the *i* vowel going back to **H* has spread to roots that did not end in laryngeal originally.

[20] i.e. **ə > *i >> ī*. This was the explanation given for *ī* in weak forms like *ádhīmahi* and *śiśīmási* (cf. fn. 15), with the lengthening of **i* motivated by a drive to match the quantity of the vowel in the corresponding strong forms (e.g. *ádhāt*, *śiśāmi*) (Wackernagel 1896: 20, 81). The lengthening was also thought to be influenced by other forms in *ī* – cf. fn. 21.

gā́y-ati ‘sings’ vs. pst.pass.ptc. *gī-tá-* ‘sung’[21]. More recent works on the topic, operating within the framework of laryngeal theory, replace the **ə* with one of the three laryngeals, and try to better specify the phonological conditions under which they are vocalized (to *ī̆*) or just lost (*Ø*).

For the loss of laryngeals in interconsonantal positions, two main factors have been identified in the literature so far: the place of accent and syllable structure. There is no consensus on the details of the conditioning involved, however. Some have proposed that the laryngeal was lost in certain pre-tonic positions (Schmidt and Peters, apud Aufderheide and Keydana 2016: 131–133) while others advocate for a general post-tonic loss (Lipp 2009: 485–486; Cantera 2018: 488). Similarly, some maintain that the laryngeal was lost at the edge of a syllable, in the position **CH.CC* (Hackstein 2002; Lipp 2009: ibid.), while others opt for laryngeal vocalization instead, in such a sequence of four consonants (Beekes 1981: 282–284). Scholars also acknowledge the role of both accent and syllable structure in their formulations (ibid.)[22]; word attestations where the two are at odds with each other, as well as other exceptions to the formulated rule, are taken as later analogical reshapings of the language. The diversity of opinions extends to the dating of these rules as well, with both Proto-Indo-Iranian and PIE being put forward as candidates (Lipp 2009: 485–486).

As for the outcome of the vocalized laryngeals, past efforts to explain the quantity of the vowel there can be subsumed under two main approaches:

a) *i* is the regular outcome everywhere; **H* → *ī* in the attested instances are then to be understood as secondary developments from an earlier *i* (**H* > *i*; *i* → *ī*) (Insler 1971: 573, 580; Beekes 1981: 285; 1988b: 62–63, 68)[23].

[21] Such an alternation *āi/ī* is possible to see in the Indian tradition, where the root here is given as √*gai-* ‘sing’, and *gā́yati* classified as a Class I present (Kale 1969: §Appendix 2.34; Macdonell 1910: 19). Wackernagel (1896: 19–20, 87–89) assumed the same alternation to underlie **H* → *ī* instances like pst.pass.ptc. *gr̥bhīta-* √*grabh-* ‘seize’ (cf. 3sg.prs.ind.act. *gr̥bhāy-ati*) as well as present forms like *amīṣi*/*bravīti* and the aorist endings of *-īs*, *-īt*. However, modern scholarship sees *gā́yati* as a Class IV present (i.e. *gā-ya-ti*) made to √*gā-* ‘sing’ < **g$^{(w)}$eH(i)-* (*LIV*$_2$: 183; Macdonell 1910: 331). On how Pāṇini handled the alternation in *gā́yati* vs. *gītá*, see ADh. 6.4.66 (*Vasu* VI: 1276–1277; Kiparsky 2007: 11).

[22] A more radical formulation is that of Aufderheide and Keydana (2016), who advocate for laryngeal deletion everywhere (at least in the initial and medial syllables). In this model, laryngeals do not “vocalize” and the vowel(s) we see in the interconsonantal context are the result of later *i*-epenthesis, independent of the phonology of laryngeals (idem: 125, 151).

[23] Note that this is essentially the same approach as the one adopted by Wackernagel (cf. supra), with PIE **ə* replaced by the laryngeals.

b) *i* and *ī* are both regular outcomes, with the split conditioned phonologically (**H* > *i, ī*) (Kuiper 1947: 203; 1955: 33, 37; Jamison 1988: 220–226)[24].

Given the presence of (near) minimal pairs where *i* and *ī* alternate (as in *variman-*/*varīman-* or *ániti*/*ámīti*, cf. §1.1), scholars following approach (b) also assume a secondary development of *i* → *ī* for certain instances, but here, they have a distinct advantage in that secondary *ī*'s can be readily explained as analogical developments, modeled after **CHC* contexts where one would regularly find *ī* (Jamison 1988: 214; Cantera 2018: 488)[25]. On the other hand, for approach (a), the source of the secondary lengthening *i* → *ī* needs to be sought elsewhere, either in further sound change (*i* > *ī*)[26], or analogy (*i* >> *ī*) to instances that have *ī* regularly from other contexts (i.e. not from **CHC*)[27]. In her landmark paper on the topic, Jamison (1988) evaluates both of the above approaches, and opts for approach (b) in the end, citing the lack of other models that can adequately motivate the sort of widespread lengthening that is required for (a)[28]. In regards to the conditioning required for her chosen approach, she proposes that *ī* was the regular outcome only in closed final syllables (*°*CHC*# > °*CīC*#; cf. **h₁é-mleuh₂-t* > *ábravīt*) while elsewhere, *i* was the norm (idem: 220, 226).

Jamison's work here has been quite influential: later works, especially those in the last decade, have used her proposal as a starting point, focussing more on topics that she did not cover, like the mechanism behind the lengthening in final syllables (Kümmel 2016: 217–222; Byrd 2016), or the relation of Indic changes to that in Proto-Indo-Iranian (Olsen 2018: 260–265; Kümmel 2016: passim). However, most of the general Indo-European handbooks and introductions only include *i* as the regular reflex of the vocalized laryngeal in Sanskrit (Kobayashi 2018: 327, 332; Beekes 2011: 147–148) – thus implicitly supporting approach (a) above – and even when *ī* is acknowledged, the conditioning of final syllables is mentioned

[24] Mayrhofer (1981: 435) seems to allow both *i* and *ī* as outcomes, but does not specify any conditioning.

[25] Under this approach, a secondary development *ī* → *i* is also possible, after contexts where *i* is regular.

[26] As Kuryłowicz (apud Narten 1964: 54) attempts to do, cf. fn. 70 later. Since **i* is preserved as *i* in Sanskrit (Beekes 2011: 139), it is in general difficult to attribute the lengthening in **H* > *i* → *ī* to sound change.

[27] Thus Wackernagel (1896: 20), cf. fn. 20.

[28] For the various *i*/*ī* ← **i* alternations in Sanskrit (e.g. denominatives to *i*-stems like 3sg.prs.ind.act. *kavīyáti kavi-* 'poet'; cf. §3.2.1, §4.1), see Jamison (1988: 214–220). Jamison concludes that these cannot act as possible models for **H* > *i* → *ī* in approach (a), since they are confined to relatively marginal morphological categories in the overall context of the Sanskrit grammatical system and also, the number of *ī* instances in these categories that could go back to an interconsonantal laryngeal are not that many.

tentatively (Fortson IV 2010: 212), or not at all (Meier-Brügger 2013: 115–116)[29]. There are also doubts to whether Jamison's proposal can explain all the attested data (cf. Gippert 1997: 74), and in direct contrast to her formulation, scholars like Lubotsky (2018: 1882–1883) continue to specify *i* as the regular reflex of vocalized laryngeals in final syllables[30].

Whatever one's disposition may be towards the status of *ī* as an outcome of laryngeal vocalization, another point of contention among scholars has been in regards to the dating of the vocalization process, like it was for laryngeal loss (cf. supra). It is widely accepted that the laryngeals had already vocalized in final syllables by Proto-Indo-Iranian times (Beekes 1981: 285; Kümmel 2016: 217), but whether the same holds for certain other positions is debatable. Some date the vocalization in all other positions to a Pre-Indic[31] stage (Kümmel 2016: 221–222; Olsen 2018: 264), while others argue for a PIIr. vocalization already in select words like *duhitár-* 'daughter' < **dʰugh₂tér* f. 'daughter' and *pitár-* < **ph₂-tér-* m. 'father' (Lipp 2009: 485; Beekes 1981: 285), though the conditioning for the vocalization here is often acknowledged as unclear (Lubotsky 2018: 1883; Beekes 1981: 285). A further wrinkle is added by the vocalization process itself, for which there are two main camps: one believes that the laryngeal consonants vocalized directly to yield the vowels we see (Beekes 1989: 24; Rasmussen, apud Kobayashi 2004: 132), while the other opts for indirect vocalization, via epenthesis of a vowel next to the laryngeal (Kümmel 2016: 217, passim; Byrd 2016: 19; Werba 2005: 724)[32].

From such differences in opinions, it is clear that the same core evidence is often interpreted in contrasting ways and in fact, this will be a common theme throughout much of the literature discussed in this thesis.

[29] Hence the remark in Kümmel (2016: 216), that the importance of Jamison's contribution and its consequences for the history of Indo-Iranian has not been recognized.

[30] Yet another dissenting opinion is that of Lipp (2009: 389–394), who on account of Iranian data (cf. §2.5.1) has proposed that a super-short **i* was actually the regular development here, which later fell together with Skt. *ī*. Kümmel (2016: 217) however notes that there is no parallel for such a process in Indic.

[31] I use the term Pre-Indic to refer to the period of Sanskrit prehistory after the breakdown of Proto-Indo-Iranian.

[32] A third position argues against "vocalization" altogether, promoting laryngeal deletion as the primary development – cf. fn. 22 earlier.

1.3 Thesis goals

The central goal of this thesis is to coherently describe the circumstances under which interconsonantal laryngeals yield each of the three Sanskrit reflexes *i*, *ī* and *Ø*. To that end, I will collect examples for each of the reflex, categorized by its position in the word (i.e. whether it is in final, medial or initial syllables)[33] – an organizing principle often utilized in literature (Kümmel 2016; Beekes 1988a: 85–87; Ravnæs 1981: 260–261) and also reflective of how the laryngeal development progressed through time, as it turns out. The analysis of the collected examples will proceed along the same lines. I will bring in existing scholarly opinions as relevant and offer my own takes on the data, especially when I find the given explanations lacking[34]. I will also discuss parallel data from Avestan along with those from Nuristani[35] and Middle Indic[36] languages, in as much as they can further illuminate the pre-history of the Sanskrit development[37]. And throughout the thesis, I will explore the viability of the following strategies to explain the data seen: a) sound change b) analogy c) compositional choice and errors[38] d) alternative morphological interpretation[39] – usually in the order specified here[40].

---

[33] Due to the sheer number of attestations (especially for $*H \rightarrow i$), I do not claim to be fully exhaustive here, but I also categorize the data further by attributes like the PIE root shape or the morphological domain of the attestations, and it is my hope that these categories will be representative enough of the full set of attestations. For the base data collection, I mainly rely on the surveys of Mayrhofer and Beekes (cf. fn. 4), along with the standard reference works outlined in fn. 1.

[34] As in the development of present ninth class weak suffix *-nī-* (§3.3), or potential root nouns like *sanis* (§2.4.1).

[35] Nuristani is either an independent branch of Indo-Iranian or an early offshoot of Indic (Degener 2002: 116; Cardona and Jain 2007: 26, 29; Nelson 2018: 53–54; Kümmel 2022a: 253–255). The matter continues to be debated, but whatever its exact position within Indo-Iranian may be, it can provide valuable counterparts to the usual Indic and Iranian data. I use Nuristani data sparingly though, owing to its late date of attestation (Kümmel 2022a: 253).

[36] Pāli and Prākrits are known to preserve Pre-Indic features that Sanskrit has done away with (Oberlies 1999: 44–48), implying that they followed a different line of development than Sanskrit, perhaps via several dialects that existed alongside the (dominant) one recorded in the Vedic texts.

[37] In theory, Indo-Iranian borrowings in Uralic could also be useful for our purposes here, but there does not seem to be any secure examples involving interconsonantal laryngeals (Holopainen 2019: 331–332, 336).

[38] For us, this includes lengthening (or elision potentially) of the *i* vowel for the sake of meter, along with poetic neologisms in some cases. Errors here refer to production errors occurring as part of the living language, and not to errors during (oral as well as written) transmission of the Vedic texts.

[39] This involves arguing for a derivation not involving an interconsonantal laryngeal. For the vocalic reflex *ĭ* , this amounts to a derivation going back to a real $*i$, while for *Ø*, it can mean an origin in *aniṭ* root instead of *seṭ*.

[40] Another possibility is that of some of the reflexes being dialectal – after all, existence of various Vedic dialects has been proposed (cf. Witzel 2005: 733, with further references) and is also assumed to explain certain Middle Indic developments (cf. Oberlies 1999: 44). However, I will not pursue this path much, since it is difficult to

With all this, I hope to not only explain the distribution of the three reflexes, but also describe how and when the laryngeal changes took place. In this regard, the vocalization of laryngeals has generated more questions (cf. §1.2) and accordingly, the thesis will focus more on cases of *i* and *ī*, compared to those of *Ø* (i.e. laryngeal loss). While I will end up adopting Jamison's methodological approach here – that *i* and *ī* were both regular reflexes of the vocalized laryngeal and it is not possible to explain all *ī*'s as secondary development alone[41] – I will also closely examine Jamison's proposal for the conditioning environment (*ī* in closed final syllables and *i* elsewhere), keeping an open eye for other possible environments that can explain the split[42].

A side goal of the thesis is to explore other oddities related to the development of interconsonantal laryngeals in Sanskrit. It is fairly well-established that in **CHV* sequences, the laryngeal aspirated a preceding stop in Sanskrit[43], but whether the same holds true in a **CHC* cluster is not immediately clear. The case of *duhitár-* < **dʰugh₂tér-*, with its medial *h* (from earlier **gʰ*), seems to support the idea of aspiration even from an interconsonantal laryngeal, but then the development of *pitár-* < **ph₂tér-* tells a quite different story. Such a behavior of the laryngeals needs to be understood in relation to their vocalization as well as loss in **CHC* positions – the simultaneous vocalization and aspiration of words like *duhitár-* is especially problematic here. Similarly, the exceptional status of Indo-Iranian **H̥ > i* also deserves some attention. As has been well-noted (cf. Kümmel 2022a: 251), this development of Sanskrit (along with Avestan) stands in marked contrast to other branches, which all show lower vowels from vocalized laryngeals. I will investigate the underpinnings of this striking difference, but only

falsify a claim that dialectal variation underlies our laryngeal reflexes, without analyzing the textual context of the data utilized – an endeavor for which I do not have time and space currently.

[41] i.e. approach (b), as discussed in §1.2.

[42] To my mind, this has not been explored much in literature. Besides Jamison (1988: 220), the only other concrete attempt I could find was that of Kuiper (1947: 203; 1955: 33, 37) – see §3.2.2 later.

[43] As in gen.sg.n. **meǵh₂-os* > *mahas* 'of great'; **plth₂-u-* 'broad' > *pṛthú* (Beekes 2011: 149). The evidence is clearest with voiceless stop **t*, but there seems to be enough evidence for other tenues as well as mediae (Mayrhofer 2005: 110–116; Kümmel 2018: 162–163). Also, that **h₂* aspirated in this context is widely agreed upon but whether the same can be said for **h₁* is debatable – against the idea, we find scholars like Mayrhofer (1981: 432; 2005: 115) and Hoenigswald (1965: 95), while Beekes (1986: 6; 1988b: 63; 1989: 24) argues for aspiration by **h₁* too, cf. Olsen (1993: 370) as well; Kümmel (2018: 163; 2022a: 250–251) is more cautious but optimistic in the end that **h₁* also aspirated. As for **h₃*, on account of forms like 3sg.prs.ind.act. *pibati* < **pi-ph₃-ti* 'drinks', it is normally held that this laryngeal had a voicing effect instead (Mayrhofer 2005: 115), but see Jakob (2017: 10) for *phena-* 'foam' which may reflect aspiration even from **h₃*.

from an Indo-Iranian perspective; a fuller study that incorporates details of laryngeal development from other branches is to be considered out-of-scope here.

At this juncture, it seems wise to identify other relevant topics which I will not take up in this thesis. Post-consonantal laryngeals in absolute auslaut (i.e. *°*CH#*) vocalize to *i* in Sanskrit while pre-consonantal laryngeals in absolute anlaut (**#HC°*) are lost[44] (Lubotsky 2018: 1882; Beekes 2011: 147–148), but despite the obvious parallels to **CHC* development, I will not explore these positions in great detail. Also excluded is the development of *ī* vowel in the change **CLHC* > *CīrC*[45], where it is the liquid that behaves as the vocalic element and not the laryngeal[46]. In other words, I strictly adhere to developments in **CHC* positions, with **C* representing either an obstruent (**T*) or a (consonantal) resonant (**R*).

Finally, an overarching goal of the thesis is to determine the extent to which we can rely on the 'regularity' of sound change – cf. Hock (2021: 38–59) – to explain the Sanskrit developments under discussion. I see three possibilities here: a) sound change rule(s) can be formulated so as to explain all of our data, without exceptions[47] b) at least some laryngeal developments occurred irregularly in this context[48] c) we do not have enough data to determine it either way. Thus, in this thesis, I will not only tackle a long-standing problem surrounding the development of PIE laryngeals, but also try to validate a foundational tenet of historical and comparative linguistics, in as much as the data allows.

---

[44] For some potential forms where the laryngeal vocalized even word-initially – e.g. 3sg.prs.ind.act. *irajyáti* 'conduct straight, lead' derived from **h₃reǵ-* – see Olsen (1993: 362–368), cf. Gotō (2013: 107).

[45] *CūrC* in the vicinity of labials (Beekes 2011: 151; Clayton 2022: 78).

[46] A possible pathway for the development here: PIE **CLHC* > PIIr. **CərHC* > Pre-Indic **Cir(H)C* > Skt. **CīrC* (cf. Av. *Carəc* /Carc/) (Clayton 2022: 61–72). The extra-length of of the vowel in Sanskrit is especially problematic, but likely not related to the laryngeal (and its loss) – Clayton (idem: 65–72) interprets it as a function of the articulation of Pre-Indic **r*; Lubotsky (1997b: 140, 147–148) considers it to be a reflex of accented **L̥*, at least in **CLHWV* sequences.

[47] This refers to exceptions *after* allowing for other strategies (e.g. analogy, cf. supra). For a complex enough distribution like the one being pursued here, it is a given that sound change alone cannot explain everything.

[48] While the neogrammarian notion of sound change regularity is often assumed in studies like this, some scholars are receptive to the idea of irregular development, specifically for laryngeal changes. For instance, Clackson (2007: 60–61), drawing on a parallel from the loss of guttural consonants in Maltese: "It would be wrong to imagine that there is no regularity at all in the sound-changes relating to laryngeals, but perhaps the researcher should not be surprised if laryngeal developments are not completely regular and exceptionless."

2. Development in Final Syllables

2.1 Data

There are not many morphological contexts in PIE where we find a **CHC* sequence word-finally, because of the lack of inflectional endings of the shape ***-(C)HC* (Beekes 2011: 186, 282)[49]. Moreover, among the commonly reconstructed derivative suffixes, the only ones ending in a laryngeal are the stative/fientive **-eh₁-* used to make present stems (Lundquist and Yates 2018: 2162) and the feminine suffixes **-i(e)h₂-* and **-eh₂-* (idem: 2096), but since all of these begin with a vowel, they cannot be part of a **°CHC#* context[50]. Hence, the medial laryngeal needed here has to come from a root-final or root-internal position i.e via roots of shape **Ce(C)H-* or **CeHC-*. Keeping this in mind, we will now list all the possible morphological classes in PIE that can supply an interconsonantal laryngeal in final syllables, along with the associated Sanskrit examples. There are no known cases of **H → Ø* in this position so we just need to focus on the reflex of *i* vs. *ī*.

2.1.1 *Cases of ī*

Class	Shape	Examples
root aorists; imperfects to root presents	2sg. **CeCH-s*	aor.inj.act. **k$^{(w)}$remH-s → krámīs*[51] √*kram-* 'stride'
		aor.inj.act. **ued^{h}h₁-s → vádhīs* √*vadh-* 'slay'
		aor.ind.act. **h₁é-sterh₃-s → ástarīs* √*st̥r̄-* 'strew'
		iprf.ind.act. **h₁é-mleuh₂-s → ábravīs* √*brū-* 'speak'
	3sg. **CeCH-t*	aor.ind.act. **h₁é-g^{h}rebh₂-t → ágrabhīt* √*grabh-* 'seize'
		aor.ind.act. **h₁é-ḱerh₂-t → áśarīt*[52] √*śr̥̄-* 'crush'
		iprf.ind.act. **h₁é-h₃emh₃-t → ā́mīt* √*am-* 'injure'
		iprf.ind.act. **h₁é-h₂enh₁-t → ā́nīt* √*an-* 'breathe'

[49] Indeclinable words ending in **CHC* seem to be non-existent as well (Beekes 2011: 246–250).

[50] Lundquist and Yates (2018: 2162) also list a factitive suffix *-h₂-* but since it is attached to thematic adjectives, it is to be ruled out too. On the other hand, **-eh₂-* suffix may have ablauted originally, with its Ø-grade capable of providing the **CHC* context under discussion – for traces of this, see §2.1.2.

[51] In Sanskrit, original root aorist forms like this (i.e. those ending in 2sg. *°īs,* 3sg. *°īt*) are synchronically categorized as *iṣ*-aorists and not root aorists (Macdonell 1910: 382–383) – cf. fn. 53.

[52] An abnormal form *ásarait* also exists in AVŚ, but it is a secondary formation (Narten 1964: 257–258).

s-aorists	2sg. **CēCH-s-s*	aor.inj.act. **sēuH-s-s → sā́vīs*[53] √*sū-* 'impel' aor.inj.act. **tērh₂-s-s→ tā́rīs* √*tr̥̄* - 'cross'
	3sg. **CēCH-s-t*	aor.ind.act. **h₁é-sēuH-s-t → ásāvīt*[54] √*sū-* 'impel' aor.ind.act. **h₁é-h₃rēuH-s-t→ árāvīt* √*ru* - 'cry' aor.ind.act. **h₁é-kērH-s-t→ ákārīt* √*kr̥̄* - 'commemorate'

Table 1. Attestations of *ī* from interconsonantal laryngeals in final syllables

In the table above, the morphs 2sg. **-s* and 3sg. **-t* are those of the PIE active secondary endings. We might also expect 1sg. **-m* to behave the same way, participating in the context **°*CHC#* under investigation. However, in word-final positions after a consonant, PIE nasals were syllabic, ultimately vocalizing to *a* in Sanskrit – e.g. PIE **dékm* > Skt. *dáśa* 'ten', cf. Av. *dasa,* Gr. δέκα, Lat. *decem* 'id.' (Kobayashi 2018: 327). Thus, PIE forms like **h₁é-gʰrebh₂-m*[55] 'I seized' and **h₁é-sēnh₂-s-m* 'I gained' did not really possess an interconsonantal laryngeal in final syllables; they should have yielded Skt. ***ágrabha* and ***ásāniṣa* respectively, and the attested forms of *ágrabham*[56] and and *ásāniṣam* are best explained as analogical remodeling of the

[53] The termination here ends up being the same as that of the root aorists/imperfects (cf. *ákramīs, ábravīs*) but other forms of the paradigm clearly show the **-s-* morph – e.g. 3pl.aor.ind.act. *ásāviṣur* < **sēuH-s-*, with the laryngeal vocalizing to *i* in medial syllables (cf. §3.1). The resulting °*iṣ-* element in this paradigm has been interpreted as a morph, serving as a marker of the Sanskrit *iṣ*-aorist class, and also being utilized to reshape original root aorist forms like *akramīs* into *iṣ*-aorists, cf. 1sg.aor.ind.act. *kram-iṣ-am* (the ablaut grade of the root here betrays the root-aorist origin of the form; original *s*-aorist forms use the lengthened grade, like in *sāvīs*) (Gotō 2013: 113–114).

[54] 3sg. **h₁é-sēuH-s-t* should yield 3sg. ***ásāvīs* with final consonant cluster simplified – cf. 3sg.iprf.ind.act *h₁é-h₁es-t* > *ā́s* for √*as-* 'to be', remade into *ā́sīt* later (Gotō 2013: 101). Such a form must have been replaced by *ásāvīt* to avoid the homophony with 2sg. ***ásāvīs* (not attested, but the injunctive form *sā́vīs* is present), under the influence of 3sg. root aorist forms like *ákramīt,* where *-t* would not be lost. Narten (1964: 54) presents a similar view in her monograph on the *s*-aorists.

[55] In the sequence °*CHm#* too, the nasal would be syllabic, since laryngeals are less sonorous than the nasals (Kobayashi 2004: 22–23)

[56] There is also a form *ágrabhīm* attested in Taittiriya-Saṁhitā (Macdonell 1910: 382), which seems to match the proposed laryngeal vocalization pattern of 2sg. *ágrabhīs* and 3sg. *ágrabhīt* – other similar verbal forms in °*īm* are 1sg.aor.inj.act. *vádhīm* (RV 1.165.8, 10.28.7) and 1sg.aor.ind.act. *ákramīm* (RV 10.166.05) (VedaWeb). However, these are normally explained as later analogical creations based on the model of 2sg. and 3sg. forms in °*īC* (Macdonell 1910: 382). Given the preference of the final nasal to be vocalized in this phonotactic context, it makes sense that *ágrabhīm* was not the original outcome here. Also, if it had been (and *ágrabham* was a later analogical creation), we should expect forms of type 2sg. ***ágrabhas* and 3sg. ***ágrabhat* to be produced, but no such forms exist.

former, based on thematic formations like *ávidam* < **h₁é-uid-o-m*[57] 'I saw' where the consonantal *-m* is entirely regular.

Similarly, one might also expect 3pl. **-nt*[58] to facilitate a **°CHC#* context, but even here, the nasal vocalizes, as in the root imperfect form **h₁é-ph₂-nt* > **ápHat* > ***ápat* >> *ápur* 'they protected'[59] – the ***-at* ending that would have been regular in these contexts is preserved in Iranian, but is consistently replaced by 3pl.prf.ind.act. *-ur* in Sanskrit, cf. 3pl.prs.inj.act. *ǵʰe-ǵʰh₁-nt* > OAv. *zazaṯ* 'they left behind' ~ Skt. *jahur* (Gotō 2013: 104; *LIV₂*: 173).

Note the absence of roots of type **CeH-* and **CeHC-* in Table 3 – only their Ø-grade can show an interconsonantal laryngeal, which the sg.act. of root formations and *s*-aorists do not utilize, cf. 3sg.aor.ind.act. **h₁é-dʰeh₁-t > ádhāt* made to **dʰeh₁-* 'place' (Beekes 2011: 263–264). And while the required Ø-grade of such roots would be present in the weak forms of the plural or the middle, the endings there with an inherent vowel are all capable of adding an extra syllable by themselves (Beekes 2011: 282), which means the laryngeal in these forms would not be in a final syllable. Thus, only roots of type **CeCH* are eligible here.

2.1.2 *Cases of i*

Class	Shape	Examples
m./f. root nouns	nom.sg.**CeCH-s*	**senh₂-s* → m. *sanís* 'gain, reward' **uietH-s* → f. *vyáthis* 'wavering' **gʰr̥bh₂-s* → m. *gr̥bhis* 'grasping'
	nom.sg. **CH-s*	**-dʰh₁-s* → m. *(ni)-dhís* 'store, treasure' **-sth₂-s* → f. *(prati)-ṣṭhís* 'resistance'

[57] For athematic formations, the remodeling of 1sg. **-m* to *-am* is a wide-spread phenomena in the Sanskrit verbal system, with a parallel in the nominal system too: acc.sg.m. **-m* >> *-am*, as in *ph₂ter-m* → Skt. *pitaram* 'father' under the influence of vocalic formations like *devam* 'god', *śucim* 'bright' (cf. Gr. *πατέρα* where the final **-m* is regularly preserved as *-a*) (Beekes 2011: 187).

[58] This is the Ø-grade allomorph of the 3pl. ending **-ent* (Beekes 2011: 263–264) and is visible in the imperfect form *ábruvan* (Macdonell 1910: 340).

[59] A similar example for our other class (*s*-aorist) here: *h₁é-sēuH-s-nt* > ***ásāvīṣat* >> *ásāviṣur* 'they impelled'.

Class	Shape	Examples
-(e)h₂- stem nouns	nom.sg. **CeC-h₂-s*	**gʷén-h₂-s* → f. *jánis* 'wife'[60]
neuter *s*-stem nouns	nom/acc.sg. **CeCH-s-Ø*	**kreuh₂-s-Ø* → n. *kravís* 'raw flesh' **uietH-s-Ø* → n. *vyáthis* 'wavering' **sedh₁-s-Ø* → n. *sádhis* 'seat'

Table 2. Attestations of *i* from interconsonantal laryngeals in final syllables[61]

Formations in acc.sg.m./f. **-m* are not included in the above table for the same reason as that of the verbal morph 1sg. **-m* in §2.1.1: in the sequence **°CH-m#*, the nasal would vocalize first (cf. fn. 55), which means attestations like *saním* and *nidhím*, seemingly reflecting **H̥ → i* in the final syllable, must be remodellings based on the nom.sg. forms. Other athematic nominal endings comprised of just consonants and potentially capable of participating in a **°CHC#* context are gen.sg. **-s* and acc.pl. **-ns* (or **ms*) (Beekes 2011: 186–188), but the former is a Ø-grade allomorph of the more common **-es*, generally restricted to sonorant-final stems (cf. **dem-s° > dámpati* ~ Gr. δεσπότης 'master of the house'), while in the latter, the nasal would vocalize again after a stem ending in a laryngeal (cf. **ped-ns > padás* 'feet') (Lundquist and Yates 2018: 2084, 2086).

For roots of type **CeH-* (e.g. **dʰeh₁-*) in Table 2, the Ø-grade of the root is utilized even in the nominative (e.g. *ni-dhís*), which goes against our general expectation for strong forms of PIE root nouns[62] (Beekes 2011: 209). This may indicate that the Ø-grade in these forms was generalized from the weak cases, where it could have occurred naturally as part of an ablauting paradigm – we will address the etymology of these forms more in §2.4.1. Similarly unnatural is the Ø-grade of the root formation nom.sg.f. **°ḱh₂s-s → ā-śíṣ*, for *ā-śiṣ-* 'wish, blessing' (cf. the simplex nom.sg.f. **ḱeh₂s-s > śā́s* 'commander, ruler'); as per Jamison (1988: 221), this also seems to be the only case of **°CHC#* from roots with internal laryngeal (i.e. type **CeHC-*). I did

[60] This is the only generally agreed upon instance of an ablauting *-eh₂-* formation in Indo-European, cf. §2.4.2. f. *nābhi-* 'navel' may also have exhibited a similar ablaut – for the details, see Kümmel (2016: 221; 2018: 165).

[61] I am unable to find any potential examples of **h₃ → i* here.

[62] There are attested root nouns with Ø-grade only (Beekes 2011: 210), but the examples seem to have root-internal **i* and **u* which we do not have here.

not list *āśī́s* in the table above because it shows *Ḫ* → *ī*. However, the long vocalism here is generally thought to be analogous after derivatives of *ā-śir-* 'mixture'[63], like *ā-śī́r-vant-* 'mixed with milk' and *á-śīr-ta-* 'id.' < *°*ḱr̥h₂-C°* (ibid.; *EWAia* I: 178) where the *ī* is a regular development[64]. The analogy here is plausible since an original nom.sg. form ***āśis* would surface as ***āśir* in sandhi before a vowel or a voiced consonant (Kobayashi 2018: 338), which makes it likely to be confused with *āśī̆r°* forms[65]. Thus, given the fact that *āśī́s* has the unnatural Ø-grade as well as the likelihood of influence from *asīr°* forms, I am inclined to treat this as a late creation[66], first based on the regular weak stem *āśiṣ-* (as in ins.sg. *°*ḱh₂s-eh₁* > *āśíṣā*, cf. §3.1), which copied the vocalism of *asīr°* subsequently. The form *āśīs* then can have no bearing on our investigation of laryngeal vocalization in final syllables.

2.2 Interpretation

It is interesting that all the cases of *Ḫ* → *ī* (Table 1) belong to the verbal paradigm while those for *Ḫ* → *i* (Table 2) are limited to the nominal. Across the two, there is no obvious split in phonological environment that would dictate different laryngeal reflexes – in fact, the verbal morph of *-s* (2sg.) and nominal morph of *-s* (nom.sg / *s*-stem marker) are the same phonetically. To reconcile the divergent development of the laryngeal then, we must regard one of the developments as primary while the other secondary. Scholars agree on this general approach, but when it comes to picking the actual primary and secondary development here, opinions differ.

2.2.1 *i as the regular outcome*

For Beekes (1981: 285; 1988b: 68) and Lubotsky (2018: 1882–1883), the interconsonantal laryngeal vocalized to *i* regularly in final syllables – a phenomena that can be dated to Proto-Indo-Iranian times itself based on parallel formations in Iranian, as in neuter *s*-stem formations like OAv. *təuuiš-* ←**teuh₂-s-Ø*. This idea is normally paired with the development of

[63] Pertaining to "especially the milk which is mixed with the Soma juice to purify it" (*MWSE*: 158).

[64] PIE **CRHC* > Skt. *CīrC* (Beekes 2011: 151)

[65] cf. the sole Rigevdic attestation of nom.sg. *āśīs* at RV 10.128.3 (*VedaWeb*). In some forms, we also see *āśiṣ-* adopting the *āśir-* stem – for the examples, see *EWAia* I (178).

[66] The late attestation of *āśī́s* starting only from Book 10 of the Rigveda and then the Atharvaveda – both being younger texts (Jamison and Brereton 2014: 4, 12) – also lends support to this interpretation. The specific RV stanza where *āśī́s* is found is marked as a late addition by multiple scholars too (*VedaWeb*).

the post-consonantal laryngeal in absolute auslaut position (*°*CH#*), which is consistently *i* (and not *ī*) – cf. nom./acc.pl.n. **-h₂* > Skt. *-i*, Av. *-i* as well as 1pl.midd. **-medʰh₂* > Skt. *-mahi*, OAv. *-maidī*[67] (ibid.); it seems natural for the laryngeal vocalization pattern to align in final syllables. The long vocalism of the Sanskrit verbal forms in *-īs/īt* ← **°H̥C#* (cf. Table 1) is not discussed by both Beekes and Lubotsky[68], but presumably it is a secondary development limited to Indic in their model.

However, there are no traces of the expected ***-is/-it* in the Sanskrit verbal system and it is also not clear to me the means by which we can secondarily explain the long vocalism[69]. In theory, the long vowel could have been a product of compensatory lengthening, when the 2sg. and 3sg. endings drop out in the s-aorist forms: 2sg. **h₁é-sēuH-s-s* > ***ásāviss* > *ásāvīs*[70] (3sg. form should also be the same originally, cf. fn. 54). Then from these forms, the vowel could have spread to the root aorists and imperfects (e.g. 2sg. **h₁é-mleuh₂-s* > ***ábravis* >> *ábravīs*). But there is no concrete evidence[71] that final cluster simplification of this sort lengthened the preceding vowel in such verbal forms, cf. the root aorist formations from √*kr̥*- 'make': 2sg. **h₁é-ker-s* > *ákar* as well as 3sg. **h₁é-ker-t* > *ákar*[72]. If the *s*-aorist forms to *seṭ* roots were not

[67] /madi/ (Beekes 1988a: 85, 154).

[68] Granted, this is likely because they focus on the situation in Proto-Indo-Iranian and Iranian in their articles.

[69] General treatises on the morphology of *s*-aorists correctly attribute the *ī* in these forms to laryngeals, but gloss over the details that produced it alongside the more frequent *i* (Gotō 2013: 113, 116; Beekes 2011: 264). We do not have the luxury of avoiding the topic here, since it is precisely the focus of this thesis.

[70] Kuryłowicz (apud Narten 1964: 54) proposes an alternative route for the change here: 2sg. **-iss* > **-iz̧z̧* > **-irr* > *-īr*, taking inspiration from the following sandhi rules: a) word-final *s* → *r* before a vowel or a voiced consonant b) °*Vr r*° → °*V̄r*° (Kobayashi 2018: 338; Macdonell 1910: 72). These sandhi rules operate only between words and not internally though. Also, if long *ī* was to be found originally only next to *r* produced in a voiced environment, we should expect at least some traces of ***-is#* before a word beginning with a voiceless consonant, even if the vowel there was leveled based on the outcome in the voiced environment.

[71] Other proposals of similar phenomena exist, namely Szemerényi's Law to explain the famous lengthened grade of words like nom.sg.m. **ph₂ter-s* > *pitā* 'father' (cf. Gr. πατήρ), and word-final degemination triggering the lengthening in nom.sg. *h₂éus-os-s* > *uṣā́s* 'dawn' (cf. Gr. ἠώς). But these proposals are for PIE itself while here, we are looking to explain an Indic-specific phenomena: even Avestan does not have the long vowel in these verbal forms (cf. §2.5.1 later). Also, for each of these proposals, alternate explanations exist and the matter is far from settled – for a brief summary, see Byrd (2016: 22).

[72] Here, there is a possibility that the root vocalism of earlier 2sg./3sg. ***akār* was leveled to *akar* based on other forms of the paradigm, but 1sg. *akaram* is the only form that would have the full grade in this scenario; it is hard to imagine that the short vowel would have spread from it alone to not just the proposed 2sg. and 3sg. forms but also 1pl. *ákarma* << **h₁é-kr̥-me* and 2pl. *ákarta* < *h₁é-kr̥-te* (both of which had zero grade originally, cf. 3pl. *ákran* < *h₁é-kr̥-ent*), unless the spread of the full grade to plural forms happened at a stage when we still had 2sg. *akar-s* and 3sg. *akar-t*.

the original source, we can also try to see if the long vowel spread from other formations[73] (i.e outside of the classes under investigation in Table 1), but there are no good models for it; we actually find the direction of spread to be the other way round – over time, the *-īs* and *-īt* endings encroach the verbal paradigms of *aniṭ* roots too, as in imperfect forms of √*as-* 'to be': 2sg. *á́s-īs*, 3sg *á́s-īt*[74].

A formulation of *°*CHC*# > °*CiC*# explains the bulk of our evidence (cf. Table 2) in a straightforward manner, but given the lack of good secondary explanations for the long vocalism of *-īs*/*-īt* forms, we need to be open to the possibility of *ī* being the regular outcome of laryngeal vocalization in final syllables.

2.2.2 *ī as the regular outcome*

This now brings us to Jamison's proposal of the interconsonantal laryngeal vocalizing to *ī* in final syllables. Her primary evidence for the proposal are verbal forms of the type *-īs* and *-īt* as laid out in Table 1 (Jamison 1988: 220) – exactly the forms we had trouble explaining in the previous section. As she notes, there are no exceptions to *°*CHC*# > °*CīC*# in the verbal system, but we now need to account for the data from the nominal system[75] (cf. Table 2), where the laryngeal reflex is seemingly short *i*. It turns out that it is possible to find reasonable, alternative explanations for this dataset and we will tackle all of it in §2.4, but first, let us briefly look at the underlying mechanics of the proposed change here, in regards to how consonantal phonemes like the laryngeals[76] could have vocalized, and that too as a long vowel *ī*.

---

[73] At this point, a theoretical possibility is that of *ī* spreading from non-final syllables, where they could be a regular laryngeal reflex. In subsequent sections, we will see this is not feasible, cf. §3.2.2.

[74] The existence of archaic 3sg. *á́s* < *h₁é-h₁es-t* (Gotō 2013: 101) proves that the terminations with *ī* are new to this paradigm. It is not surprising that *-ī-* spread to forms of *aniṭ* roots, since it keeps the personal endings 2sg. *-s*, 3sg. *-t* intact.

[75] With this proposal, we also lose the parallelism with *°*CH*# > °*Ci*# (cf. §2.2.1), but this is less of a problem. In closed vs. open final syllables, we can have differing developments; we will also address this better in §2.3.3 (cf. fn. 84), when we discuss the underlying mechanism for the vocalization.

[76] The clearest evidence of the consonantal nature of the PIE laryngeals is in the retention of **h₂* and **h₃* as a fricative in the Anatolian languages, as in **h₂ent-* > Hitt. *ḫant-* 'forehead' (cf. Skt. *ánti* 'before', Gr. ἀντί 'against') and **h₃eui-* 'sheep' > Luw. *ḫawi-* (cf. Skt. *ávi-*, Gr. οἶς) (Beekes 2011: 149; Kümmel 2022b: 203–204). **h₁* may also have been preserved in these languages similarly – Kloekhorst (2020) argues for a phonemic glottal stop in Hittite going back to **h₁*, as in 3sg.prs.ind.act. *h₁és-ti* 'he is' > Hitt. *ēšzi* <e-eš-zi> /ʔestsi/ (cf. Skt. *ásti,* Gr. ἐστί) (idem: 121). For potential retention of initial **h₂* as a consonant even in Iranian, see Kümmel (2022b: 205; 2018: 166). For other arguments to treat laryngeals as consonants, see Kobayashi (2004: 127–128).

2.3 Mechanism for *°*CHC*# > °*CīC*#

2.3.1 *The case for vocalization by epenthesis*

The exact phonetic values of the PIE laryngeals is still debated, but there is general agreement that they were fricatives[77], produced in the back of the mouth and throat[78] (Fortson IV 2010: 62; Byrd 2018: 2064–2065). While such sounds are capable of vocalizing directly in an interconsonantal position, forming the syllable nucleus on their own[79] (similar to what the PIE resonants do), the approach to be favored at least for the outcome in Indic is that of vocalization via epenthesis of a vowel next to the laryngeal and then the eventual loss of the laryngeal. This is so because it is difficult to arrive at the long vowel in final syllables here with direct vocalization of the laryngeal, but with the epenthesis approach, the proposal receives an immediate explanation: *°*CHC*# > *°*CiHC*# > °*CīC*#[80]. The compensatory lengthening of *i* with the loss of laryngeal is a well-established sound change for Indic – cf. **piHuon-* > *pī́van-* 'swelling' (Beekes 2011: 149–150; Kobayashi 2018: 327) – but here, I am assuming two things: /i/ was the epenthetic vowel and the placement of it was to the left of the laryngeal. I will explore these assumptions in some detail next.

---

[77] Instead of a fricative, *h_1 could have been a (glottal) stop, like Beekes (1989: 26–27) argues. Also, based on the Anatolian evidence of Lycian and Carian, Kloekhorst (2018) has suggested that *h_2 and *h_3 were actually uvular stops at the earliest stage of PIE. But his model still allows for them to have evolved into fricatives after the departure of Anatolian (idem: 71), and even in the earliest stage, they could have had fricative allophones in certain environments; the exact details of the conditioning here is left for future research (idem: 90–91), but to my mind, interconsonantal positions are a likely candidate.

[78] Glottal articulation is commonly assumed for *h_1 due to its non-coloring nature but for *h_2 and *h_3, velar, uvular and pharyngeal articulation have all been proposed (Kümmel 2022b: 201). For an older survey of the various proposals, see Petit (2013: 81–86). Shifts in articulation (e.g. uvular to pharyngeal) may have taken place as well in the history of PIE, cf. Weiss (2016: 337) and Colarusso (2013: 101–106).

[79] This is especially true for pharyngeal fricatives, since a reduction in a degree of their stricture produces low back vowels (Reynolds, West, and Coleman 2000: 382) – hence the proposal by Beekes (1989: 24, 29–30) to treat *h_2 and *h_3 as /ʕ/ and /ʕʷ/ (and *h_1 as /ʔ/), with an example of a similar system from Shuswap, a Salishan language; Byrd (2016: 18) points to further typological parallels in the Caucasian languages. For a criticism of such a fricative system in the context of the rest of the PIE phonological system, see Reynolds, West, and Coleman (2000: 381–382).

[80] This proposal also neatly sidesteps the issue that the approach of direct vocalization would have to tackle: direct vocalization works only if the sonority of the laryngeals is demonstrably higher than that of the other fricative /s/ (the examples for final syllables mostly end in °*CHs*, cf. Table 1 and 2) , but the answer to that question is considered to be indeterminate (Kobayashi 2004: 22–23, 138). I will also adopt the vocalization-by-epenthesis approach for the development in middle syllables (cf. §3.1) and there, I will present more concrete evidence for the position that this was indeed the vocalization pathway in Indic, whatever the phonetic realities of the laryngeals may have been in PIE and the pre-history of Indic.

2.3.2 *Choice of vowel i*

/i/ as a general epenthetic vowel is attested quite well in the Middle Indic languages, like in the case of the word for 'king': ins.sg.m. Aś. *lājinā* 'by the king' ~ Skt. *rā́jñā* < **h₂reh₁ǵ-n-eh₁* (Cardona 2018: 316; Kobayashi 2004: 137), but as Kobayashi (2004: 137) observes, laryngeals always underlie the oldest cases of *i*-epenthesis in Sanskrit and it could be that some phonetic property of the laryngeals motivated the choice of /i/ as the vowel to break up the consonant cluster *CHC*. But like for PIE, there is no consensus on what sounds the laryngeals stood for in the pre-history of Sanskrit[81]; at any rate, in light of the markedly distinct reflex of the vocalized laryngeals in Indo-Iranian – Greek has the famous triple reflex of /e/*,* /a/*,* /o/ while all other branches have /a/ (Beekes 2011: 147–148) – there were probably other factors at play here. After an illuminating discussion of vowel features in PIE and Indo-Iranian, Kobayashi (2004: 134–138) tries to relate Sanskrit's choice of /i/ to its overall vowel system and the upheavals it underwent in its history: according to him, after the merger of the mid vowels **e* and **o* into the low vowel **a* in Proto-Indo-Iranian and before **a* shifted to a schwa-like mid-central articulation in Indic, the high vowel /i/ became the least marked vowel and was thus utilized for epenthesis (idem: 138–139). While it is not immediately clear in Kobayashi's explanation why the other candidate of /a/ would not acquire such a status of the null vowel (/u/ is clearly ruled out due to its extra feature of roundedness), Aufderheide and Keydana (2016: 136) point out that for epenthetic processes, languages of the world tend to choose either particularly sonorous vowels, or – even more frequently – those that are the least sonorous from their vowel inventory. /i/ is less sonorous than /a/ and thus, Pre-Indic preferred it for epenthesis – as a high vowel, /u/ has similar sonority as /i/ but it is ruled out again since it is more marked (ibid.)[82]. In both these

[81] Lubotsky (2018: 1881) and Beekes (1988a: 83; 1989: 28) are of the opinion that the three laryngeals had probably merged to glottal stop [ʔ] by Proto-Indo-Iranian times; on the other hand, Kümmel (2018: 170) thinks **h₁* and **h₂* probably merged into the glottal fricative [h], with **h₃* becoming a "weak velar, uvular or pharyngeal fricative or glide".

[82] A schwa /ə/ (or some other reduced vowel) is sometimes reconstructed as an epenthetic vowel for **CHC* contexts, either in PIE itself, or in Proto-Indo-Iranian (Kobayashi 2004: 132), but we do not endorse either approach here. For the former, we are working on the assumption that the vocalization process started independently in the separate branches, based on the varying outcomes we see in each (cf. Kocharov 2018: 123). For the latter, it does not seem necessary to me to posit the existence of such a vowel as a phoneme in PIIr. – all the vocalized reflexes in Indic as well as Iranian (cf. §3.1, 4.2) use *ĭ*. Note that a short variant of /i/ (or even [ə]) may have been utilized for the epenthesis in **CHC* but it would have existed as an allophone in this specific environment tied to the laryngeal, and if so, we are tracking the vowel *after* its merger with /i/ in this thesis i.e. when */CHC/ [CH^{i}C] became */CHiC/ and was indistinguishable from inherited cases of **CHiC*. In support of the possibility of an earlier short vowel in

explanations, the assumption is that *i*-epenthesis started after the Indo-Iranian merger of vowels **e* and **o* into **a*. However, for the development in final syllables, the epenthesis could have occurred earlier too, if sonority was indeed the deciding factor behind the vowel choice (/i/ is still less sonorous than /e/ and /o/) – this would also keep the process in line with Lubotsky's (2018: 1886) early dating of laryngeal vocalization in final syllables, in his chronology of Proto-Indo-Iranian sound changes. At this moment, the relative ordering of *i*-epenthesis in relation to the vowel merger should be considered indeterminate, and is also of little consequence to our overall argument of epenthesis as a driving mechanism of laryngeal vocalization in final syllables.

2.3.3 *Position of the epenthesis vowel*

Now that we have established the plausibility of /i/ as an epenthetic vowel, the question is whether it would be placed before the laryngeal, or after it in interconsonantal contexts. For the Sanskrit outcome of *ī* in final syllables, it is clearly beneficial to set it up as **°CiHC#*, like we presented earlier, and like Byrd (2016: 26) does. However, languages tend to maximize syllable onsets (Kobayashi 2004: 23–24) so a formation **°CHiC#* is actually more natural in epenthesis, with the vowel added after the laryngeal[83]. Accordingly, Kümmel (2016: 217) invokes the Indo-Iranian process of laryngeal metathesis to go from **°CHiC#* to **°CiHC#*, which applied to the sequences **Hi* and **Hu* between consonants[84], as attested in PIE **ph₃i-to-* > PIIr. **piHta-* > Skt. *pītá-* 'drunk' (Modern Persian *nabīd* < PIr. **ni-pīta-*) (Lubotsky 2018: 1884; Jakob 2017: 10–11 with more examples). This gets us to Skt. *CīC* but the metathesis **°CHiC# > *°CiHC#* destroys the well-formed syllable that we proposed via earlier epenthesis. Kümmel (2016: 217) – pointing out to the lack of metathesis in **CHaC* sequences – motivates the change by explaining it as a special development in front of the high vowels, which is itself composed of the following

such clusters, a parallel is provided by the articulation of Vedic *r̥* as well as *rC* clusters (as described by the ancient Indian grammarians), cf. Allen (1953: 62, 73). See also Fortson (2010: 68) for the concept of PIE "schwa secundum" – a prop vowel already in PIE.

[83] In other words, when a sequence like **°VCHC#* undergoes epenthesis, formation of **°VC.HiC#* is to be preferred over **°V.CiHC#* – the latter route produces a final syllable that does not maximize the onset. Note that another way to resolve the difficult sequence of **°VCHC#* in Proto-Indo-Iranian might have been to delete the laryngeal or the final consonant, but epenthesis was clearly preferred based on the outcome we see of *ī*.

[84] Post-consonantal laryngeals in absolute final position (cf. the examples in §2.2.1) must also have gone through epenthesis of vowel *i*, but the metathesis of **Hi* likely occurred between consonants only (cf. Jakob 2017: 1), which explains why we see a short vowel there. In other words, the transition there is: **°CH# > *°CHi# > °Ci#*.

stages: **CHiC* > **CHⁱiC* > **CHⁱC* > **CiHⁱC*[85]. There may be other ways to motivate the phenomena: while metathesis is typically thought of as an irregular or a sporadic process, tied to speech errors and exempt from the Neogrammarian view of sound change regularity (Hock 2021: 46, 128), regular cases of metathesis – like the one being leveraged here – can occur if it serves "a specific structural purpose", which usually lies in "converting phonologically or perceptually marked structures into more acceptable ones" (idem: 136–137). Similarly, Hume (2001: 3) contends that metathesis can be regular if a reordering of the two sounds involved improves the perceptibility of the sequence. Whatever the exact motivation of the laryngeal metathesis here may be, Kümmel's reliance on it to explain the long outcome of the vocalized laryngeal is certainly economical, as a phenomena already attested in the language.

2.3.4 *Summary*

The entire development in final syllables can now be summarized as PIE *°*CHC*# > Pre-PIIr. *°*CHiC*# > PIIr. *°*CiHC*# > Skt. *°*CīC*#[86]. Due to the dependency on Indo-Iranian laryngeal metathesis[87], we can now date the intermediate developments too, but note that we cannot assume the long vowel *ī* to have risen already in Proto-Indo-Iranian – this is because sequence *°*iH*° was still intact there[88] and *ī* is not usually reconstructed as a PIIr. phoneme (Cantera 2018:

[85] Kümmel (2016: 217) further adds that if /H/ was in reality [h] or a dorsal fricative, this transition is phonetically quite likely. Even if /H/ was [ʔ] (cf. fn. 81), the metathesis here is a probable one – Blevins and Garrett (1998: 513) have documented metathesis examples involving glottal stop and a vowel in Zoque (idem: 518) and Mohawk (idem: 524).

[86] A concrete example with syllable boundaries marked: 3sg.impf.ind.act. PIE **h₁é-mleuh₂-t* > Pre-PIIr. **ám.rau̯.Hit* > PIIr. **ám.ra.u̯iHt* > Skt. *áb.ra.vīt*. In the PIIr. reconstructions here and elsewhere (for final syllable cases), I am assuming that the merger of vowels **e* and **o* into **a* took place before the start of the laryngeal vocalization process, but as pointed out in the discussion of *i*-epenthesis earlier, the merger could have occurred after the epenthesis too. The choice to adopt the **a* vowel here is purely for convenience and familiarity.

[87] Jakob (2017) examines the evidence of laryngeal metathesis in non Indo-Iranian branches too and concludes that as a rule, it can be dated all the way to PIE (idem: 27). For our purposes, this just means the rule was still active for Proto-Indo-Iranian, when new instances of **CHiC* were created via vowel epenthesis.

[88] We can say this with a fair degree of certainty because of these three phenomena: a) Kuiper's Law: loss of post-vocalic, word-final laryngeals in pausa, as demonstrated by Kuiper (1955) for Rigveda, cf. ins.sg.n. *śámi* / *śámī* < **-ih₁* for *śami-* 'labor' (idem: 263) b) Lubotsky's law: loss of laryngeal in the sequence **VHC₁C₂* where **C₁* is the PIE mediae series, reinterpreted as glottalized under the glottalic theory, cf. PIE **peh₂ǵ-ro-* > PIIr. **pajra-* > Skt. *pajrá-* 'firm' (Lubotsky 1981: 133, 136; 2018: 1881–1882) c) shift of accent from the root to the suffix in *i-* and *u-* stem formations to the roots of type *(C)CeHC,* cf. PIE **h₁éh₁p-i-* > PIIr. *HaHpí-* > Skt. *āpí-* 'friend' (Lubotsky 1992: 266; 2018: 1885). All of this implies a late preservation of the laryngeal in a **VH(C)* sequence. One can argue that **VH(C)* > **V̄(C)* still took place in Proto-Indo-Iranian, after the changes in b) and c), but a) points to continued retention of the laryngeal, till the time of Rigveda composition; also note Cantera's (2018: 484) hesitation to date the

485; Lubotsky 2018: 110). Any formulation of Proto-Indo-Iranian changes should also look at the Iranian data, to see if the formulation is supported there. We will do just that in §2.5, but first, we turn back to the Sanskrit nominal forms (cf. Table 2) that have *i* in the final syllables instead of the expected *ī*. These act as counterevidence to the overall proposal of PIE **°CHC#* > Skt. **°CīC#* and we will see if we can explain them away, keeping in mind all the intermediate stages of the change as discussed here. The implications of these stages have not been fully explored yet in the literature and I will attempt to do some of that in the upcoming sections as well.

2.4 Counterevidence for **°CHC# > °CīC#*

2.4.1 *Potential root nouns (type sanis)*

Forms like nom.sg.m. *sanís* (cf. Table 2) can be seen as simple root noun formations in PIE (Jamison 1988: 222) – as in **sénh₂-s*[89] – but synchronically in Sanskrit, they follow the paradigm of *i*-stem nouns, cf. *śúcis* < **ḱuk-i-s* for *śuci-* 'bright' (*EWAia* II: 656). Accordingly, we can treat them as original *i*-stems (i.e. **sénh₂-i-s* > *sanís*[90]), thus sidestepping the issue of laryngeal vocalization altogether. Compound forms in *-sáni-* 'gaining, winning'[91] can also be analyzed the same way, though they may have followed a different derivation pathway than the simplex *saní-* 'gain, reward', owing to their different semantics and accentuation[92].

However, there are indications that a simple root formation also existed for **senh₂-*, based on attested compound forms like gen.sg. *-sanas*[93] and the curious nom.sg. *-sā́s*[94] (besides *-sanis*),

laryngeal accent shift in c) to Proto-Indo-Iranian times – he is of the opinion that it affected Indic only, which would again place the loss of the laryngeal only after Proto-Indo-Iranian, at least in this context.

[89] The *seṭ* status of the root is secured by the medial **H̥ → i* in m. *sánitar-* 'winner' (Macdonell 1910: 244; VedaWeb), as well as the presence of *ḫ* in Hittite forms like 3sg.prs.act. *sanaḫzi*, 3pl. *sanḫanzi* 'seek' (*LIV₂*: 532; Kloekhorst 2007: 721), all made from the same root.

[90] cf. fn. 88 for the accent shift from the root to the suffix here.

[91] e.g. nom.sg. *hrdaṁ-sánis* 'winning heart', *vāja-sánis* 'winning prize', acc.sg. *go-ṣáṇim* 'winning cows', etc. For all the attestations, see Scarlata (1999: 577–585).

[92] Grestenberger (2017: 10, 12) derives *-sáni-* from the *a*-stem adjective *-sána-* historically (cf. *su-ṣáṇa-* 'easy to win'), in a process she terms '*i*-substantivization'; the simplex *saní-* is seen as an independent formation and referred to as a case of passive nominalization (cf. √*san-* 'gain') in Grestenberger (2014: 91), where she also acknowledges its etymological ambiguity.

[93] Attested once in the Rigveda, for the compound *go-ṣaṇ-* 'winning cows' at RV 4.32.22 (Scarlata 1999: 580; VedaWeb).

[94] Multiple RV attestations, alongside acc.sg. *-sā́m*, gen.sg. *-sás*, dat.sg. *-sé* etc. following the declension of radical *-ā-* stems (Macdonell 1910: 248). For the full attestation details, see Scarlata (1999: 577–585).

best explained as regular descendants of the Ø-grade formations *-*snh₂-és*[95] and *-*snH-s*[96] respectively (Beekes 1982: 202; Scarlata 1999: 586). If we take the latter nom. form as a new creation based on the weak stem – coupled with the fact that forms in -*sani*° are attested only in the nom./acc. (Scarlata 1999: 585) – the following mobile paradigm emerges:

	Expected	Attested
nom.	**sénh₂-s* > **sanHis* > **saniHs* > ***sanīs*	*sanís*, -*sánis*
acc.	**sénh₂-m* > **sanHa(m)* > ***sanam*	*saním*, -*sánim*[97]
gen.	**snh₂-és* > ***sanas*	–, -*sanas*[98]
dat.	**snh₂-éi* > **sanai* > ***sane*	(*sanáye*[99]), –

It remains to be seen whether all the attested forms here (including the ones for -*sā*-, cf. fn. 94) went back to a common root paradigm, but for our purposes, we cannot ignore the possibility of a formation like nom.sg. **sénh₂-s*, especially as the second member of the compounds.

If interconsonantal laryngeals really vocalized to *ī* in final syllables, we should expect to see ***sanīs* here then, but it is not attested. Jamison (1988: 222) seems to attribute this to its paradigm being completely reanalyzed as *i*-stems, but she does not clarify how such a reanalysis would take place here. To me, the only way the expected paradigms above would yield the attested forms is if the *i*-stem reanalysis happened at the stage when **sanHis* was the norm[100], when the epenthetic vowel after the laryngeal was established as *i* in such contexts, cf. §2.3. This would also lead to the creation of other *i*-stem forms, including acc. **sanHim* to replace the aberrant form **sanHa(m)*. By this time, the *i*-stem status of the formation would be firmly

[95] PIE **CNHV* > Skt. *CaNV* (Beekes 2011: 152).

[96] PIE **CNHC* > Skt. *CāC* (Beekes 2011: 151).

[97] Scarlata (1999: 586) treats -*sánim* as a contamination from the *i*-stem *saní*- forms, likely when the acc.sg. was in the aberrant state **-*sanam*; then -*sánis* was created on the model of -*sánim*. This makes certain sense, especially given the presence of the *a*-stem adjectives in -*sána*- (cf. fn. 92), with whose forms the nominal **-*sanam* here would clash. This assumes an *i*-stem formation already existing besides the root noun paradigm though, and for our discussion, I would like to cover even the possibility of the simplex *sanís* reflecting a pre-form **senh₂-s*.

[98] *i*-stem simplex ***sanes* is not attested. As for the root formation -*sanas*, one can posit the change **-sénh₂-os* > -*sanas* too, but then we lose the Ø-grade stem that neatly explained the aforementioned nom.sg. -*sā́s*.

[99] A true *i*-stem form, with the full grade of the suffix. If a PIE form, this would go back to **senh₂-éi-ei*.

[100] It is true that root noun formations in the plural cases – ins. ***sánibhis*, dat./abl. *sánibhyas* (attested 5x in RV, cf. VedaWeb) and loc. ***sániṣu*, assuming that the laryngeal vocalized to *i* in this context – would be indistinguishable from *i*-stem formations but as less popular forms, I consider their influence on the potential *i*-stem reanalysis only marginal.

entrenched, and when ***sanīs* and ***sanīm* were regularly produced (via laryngeal metathesis and subsequent laryngeal loss with lengthening of *i*), they would be replaced to *sanis* and *sanim* based on the rest of the paradigm. This development can be summarized as: **sénh₂-s* > **sanHis* > **saniHs* > ***sanīs* >> *sanis.*

Thus, it is possible to reasonably explain why *sanís* does not have *ī* as a laryngeal reflex – they can be treated either as an original *i*-stem, or original root noun reanalyzed as *i*-stem[101]. Other forms of the type are nom.sg.f. *vyáthis* 'wavering'[102], nom.sg.m. *gr̥bhis* 'grasping'[103] etc., or – as second member of compounds with no *i*-stem simplex attestation – nom.sg.m. *ni-dhís* 'store, treasure'[104], nom.sg.f. *prati-ṣṭhís* 'resistance' (Jamison 1988: 221–222, cf. Table 2) and they can be dealt with in a similar way.

[101] Kümmel (2016: 220) offers a different explanation than the one advanced here, but he assumes that in acc.sg. the final nasal never vocalized – cf. Gotō (2013: 16) as well (but with *H̥* > *i* here that we already rejected). Then in the sequence **sénh₂-m* > **sanHim*, metathesis that yields the *ī* elsewhere probably never happened because it leads to an undesirable coda *°Hm* with the more sonorous sound at the end, in violation of the principle of decreasing sonority from the syllable nucleus. The resulting *sanim* can now serve as a model for the reshaping of regular ***sanīs* (where metathesis would happen) into *sanis.* This explanation, though phrased in uncertain terms, has the advantage that we can operate entirely from an original root paradigm without having to invoke *i*-stem derivation/renalysis. However, we cannot accept this explanation here, since it is not consistent with our formulation of the sound laws in regards to what happens in the sequence *°CHN#* – in this, I follow Beekes (1982: 201), cf. §2.1.1, §2.1.2. We can potentially get around this by positing that the *i*-epenthesis happened before the final nasal could vocalize, but more problematic is the case of the neuter *s*-stem nouns like nom/acc.sg.n. *kravís* ← **kreuh₂-s-Ø*, since they do not have accusative in **-m* to block the metathesis that yields *ī*. Kümmel (2016: 217) leans towards treating these as real *i*-stems rather than *s*-stems; we will look at them more in the upcoming section §2.4.2.

[102] A neuter form nom./acc.sg.n. *vyathis* exists too, which needs to be taken as a *s*-stem formation (*VedaWeb*) – for a neuter *i*-stem or root noun, the *-s* ending would be out of place; we should expect ***vyathi* insead. Thus, *vyathi-* can be also treated as an original *s*-stem noun, besides an *i*-stem or a root noun (Grestenberger 2014: 93). Here, Rigveda only has the form *vyathis,* but for the prefixed adjectival formation *a-vyathi-* 'unwavering', the *i*-stem inflection is clear at least synchronically, cf. ins.pl. *avyathíbhis,* loc.pl. *avyathíṣu*.

[103] As (Jamison 1988: 222) notes, forms of √*grabh* consistently shows long reflex of the interconsonantal laryngeal (cf. pst.pass.ptc. *grabhī-ta-*). The presence of just *i* in forms of *gr̥bhi-* may also mean it went back to a real *i*-stem; its Ø-grade speaks towards a later deverbal derivation.

[104] The root noun linked with *nidhi-* is m./f. *dhā́-* 'placing' < **dʰéh₁-* which is also found in compounds (e.g. *apa-dhā́-* 'hiding'); simplex ***dhi-* is not attested . For compounds like this with preverbs as antecedents, it is more widely argued that they represent real *i*-stems (nom.sg. **°dʰh₁-i-s* > *°dhis*) rather than being derived from the Ø-grade forms of the root noun (nom.sg. *°dʰh₁-s* → *°dhis*) – cf. Grestenberger (2014: 92; 2017: 11) as well as (Litscher 2007: 114), both with references. For a possible pathway of *i*-stem derivation in compounds, see fn. 92.

2.4.2 *-(e)h₂- stem nouns (type janis)*

The instance of nom.sg.f. *jánis*[105] for *jani-* 'wife' (cf. OAv. *jāni-*, YAv. *jaini-*) is a special case – it shows *i*-stem inflection synchronically and while some do treat it as an original *i*-stem (**gʷen-i-* > *jani-*), it is generally regarded as a proterodynamic formation with an ablauting *-eh₂-* suffix, as in nom.sg.**gʷén-h₂-s* → *jánis*[106] (Kümmel 2016: 221; Jasanoff 1989: 135). This need not constitute a counterevidence for the proposal *°*CHC*# > °*CīC*#, however. Based on the OIr. cognate of nom.sg.f. *ben*, we know that the original nominative here was endingless[107] and the *-s* reflected in the Sanskrit form is a later addition – thus, the form *janis* may just reflect the regular word-final vocalization of the laryngeal to *i* (cf. §2.2.1) and then the addition of the *-s* morph to fix the resulting aberrant form: **gʷén-h₂-Ø* > **jáni* >> *jánis*. Alternatively, if we say that *-s* was added before the final laryngeal vocalized, the form can be explained the same way as *sanis* earlier, with the *i*-stem reanalysis happening in the intermediate stage of **janHis*.

2.4.3 *Neuter s-stem nouns (type kravis)*

The case of neuter *s*-stem formations, cf. nom./acc.sg.n.**kreuh₂-s-Ø*[108] → *kravís* 'raw flesh', poses another problem for the proposal *°*CHC*# > °*CīC*#. This is perhaps more easily explained

[105] Despite the use of this particular form in Indo-European literature – cf. Beekes (2011: 204), Jasanoff (2003: 137) – it does not seem to be actually attested in the Vedic corpus, along with the acc.sg. *jánim*. The presence of *jánis* at AVŚ 20.48.2c (Roth and Whitney 1924: 411; Sanskrit Lexicon n.d.) happens to be a modern emendation of the manuscript's nom.sg.f. *jātrī́s* 'mother' (Macdonell 1910: 279; Bhattacharya n.d.: 5, 13); the parallel passage in AVṔ (18.22.10c) also has *jātrī́s* (GRETIL 2020). Accordingly, Macdonell (1910: 279) regards the *ī*-stem formation *jánī* – attested once in the Rigveda (Lubotsky 1997a: 557; *VedaWeb*) – as the irregular nom.sg. of *jani-*. All this should perhaps absolve us from having to discuss the *jánis* form here, but I still do it for the following three reasons: a) *jánis* (along with *jánim*) is attested in the later Sanskrit texts (*DCS*) and while these attestations seem to be patchy, the *i*-stem status of *jani-* is quite clear already from the variety of its forms in Rigveda (Lubotsky 1997a: 555–556; *VedaWeb*) b) as second member of compounds, forms in *-jāni-* exist (e.g. *yúva-jāni-* 'having a young wife') which can reflect either **gʷonh₂-* or **gʷēnh₂-* (Lubotsky 2018: 1877; Harðarson 1987: 130–133), and for which we cannot ignore the possibility of *°*CH-s*# given the attestation of nom.sg. forms in *-jānis* c) there may have been other proterodynamic formations with ablauting suffix *-eh₂* and for which nom.sg. in °*Cis*# ← *°*CH-s*# is well-attested – e.g. *nābhis* with 19 RV attestations (*VedaWeb*), cf. fn. 60. For the Iranian situation here, see fn. 120 later.

[106] In Sanskrit, the full-grade of the suffix is presumably preserved as part of the separate paradigm of *gnā-* 'lady, goddess': e.g. gen.sg. **gʷn-éh₂-s* > *gnā́s*, cf. OIr. gen.sg. *mná* in the irregular paradigm of *ben* 'woman, wife' (Beekes 2011: 204; Jasanoff 1989: 135). For traces of the ablaut in other languages, see *NIL*: 177–178.

[107] As was the norm for *°*h₂* stems in PIE and Sanskrit, cf. nom.sg.f. *h₁eḱu-eh₂-Ø* > *áśvā* 'mare'; **deiu-ih₂-Ø* > *devī* 'goddess' (Lundquist and Yates 2018: 2096).

[108] The word-final laryngeal here is secured by the equivalent Greek reflex *κρέας* 'raw flesh', as well as adjectival formations Skt *krūrá-*, Av. *xrūra-* 'bloody, cruel' < **kruh₂-ro-*, cf. Lat. *crūdus* 'hard, raw' (Meissner 2006: 61).

away: the regular long vowel in ***kravīs* would be replaced with the short counterpart, based on the rest of the paradigm, as in ins. *kravíṣā,* dat. *kravíṣe*, gen./abl. *kravíṣas* which can all derived from **kreuh₂-s-*[109] with the appropriate case endings. Here, we are assuming that the interconsonantal laryngeal vocalized to *i* regularly in this context of a medial syllable – we will explore this more in detail in §3.1. Jamison (1988: 222) also attributes ***kravīs >> kravis* to the influence of the more frequent neuter s-stem formations in *-as-* (*manas-* 'mind'), as well as formations in *-iṣ-* (with original *i,* e.g. *śociṣ-* 'flame, light' to *aniṭ* root √*suc-* 'gleam', cf. *śuk-rá-* 'bright') and *-uṣ-* (*cákṣus-* 'eyesight'), all of which mark the nom./acc. with a short vowel. This is especially convincing since for the neuter *-as-* formations, there are corresponding adjectival forms with long vowel in the nom.sg., cf. n. *yáśas* 'glory' vs. m./f. *yaśā́s* 'glorious'; a neuter form ***kravīs* would thus have been reshaped to avoid it patterning with the m./f. adjectives[110].

Yet another motivation for ***kravīs >> kravis* that I can think of is the influence of the potential *i*-stem formations from the underlying root, which would have a regular nom.sg. in *kravis*. To this end, **kreuh₂-i > kravi-* 'bloody' is seemingly attested[111] in Yajurveda as an epithet of Rudra and also in the Rigvedic compounds *ákravihasta-* 'without bloody hands' (cf. Av. *xruui-dru-* 'with bloody club') along with *kravyā́d-* 'eating carcass'; even though the evidence for the independent formation *kravi-* is in traces, the participation of the root in the Caland system (cf. also the formations *krūra-* 'bloody, cruel' < **kruh₂-ro*) should be enough to secure its position alongside *kraviṣ-* (Litscher 2007: 111; Meissner 2006: 14–15). Furthermore, to explain the vocalism of the Iranian cognate YAv. *xr(a)uuiš-(iianṭ-)* 'cruel', influence of the *i*-form *xruui°* (cf. *xruui-dru-*) is often invoked (Litscher 2007: 111; Cantera 2018: 488) and in this light, it does not seem a stretch to imagine their influence on Skt. *kraviṣ-* too. The confusion over the original

[109] For *s*-stem nouns in PIE, an underlying proterodynamic inflection is widely assumed, with the full grade of the suffix utilized in the weak cases, as in gen.sg. *manasas* < **-es-os* (cf. Gr. μένεος) (Lundquist and Yates 2018: 2134). By this formulation, we should be reconstructing **kruh₂-es-* or **kreuh₂-es-* (with the full grade of the root generalized) for the weak cases. However, there is no evidence of the full grade of the suffix in the paradigm of *kraviṣ-* (as there is for *manas-,* for example); neither are there relic forms preserving it. So it may be that the suffix shape was already generalized to *-s-* throughout the paradigm here.

[110] In the Sanskrit nominal system, nom.sg. forms in *°īs* regularly occur in the paradigm of *vṛkī́-* type, which is comprised of root nouns (e.g. nom.sg.f. *dhīs* 'thought' < **dʰiH-s*,) and derivatives to *-a-* stems (e.g. nom.sg.f. *vṛkī́s* 'she-wolf' < *wl̥k-iH-s*, cf. *vṛka-* 'he-wolf') (Gotō 2013: 21). The fact that this class is associated with mostly feminines (and some masculines) could provide another motivation as to why neuter ***kravīs* would not be tolerated. However, the paradigm of *vṛki-* would have clashed with that of *kraviṣ-* only in the nominative and the influence it exerted was probably minor.

[111] This is as acc.sg.n. *kravi* though (Litscher 2007: 111).

status of nom.sg. *vyathis* – whether it is a *s*-stem formation originally or an *i*-stem or both, cf. fn. 102 – may also be taken in support of the idea that *°*CH-i*- formations existed alongside *°*CH-s*-, exerting influence on the *s*-stem paradigm after the laryngeal vocalized there.

A more radical approach here is to reject the status of *kravis* as a PIE *s*-stem altogether and try to treat its *i* as original. The validity of the *s*-stem formation *°*CH-s*- in PIE is usually assumed, based on the striking word equation of Skt. *kravis* ~ Gr. κρέας 'flesh'. However, like Meissner (2006: 45, 124) and Litscher (2007: 107–108) point out, this is the only such word equation – other often-cited examples are attested either within Greek, or Indo-Iranian[112]. Moreover, *s*-stem formations for roots not ending in a laryngeal – and these have robust support across branches – seem to actually go back to the suffix variant *-*os*- in the strong cases, cf. nom./acc.sg.n. Skt. *manas* ~ Gr. μένος < **men-os-Ø* 'mind'[113]. In light of this anomalous behavior of the proposed *°*CH-s*- formations, scholars have doubted their existence, choosing to explain the attested examples like *kravis* in other ways[114]. While this bodes well for our investigation here – and perhaps the lack of forms like **kravīs* could itself be hinting that an interconsonantal laryngeal never occurred here – I have not been able to find a more convincing explanation of these formations, that also takes into account the Greek data; should future

[112] The Indo-Iranian examples are also not many: besides the case of Skt. *kraviṣ-* ~ Y.Av. *xr(a)uuiš-(iianṭ-)* already mentioned, the ones often advanced are Skt. *vyáthiṣ-* 'wavering' (cf. fn. 102), *sádhiṣ-* 'seat, abode', *pā́thiṣ-* 'dwelling place'; OAv. *təuuiš-* 'cruelty', YAv. *stairiš-* 'sacrificial grass'. Among these, OAv. *təuuiš-* ← **teuh₂-s-* is the clearest; Skt. *tavás-* 'strong', *tuví°* also points to a form **tavis-,* though not attested. For a detailed evaluation of these forms, see Litscher (2007: 112–114).

[113] Granted, an earlier transition **men-s-Ø* >> **men-os-Ø* is posited, whose relic is thought to survive in the formation nom./acc.sg. **men-s-Ø* + **dʰeh₁-* > OAv. *mazdā-* 'to perceive' (Lundquist and Yates 2018: 2134). But there does not seem to be a good explanation as to why the *-*os*- ending was not carried over for *°*CH-s-Ø* formations too: Schindler (apud Meissner 2006: 170) took this as an indication that the laryngeal had already vocalized to some extent in pre-PIE, at least in this context (unstressed final syllables) – thus preventing the introduction of *-*os*- here. For a criticism of this formulation, see Litscher (2007: 120).

[114] For instance, Litscher's (2007: 107–120) investigation of Ø-grade -*s*- in the strong cases of *s*-stem nouns and his subsequent rejection of it (in favor of just *-*os*-) offers a template. According to him, *kraviṣ-* actually went back to a formation **kreuh₂-is-* in PIIr., where the fairly productive suffix *-*is*- was born out of contamination of *-*s*- stems with *-*i*- stems – e.g. *śociṣ-* from *s*-stem in **śokas-* (attested in the compound *sahásra-śokas-* 'spitting a thousand flames) and *i*-stem in *śuci-* 'bright, white' – similar to how other complex suffixes like *-*iro*-, *-*ulo*-, *-*nes*- were created as an offshoot of the Caland system. Thus, under this analysis, the *i* we see in *kravis* never went back to a laryngeal. But this does mean we have to give up the direct correspondence with Gr. κρέας. Litscher (2007: 114–118) explains κρέας as an inner Greek creation instead but I am not fully convinced, even if Kümmel (2016: 217) implicitly supports Litscher's ideas for his brief treatment of these formations in the context of laryngeal vocalization.

research present a stronger alternative, it may be possible to simply eliminate the case of *kravis* in questions of laryngeal vocalization.

For now, I still advocate an underlying *s*-stem formation for the *kravis* type, as is the *communis opinio*. It is still possible to reasonably explain why they do not have *ī* as a laryngeal reflex – it mainly boils down to the influence of other *s*-stem formations as well as *i*-stems, like we outlined earlier.

2.5 The Iranian evidence

Based on the discussion so far, we have seen that it is the proposition PIE *°*CHC*# > Skt. °*CīC*# that can reasonably explain all our data for final syllables. We also saw that this change can be broken down into multiple stages, with laryngeal metathesis playing a crucial role: PIE *°*CHC*# > Pre-PIIr. *°*CHiC*# > PIIr. *°*CiHC*# > Skt. °*CīC*#. Here, I will briefly examine the Avestan counterpart to our data (cf. Table 1 and 2), to see if the Iranian evidence is compatible with this proposal. PIIr. sequence *°*iHC*° yields *ī* in Avestan too as in Sanskrit (Cantera 2018: 489), so this mainly amounts to checking if the Avestan examples have a long vowel reflex and then explaining the counterexamples, like we did for Sanskrit.

2.5.1 *Correspondences to Sanskrit ī*

In the verbal paradigm, for the root **mleuh₂-* 'speak', we find 2sg.iprf.ind.act. **h₁é-mleuh₂-s* → Av. *mraoš* 'you spoke' (cf. Skt. *abravīs*), similarly 3sg. Av. *mraoţ* (cf. Skt. *abravīt*). There are only two more such examples of laryngeals in final syllables and both are root formations as well – 3sg.aor.inj.act. **meith₂-t* Av. → *mōist* 'he threw' and 3sg.iprf.ind.act. **h₂enh₁-t* → *(auu)-ąn* 'he breathed in'[115] (cf. Skt. *ā́nīt*) (Kümmel 2016: 218). In all of these, the root-final laryngeal seems to have disappeared without any trace, in contradiction to what we saw for the Indic data, and what we were expecting here too. These are only four instances though and their lack of *ī* in final syllables is not necessarily an issue for our proposal: they can be easily explained as analogical reshaping of earlier historically-correct forms (as in Pre-Ir. **mrawīt* >> Av. *mraoţ*), either under the influence of other similar root formations in Iranian (e.g. 3sg.aor.ind.act. Av. ***sraoţ*[116] 'he

[115] The etymology here is controversial, cf. *LIV₂*: 267.

[116] While this exact form is not attested, other aorist forms are attested from the root, as in 3sg.imp.act. *sraotū* (de Vaan and García 2014: 20).

heard' ← **kleuH-t*, cf. Skt. *áśrot*), or after formations from the same root where the laryngeal is not in final syllables (e.g. 3sg.prs.ind.act. Av. *mraoiti*[117] ← **mleuh₂-ti*, cf. Skt. *bravīti*[118]) (Kümmel 2016: 219; Cantera 2018: 488)[119].

2.5.2 *Correspondences to Sanskrit i*

In contrast, forms in the nominal paradigm seem to show an *-i-* reflex: nom./acc.sg.**teuh₂-s-Ø* → OAv. *təuuiš* 'cruelty', **sterh₃-s-Ø* → YAv. *stairiš* 'sacrificial grass', etc. (Cantera 2018: 488; Lubotsky 2018: 1883) – see also fn. 39. The evidence here is limited to the class of neuter *s*-stem nouns[120], and while the development here is still not the expected *ī*, it matches the Indic situation and so, in theory, we can just leverage the analysis we offered in §2.4.3, replicating the influence other *s*-stem and *i*–stem nouns had on these formations for Iranian too: thus Pre-Ir. ***təuuīš* >> OAv. *təuuiš*, after formations with original short vowels like Pre-Ir. **manas*, cf. OAv. *manō*[121] (**tavas* from the same root is also attested in YAv. °*-tauuah-* 'strength' (Litscher 2007: 112)), and Pre-Ir. **tuvi-* (descendants not attested in Avestan, but there is Skt. *tuví-*°). Here, we are proposing that a similar reshaping of °***īs* forms occurred independently in the history of both Sanskrit and Avestan. It would perhaps be more economical to assume this to have been completed by Proto-Indo-Iranian times itself, but we cannot simply move this change of °***īs*

---

[117] The *i* before the termination *-ti* is epenthetic here in Avestan and not to be taken as a laryngeal reflex, cf. 3sg.prs.act.ind. *bʰér-e-ti* → Av. *baraiti* ~ Skt. *bharati* 'he carries'; **ḱl-né-u-ti* → YAv. *surunaoiti* ~ Skt. *śr̥ṇóti* 'he hears' (de Vaan and García 2014:17, 92; Beekes 1988a: 51). At any rate, laryngeals disappear unconditionally in medial syllables for Iranian, as we shall also see in §3.1 (Cantera 2018: 488).

[118] We will discuss the length of the laryngeal reflex here in §3.2, but essentially, it can be understood as an influence from *abravīt*, where we now know the length was regular. The direction of analogy here is thus in opposite direction to that we see in *mraoṯ*.

[119] Kümmel (2016: 218) also points out potential confusion with Avestan optatives in °*īt* as another motivation for the elimination of **°*īt* in the Avestan root formations. These are the reduplicated optatives going back to a static paradigm in PIE: e.g. for the root **dʰeh₃-* 'give', 3sg.prs.opt.act. **dʰé-dʰh₃-ih₁-t* > Av. *daidīṯ* (Beekes 2011: 275; 1988: 161). Sanskrit has generalized the full grade of the optative suffix **-ieh₁-* here (cf. *dadyā́t*) so the presence of °*īt* in its root formations is not a cause for similar concern.

[120] Potential root noun forms like Skt. *sanis* do not seem to be attested in Avestan and the evidence of proterodynamic nouns utilizing the *-(e)h₂-* suffix is as scant as Indic – OAv. *jāni-* exists as a parallel to Skt. *jani-* and while it is synchronically classified as an *i*-stem too, nom.sg. OAv. ***jāniš* does not exist in the Gathas (Skjærvø 2018: 513); assuming it was there in the spoken language, its lack of *ī* can be explained the same way as Skt. *janis*, cf. §2.4.2.

[121] Pre-Ir. **°as#* > OAv. *°ə̄ #* > YAv. *°ō#*, then the introduction of the ending in OAv. too (de Vaan and García 2014: 15) – the old ending with the short vowel is still visible in OAv. *manas-cā* 'thought' (Gotō 2013: 35). Here, we are assuming the influence of the other *s*-stems on ***təuuīš* before these sound changes occurred.

>> °**is* up for Proto-Indo-Iranian, given that the sequence *°*iH*° was still intact there (§2.3.4, cf. fn. 88) and had not yet yielded *ī* like in the daughter languages. We can choose to view this as a change of Pre-PIIr. *°*iHs* >> PIIr. °**is* though – even in this early period, the termination of *°*iHs* for nom./acc.sg. of the neuter *s*-stems would have stood out in relation to forms within the paradigm as well as parallel paradigms like the afore-mentioned *s*-stem and *i*-stem nouns. Thus, based on the Avestan data, we have revised the timeline for the analogy that operated in the pre-history of Sanskrit forms like *kravis* – its transition can now be summarized as: PIE **kreuh₂-s* > **kravHis* > **kraviHs* >> PIIr. **kravis* > Skt. *kravis*[122].

2.5.3 *Summary*

We have now seen that the Avestan data is compatible with the kind of Proto-Indo-Iranian development we assumed for the development of PIE *°*CHC#* in Sanskrit. It may seem odd that Avestan does not preserve any traces of the regular reflex *ī* here (unlike Sanskrit), but given the even fewer attested contexts of *°*CHC#* in Avestan, it is perhaps not surprising[123]. A more thorough examination of the Avestan as well as wider Iranian data may yield some traces, but that is beyond the scope of this thesis, given that Sanskrit is our focus.

[122] This is a slight revision to the earlier proposal of ***kravīs* >> *kravis* within Sanskrit; since we dated the analogy here to PIIr. itself, there is now no reason to propose ***kravīs*. And should we prefer the explanation of *sanis* as an original root noun reanalyzed as *i*-stem (cf. §2.4.1), we can also eliminate ***sanīs* similarly (i.e. **saniHs* >> PIIr. **sanis* over ***sanīs* >> Skt. *sanis*).

[123] An alternative is to assume a short reflex *i* as regular for Avestan, keeping *ī* still for Sanskrit, like what Cantera (2018: 488) does. However, under our current model of the laryngeal vocalization process (cf. §2.3) where there is a vowel epenthesis followed by laryngeal metathesis, this is feasible only if we consider the metathesis to be an Indic-only phenomena (PIIr. *°*CHiC#* > Av. *°*CiC#*; PIIr. *°*CHiC#* > *°*CiHC#* > Skt. *°*CīC#*), or assume that the vocalization process started independently in Indic and Iranian after the split from Proto-Indo-Iranian, with Iranian using a much shorter quality of vowel for the initial epenthesis that merges with *i* after the metathesis (PIIr. *°*CHC#* > *°*CHⁱC#* > *°*CⁱHC#* > Av. *°*CiC#* ; PIIr. *°*CHC#* > *°*CHiC#* > *°*CiHC#* > Skt. *°*CīC#*). Both of these proposals are problematic: for the former, there are clear indications of laryngeal metathesis being a shared Indo-Iranian phenomena (Lubotsky 2018: 1884); the latter moves the start of the vocalization process away from Proto-Indo-Iranian which may be in conflict with the relative chronology of other sound changes leading up to Proto-Indo-Iranian – for one formulation of this chronology, see Lubotsky (2018: 1885–1886).

3. Development in Medial Syllables

3.1 Regular development: **°CHC°* > *°CiC°*

We now turn our attention to the development in medial syllables, where things are less ambiguous, at least in terms of the vocalized outcome of **°CHC°*. Based on the overwhelming instances of *i* going back to an interconsonantal laryngeal, there is widespread agreement that *i* was the regular development here, as in **ǵénh₁tor-* > m. *janitár-*[124] 'progenitor', or **ish₁-ró-* > *iṣirá-* 'refreshing' (Jamison 1988: 226; Kümmel 2016: 221–222; Olsen 2018: 262; Lubotsky 2018: 1883; Beekes 2011: 148) – for more examples, see §1.1 earlier. The mechanism behind the vocalization here was probably similar to that of the final syllables, via epenthesis of the vowel *i* next to laryngeal. In regards to why such a process did not yield *ī* here (via laryngeal metathesis, like for final syllables), Kümmel (2016: 221–222) proposes that the epenthesis in middle syllables occurred only relatively late in Indic, after the Indo-Iranian laryngeal metathesis ceased to be active – for final syllables, it predated the metathesis and had already occurred in Proto-Indo-Iranian, as we saw in §2.3[125]. Thus, the development pathway for medial syllables can be summarized as: PIE **°CHC°* > PIIr. **°CHC°* > Pre-In. **°CHiC°* > Skt. *°CiC°*. Given that the parallel outcome in Avestan is always *Ø*[126] (Cantera 2018: 488; Beekes 1988a: 85–86), an Indic-only epenthesis is quite attractive and economical to pose[127].

---

[124] Variant *jánitar-*, preserving the original root accent, also exists (attested 4 times as nom.sg. *jánitā* in the Rigveda), but more common is *janitár-* (Olsen 2018: 257–258). The latter can reflect either **ǵenh₁-tér-* (cf. Gr. γενετήρ), or *jánitar-* >> *janitár-* under the influence of hysterodynamic *pitár-* (ibid.; *EWAia* I: 569).

[125] As to why the epenthesis in final syllables had occurred so early, Kümmel (2016: 222) suggests that **CHC* was a more complex structure to have in final syllables, as opposed to the middle.

[126] For some Iranian examples along with Sanskrit counterparts, see Mayrhofer (2005: 119–120). As for Nuristani, it seems to mirror the Sanskrit situation with vocalization to *i* – e.g. Waigali *trämiš* 'darkness', cf. Skt. f. *támisrā-* 'dark night', YAv. *tąθra-* < **temHs-ro-* (Morgenstierne 1926: 61; Cardona and Jain 2007: 26). *s*-stem paradigm forms like ins.sg.n. Av. /snaθišā/ 'weapon' ← **ḱnetH-s-eh₁* and derivatives like nom.sg.f. Av. /tavišī/ 'strength' (cf. Skt. *táviṣī-*) are attested (Beekes 1988a: 85), with an *i* reflex seemingly, but these are commonly explained as analogical creations after the nom./acc.sg.n. forms in *-iš*, cf. Av. /snaθiš/, /taviš/ (ibid.; Cantera 2018: 488) After our stance of **-īš* as the original development in the final syllable of these forms (cf. §2.4.3, §2.5.2), it is best if we take the analogy postulated here as active only after *-īš#* >> *-is#* is complete.

[127] In Olsen's (2018: 264) formulation of the change, the epenthesis has already occurred in Proto-Indo-Iranian, with a prop-vowel being placed next to the laryngeal, but by her own admission (idem: 265), the prop vowel is consistently lost in Iranian. Thus, I do not consider it necessary to date the epenthesis here to Proto-Indo-Iranian.

The other possibility for the vocalization mechanism here is that of direct vocalization, of course[128]. Besides being inconsistent with our proposal of epenthesis in final syllables and the problem it entails in relation to the phonetic reality of the laryngeals in Indo-Iranian (cf. §2.3), we can actually rule out direct vocalization reliably here and argue for epenthesis, that too of a late date. This is so because of a remarkable piece of evidence contained in the meter of the Rigveda: the first syllable of nominal forms like f. *duhitár-* 'daughter' < **dʰugh₂tér-* (cf. Gr. θυγάτηρ, TochB *tkācer*, Goth. *dauhtar*) or f. *pr̥tʰivī́-* 'earth' < **plth₂u-ih₂-* (cf. §1.1) occurs sufficient number of times in a position expected to be long by the meter (in contrast to their short scansion)[129], on the basis of which we know that interconsonantal laryngeals were treated as consonants too and not as vocalic segments, at least when the lines with these forms were composed (Gippert 1997: 64; Kobayashi 2004: 128, 133)[130].

Another piece of evidence often invoked to support the epenthesis model here is that of aspiration of the consonant preceding the laryngeal in these same forms: **plth₂u-ih₂-* > **prtHiu̯-iH-* > **pr̥tʰivī́-*, or **dʰugh₂tér-* > **dʰugHitár-* > **dʰugʰitár-* > *duhitár-*[131] (Mayrhofer

[128] Yet another possibility here is that of laryngeal deletion first and then Indic *i*-epenthesis in the resulting consonant cluster. Given that Avestan consistently shows *Ø* here, this approach should be a serious contender for the development in middle syllables, and accordingly, it is explored in great detail by Aufderheide and Keydana (2016). According to them (idem: 125, 151), the *i*-epenthesis was used in Pre-Indic to repair phonotactically illicit clusters initially, from where it spread to other contexts, to "express morphologically, semantically or pragmatically motivated lexicalizations in the context of derivational morphology" and to "develop syllabic or rhythmic tendencies in the context of phonology and metrics" – all motivated by Pre-Indic tendencies towards "open syllables, paradigm uniformity and morphological recoverability to enhance lexicon retrieval". However, laryngeals always seem to underlie oldest cases of *i*-epenthesis (§2.3.2) but if epenthesis occured only after laryngeal loss, we should expect to see enough cases of old *i*-epenthesis in words that cannot be traced to laryngeals. Similarly, the long position of the first syllable of words like *duhitar* (cf. supra) also suggests the late retention of laryngeal even after the presence of *i* vowel, but the approach suggested by Aufderheide and Keydana (2016) does not allow for it.

[129] Gippert (1997: 64) reports that there are 32 such instances where the laryngeal created a long position historically, out of the matching 38 instances of the structure *°V̆(T)hi°* ("a short vowel followed by either a plain *h* or by an aspirate stop, plus *i*") in the whole of Rigveda.

[130] Though see Kümmel's (2014: 36) evaluation of these *brevis in longo* instances: he suggests that their distribution is not actually significant in relation to similar forms that did not have a laryngeal (i.e. we cannot credit their presence in the long positions to the laryngeals being there as consonants still). These forms are still widely cited as instances of late preservation of laryngeal in Indic though (cf. Olsen 2018: 265) and for now, I will accept their validity.

[131] The medial palatalization in this word (**gʰ* → *h*) is often used to argue for a Proto-Indo-Iranian vocalization of the laryngeal in this word (Lipp 2009: 351–2, 374–98; Lubotsky 2018: 1883), cf. PIE **gʰ* > PIIr. **ǰʰ* > Skt. *h* before front vowels, as in 3sg.prs.ind.act. PIE**gʷʰen-ti* > PIIr. *ǰʰanti* > Skt. *hanti* (Lubotsky 2018: 1881). Kümmel (2016: 219–220) however maintains that this particular word cannot be used to date the vocalization here to Indo-Iranian times, since the palatalization here could have been secondary only in Indic, similar to how PIE **dʰ* and **bʰ* yield Skt. *h*, cf. pst.ptc. PIE **dʰh₁-tó-* > Pre-In. **dhita-* > Skt. *hita-* 'placed', alongside *°dhita-*; PIE **gʰrebh₂-*

1986: 138; Byrd 2016: 19). The assumed development here is of the form PIIr. *°*CHC*° > Pre-In. *°*CHiC*° > Skt. °*C*^{h}*iC*°, with which the aspiration seems to come for free[132]; such an epenthesis-driven approach also solves the problem of simultaneous vocalization as well as aspiration in these forms – if the laryngeal vocalized directly only, how should we account for the phenomena? For the cases of mediae aspiration, Lubotsky (2018: 1882) – leveraging the glottalic theory – offers an ingenious solution[133] without a need for epenthesis, and cases of tenues aspiration from interconsonantal laryngeals can perhaps be explained away with analogy from other forms where they would be in an original *°*CHV*° position (for instance, the aforementioned *pr̥t*^{h}*ivī́-* < ***pr̥tivī́-,* after *pr̥thú-*)[134]. These do not have the same economy of explanation as the epenthesis approach though, and aspiration after the rise of the epenthetic vowel is to be preferred, considering that a parallel phenomena already exists in the language.

However, a problem is posed by the Avestan form of OAv. *dug*^{ə}*dar*, YAv. *duγdar* 'daughter', where the medial *d* is best explained from PIIr. **d*^{h}*ug*^{h}*Htar* (via Bartholomae's Law, cf. Lubotsky 2018: 1879), with the aspiration of mediae already occurring in PIIr. (Werba 2005:

> Skt. √*grabh-* > Skt. √*grah-* 'seize' (Lubotsky 1995: 125). For Skt. *bh* to *h* especially, there are only two clear examples and Lubotsky (idem: 128, 138) attributes them to a possible Prākrit influence or a borrowing from another dialect – *duhitar* from earlier ***dughitar* can perhaps be explained similarly, potentially conditioned by sociolinguistic factors as well. At any rate, considering that this is the only word put forward in support of a PIIr. palatalization before a secondary *i* (the Nuristani evidence of Prasun *lüšt* 'daughter' notwithstanding, with the medial *š* also indicating earlier palatalization there as per Beekes (1981: 284)), I am inclined to side with Kümmel here, and consider palatalization in the reflexes of this word as secondary. In potential support of a secondary Skt. **gh* > *h*, Kümmel (2016: 220) also cites the personal names of *Ráhūgaṇa* and *Jahnu* (cf. *raghu-* 'rapid', *jaghnu-* 'killing').

[132] *°*CHV*° sequences yielding aspirates is regular in Sanskrit, cf. fn. 43.

[133] Namely, [ˀDʔC] > /*[DʔC], where *ˀD* represents the pre-glottalized *mediae* series which loses its glottalization next to /H/ (also [ʔ] in Lubotsky's model by this time). Then the [D] series regularly yields aspirates in Sanskrit, leaving the medial [ʔ] to vocalize independently (Lubotsky 2018: 1882).

[134] Beekes (1986: 81) relies on analogy to explain even the aspiration of *duhitar-*, saying it "got its *h* from *gH* in forms where the laryngeal was not vocalized". For him, the laryngeal actually vocalized already in PIIr. in the sequence **CHCC* i.e gen.sg.f. **d*^{h}*ugh*$_{2}$ *-tr-es* > **d*^{h}*ugitras* >> **dug*^{h}*itras* > **duhitras* (>> *duhituḥ*), with regular vocalization of the laryngeal and aspiration after forms like nom.sg.f. **d*^{h}*ugh*$_{2}$*-tēr-Ø* > **d*^{h}*ugh*$_{2}$*tēr* > **d*^{h}*ug*^{h}*tā* > **dugd*^{h}*ā* (>> *duhitā*). However, the Avestan forms for 'daughter' (cf. infra) do not show any indication of the vocalized reflex *i*, neither do forms like YAv. *tąθra-* < **temHs-ro-* (cf. Skt. f. *támisrā-* 'dark night') (Lubotsky 2018: 1882). Here, it is important to make the distinction that Beekes argues for a Proto-Indo-Iranian vocalization only in select forms like that of the 'daughter' word (with "unclear" conditioning) – for other words, he accepts that interconsonantal laryngeal was vocalized in Sanskrit (later), on "a large scale" (Lubotsky 2018: 1882). Also note that we will come back to **°CHCC*° in §3.4, where we will see that the laryngeal is actually lost in this environment already in PIE.

724; Kümmel 2022a: 257)[135]. This is at odds with our earlier proposal of aspiration arising only in Pre-Indic, after the epenthesis PIIr. *°*CHC*° > Pre-In. *°*CHiC*° and in this light, we must revise our proposal, allowing for aspiration even in PIIr. **CHC* clusters. We need to do so only for the aspiration of mediae though[136] – tenues aspiration in general should be considered an Indic feature only, as has been well-argued by Lubotsky (2018: 1879). Also, the different aspiration of Sanskrit voiced aspirates in relation to their voiceless counterparts – [ɦ] vs. [h], as reported by Allen (1953: 35) and Kobayashi (2018: 331) – is suggestive of an independent development of mediae and tenues aspiration, separated by time as well as a difference of mechanics (as in just PIIr. **CHC* for the mediae, but PIIr. **CHC* > Pre-In. *CHiC* for tenues). Thus, the case of tenues aspiration can still be used in support of laryngeal vocalization via epenthesis[137].

[135] We can in theory push the **g*^{h} required for Avestan here to Pre-Ir. phase, with a late application of Bartholomae's Law after the Iranian deletion of the laryngeal. While it is possible to argue for a continued application of Bartholomae's Law in other Iranian contexts too (Cantera 2018: 490), it is parsimonious to date the aspiration of **g* here to PIIr., given that the Skt. cognate of *duhitar-* also demands it. In this scenario, we can still see Bartholomae's Law as operating only in Iranian for this word (Werba 2005: 724), or if we accept that the law operated over laryngeal boundaries too, we can just date it to PIIr. (Lubotsky 2018: 1879).

[136] Thus, the development of the 'daughter' word becomes: PIE **d*^{h}*ugh*$_{2}$*ter-* > Pre-PIIr. **d*^{h}*ugHtar-* > PIIr. **d*^{h}*ug*^{h}*Htar-* > Pre-In. **d*^{h}*ug*^{h}*Hitar-* > Pre-In. **d*^{h}*ug*^{h}*itar-* > Skt. *duhitár-*. The (final-syllable) examples of *sádhiṣ-* < *°*dh*$_{1}$° and *ágrabhīt* < *°*bh*$_{2}$° (§2.1) can be seen as other examples of mediae aspiration in a **CHC* context, though they are not as secure as the case of *duhitár-*. For *sádhiṣ-*, even if we accept that **h*$_{1}$ caused aspiration (cf. fn. 43), alternate derivations going back to **d*^{h} (and not **d*) are possible for the word (Pulju 1997: 387–388; Litscher 2007: 113–114). For *ágrabhīt*, the status of the mediae is more certain (fn. 9), but it could have had the development under the analogical influence of forms like 1sg.aor.ind.act. *ágrabham* or 1sg.prf.ind.act. *jagrábha*, where the mediae aspiration occurred in a **CHV* context (fn. 43). The PIIr. mediae aspiration in **CHV* is slightly more well-attested, see Lubotsky (2018: 1882) and Mayrhofer (2005: 115–116), cf. Pulju (1995: 49–97).

[137] *átithi-* 'guest' < **HatHtHi* (cf. Av. *asti* 'id.') may be seen as a counter-example to the idea that tenues aspiration also occurred from **CHC*. However, it is the only example of such a form, and since the word is attested only in Indo-Iranian (*EWAia* I: 57–58), the identity of the laryngeal here is also not clear. If a formation from **h*$_{2}$*et-* 'wander', we can reconstruct a seṭ root here – Mayrhofer (2005: 18) and *LIV*$_{2}$ (273) then suggest **h*$_{1}$ as the identity of the ending laryngeal, but if we take **h*$_{1}$ as capable of aspiration (cf. fn. 43), it could very well be **h*$_{3}$, which would also explain the lack of medial aspiration in the word. Another possibility is that of a reworking from an earlier ***áthi-ti-*, with throwback of the medial aspiration (*EWAia* I: 57–58). See §4.2 later for more discussion in the context of initial syllables.

3.2 Cases of *ī*

3.2.1 *Data*

In the previous section, we advocated for *i* as the regular outcome of the laryngeal vocalization in medial syllables. There are a non-trivial number of cases where the reflex is seemingly *ī* though, even in this position. I arrange them based on their morphological domains in Table 3 here:

Class	Example Developments	Other Examples
root presents[138]	2sg.ind.act. **mleuh₂-si* → *brávīṣi* √*brū-* 'speak' 3sg.ind.act. **h₁é-h₃emh₃-ti* → *ámīti* √*am-* 'injure' 2sg.imp.midd. **ḱemh₂-sue* → *śamīṣva* √*śam-* 'labour' 3sg.ind.act. **teuh₂-ti* → *távīti* √*tu-* 'be strong'	*brávīmi, bruvītá* *ámīṣi, ámīṣva* *śamīdhvam* –
root aorists[139]	1pl.ind.midd.**h₁é-dʰh₁-medʰh₂* → *ádhīmahi* √*dhā-* 'place'' 1pl.ind.midd.**h₁é-dh₃-medʰh₂* → *ádīmahi* √*dā-* 'give' 3sg.ind.midd. **h₁é-ḱh₃-te* → *(sam-)áśīta* √*śā-* 'sharpen'	*ádhītām* – –
s-aorists	1pl.act. **h₁é-gʰrēbh₂-s-me* → *ágrabhīṣma* √*grabh-* 'seize' 3sg.ind.midd. **h₁é-gʷh₂-s-te* → *(adhy)agīṣṭa* √*gā-* 'go'	*ágrabhīṣur, grabhīṣṭa* –
Nominal (& adjectival) derivatives (in *-tar, -man, -ta, -ra* etc.)	**gʰrbh₂-tó-* → *gr̥bhīta-* pst.ptc. √*grabh-* 'seize' **ḱerh₂-teu-s* → *śárītos-* abl.sg.inf. **śr̥̄-* 'crush' inst.pl.n. **h₁uerHmn-bʰi* → *várīmabhis* 'expanse' loc.sg.n. **h₁sterh₃men-i* → *stárīmani* 'strewing' nom.sg.m. **-seuH-tōr-Ø* → *(pra)-savītā́* 'impeller' adj. **gʷʰmbʰh₁-ló-* → *gabhīrá-* 'deep'	gd. *gr̥bhītvā́*, *grabhītar-* *amīva-* 'pain, grief' loc. *várīman* *savīman-* 'impulsion' *áśīti-* 'eighty'[140] *śárīra-*'body'

[138] Pāṇini (ADh. 7.3.95) advocates *ī* in root present formations of √*ru-* 'cry' and √*stu-* 'praise' (*Vasu* VII: 1447–1448), but such formations do not seem to be attested in the actual texts we have. At any rate, only √*ru-* went back to a root-ending laryngeal (*LIV*₂: 741, 746).

[139] Only one imperfect form seems to have *ī*: 2pl.iprf.ind.act. *ábravīta* from √*brū-*.

[140] This is to be treated as an original abstract collective formation in *-ti-,* meaning 'group of eight': **HoḱtH-tí* > **HoḱHtí* > *áśīti,* cf. *aṣṭa* 'eight' (Rau 2003: 139).

Class	Example Developments	Other Examples
weak forms of present ninth class	3sg.ind.mid. **pu-n-H-tó-i → punīté* √*pū-* 'cleanse' 2sg.imp.act. **gʰrb-n-h₂-dʰí → gr̥bhṇīhí* √*grabh-* 'seize' 1pl.ind.act. **mi-nH-més → minīmasi* √*mī-* 'damage' 3du.ind.act. **pl-nh₁-tes → pr̥ṇītás* √*pr̥ -* 'fill' 1pl.ind.midd. **str-nh₃-medʰh₂ → str̥ṇīthána* √*str̥-* 'strew'	*punīhí, punītá, punītána* *gr̥bhṇītá* *krīṇī-* √*krī-* 'buy'
weak forms of reduplicated presents[141]	2sg.imp.act. **mi-mh₁-dʰí → mimīhí* √*mā-* 'measure' 1pl.ind.act. **ḱi-ḱh₃-més → śiśīmási* √*śā-* 'sharpen 2pl.imp.act. *ǵʰe-ǵʰh₁-te → jahīta* √*hā-* 'leave' act.	*mímīte, mimīmahe* *śíśīte, śiśītá, śiśītā́m* *jíhīte* √*hā-* 'go forth' *rarīthās*[142] √*rā-* 'give'

Table 3. Attestations of *ī* from interconsonantal laryngeals in medial syllables[143]

Certain other formations also seem to show *ī* from *°*CHC*°, but are not going to be useful in our upcoming investigation of whether *ī* could also be a regular reflex of **H̥* in middle syllables. These are:

- Denominative verbal formations in *-ya-*, as in 3sg.prs.ind.act. *janīyáti* ← **gʷénh₂-ie-ti*[144] (f. *jani-* 'wife'). In Sanskrit, stems with final *i* commonly lengthen this vowel in front of suffixes starting with *y* – an example which goes back to a real *i*: 3sg.prs.ind.act. *kavīyáti kaví-* 'poet' (Jamison 1988: 215–216). For *ī* before *-ya-* in passives like 3sg.prs.ind. *dhīyate* √*dhā-* 'place' ← *dʰh₁-ie-te* (cf. ptc.midd. *pratidhīyámāna-*), see §4.1 later, where we discuss the development in initial syllables.

[141] The frequent reduplicated presents from √*dhā-* 'place' and √*dā-* 'give' also going back to a root-final laryngeal show a *Ø* reflex instead; they will be dealt with in §3.4.

[142] *rirīhi,* a form with *i*-reduplication is also attested once in Rigveda (Whitney 1889: 247–248).

[143] For an exhaustive list of all the *ī* attestations, see the sections on nominal stem formation, declension and the verb in Macdonell's (1910) Vedic Grammar, which separates the *ī* forms under the label "*with connecting vowel ī*" in most cases (along with *i* forms as well). We do still need to distinguish between *seṭ* and *aniṭ* roots though.

[144] This word was likely a later formation in Indic, because we know PIE *°*CHiV*° regularly yields Skt. °*CyV*° by Pinault's Law, with the laryngeal loss already in PIE (Byrd 2015: 208–209) – also to be discussed later in §3.4. Here, for the sake of argument, we are assuming that the stem final **H* was still intact when the word was created in the history of Sanskrit (at a point when Pinault's Law ceased to be active), as in **janH-ya-ti*. This is already tenuous, but we see that even with all the assumptions, we cannot treat the long *ī* here as a regular laryngeal reflex.

- Intensive verbal stems, like *varīvar-* < **h₂uer-h₂uer-* (√*vṛ-* 'cover') or *sanīṣan-* < **senh₂senh₂-* (√*san-* 'gain'). In the reduplicated stem, this class follows a clear pattern of having the medial *ī* in open syllables while *i* is reserved for closed – formations to *aniṭ* √*gam-* 'go' provides a clear example: 3sg.act. *gánīganti* vs. acc.sg.act.ptc. *ganigmatam*, cf. 3pl.midd. *saniṣṇata* < **senh₂snh₂-*.

From these classes alone, we cannot know if *ī* was a regular development of **H̥* , because it could just as well be the lengthened outcome of the common reflex *i*, after following the relevant morphophonological rules of the class. Considering the established status of the *i* reflex, it is best to explain these with it first, followed by a secondary lengthening of *i* (before *y* for the passives/denominatives and in open syllables for the intensives): **H̥* > *i*; *i* → *ī*[145].

3.2.2 *The (im)possibility of *°CHC° > °CiC°, °CīC°*

For the data in Table 3, it is only in the weak forms of present ninth class that *ī* is consistently present; in the other classes, there are also clear cases of *i* going back to a laryngeal. For root presents made to *seṭ* roots, the *i* reflex is well attested, as reflected in forms like 3sg.prs.ind.act. *aniti* 'breathes' < **h₂enh₁-ti* (cf. 1pl.ind. *animas*, 2sg.imp. *anihi*; *ánila-* m. 'wind') and *vamiti* 'vomits' < **uemh₁-ti*[146]. Similarly, in the class of nominal derivatives, there is *savitar-* 'impeller' < **seuHtor-*, *janiman-* 'birth' < *ǵenh₁-men-*, *iṣirá-* 'refreshing' < **ish₁-ró* and many more; for loc.sg.m. *varīman* included in Table 3, a parallel form of *variman* is also actually attested (alongside nom. *varimā́*, acc. *varimā́ṇam*), though other exact doublets like this are hard to come by. For *s*-aorists, it turns out only the root √*grabh-* yields forms in *-īṣ-*[147]; all other attestations of the class have *-iṣ-*, cf. 3pl.ind.act. *asāviṣur* √*sū-* 'impell', 3sg.imp.act. *áviṣṭu* √*av-* 'favour' (Jamison 1988: 225; Macdonell 1910: 382–385). And Gunkel (2018: 89) reports a form

[145] For why we cannot also use these forms as a model to explain other instances of *ī* (as spread of the vowel from here to other instances that might also have *i* from **H̥* originally), see §1.2.

[146] For more root present forms with *i*, see the grammars of Macdonell (1910: 335–337) and Whitney (1889: 238–239), who refer to the vowel as connecting *i* or a union vowel. Note that some of the forms recorded therein are to *aniṭ* roots – as in *śvásiti* 'blows' < **ḱues-* (*LIV₂*: 341) – where the vowel has spread to from the *seṭ* formations. For us, more interesting is the fact that a doublet form *śamiṣva* also occurs besides *śamīṣva* (cf. Table 3), though in a different Vedic text (Whitney 1889: 239).

[147] There is a form 2pl.imp.act *yāsīṣṭa* √*yā-* 'go' ← **ieh₂-s-te* attested in RV 1.165.15 (Macdonell 1910: 385), but the *-siṣ-* aorist formation here is secondary (Gotō 2013: 113–114); the original *s*-aorist formation is reflected in 1sg.ind.act. *ayāsam* ← **iēh₂-s-m*. The long vowel in the form is still abnormal but the form was most likely created after the timeframe of laryngeal vocalization in Pre-Indic.

1pl.prs.ind.act. *jahimas* √*hā-* 'leave' act. < **ǵʰe-ǵʰh₁-mes* in AVŚ, which reflects a short reflex even in the reduplicated presents – to this family, we can also add the forms *jahitas, jahitam* and *ajahitām* attested in the later Vedic texts, next to forms with *ī*: *jahīta*, *jahītāt* (Whitney 1889: 248).

Our first instinct should be to see if it is possible to restrict the apparent reflex of *ī* under some phonological environment. Considering the consistency of *ī* in the nasal presents, a useful formulation would be to say that the laryngeal vocalized to *ī* next to the nasals, as Kuiper (1947: 203) seems to do, but like Jamison (1988: 224) points out in response, there are counterexamples elsewhere in the language, like the aforementioned cases of *janiman-* and *aniti*. Kuiper (1955: 33, 37), in a later work, revises his proposal slightly, suggesting that the occurrence of **H̥* → *ī* within words was governed by a "preceding sonant continuant (in particular a labial sound)", as in the cases of *brávīṣi, ámīti, gr̥bhīta-, mimīte, etc.* (cf. Table 3), and "sometimes *r*"[148], as in *śárīra-* and *gabhīrá-*. Jamison (1988) does not seem to be aware of Kuiper's later thoughts on the topic, but by Kuiper's own admission, forms like *vamiti, śamitar-, savitar-* etc. are counterexamples now, with their short *i* – to his list, I can add cases like *śiśīmási* or *áśīti-*, with lengthening in an environment not predicted by his forumulation (if we operate on the stricter criteria of labial vicinity for presence of *ī*, the forms in °*nī*° also become problematic, as in the ninth class presents). Granted, Kuiper's formulation was in tentative terms, but it seems that for any new conditioning that we postulate, there will be exceptional forms that will need explaining[149]. Moreover, we may be able to set up an environment that minutely captures the distribution of our data, but in the end, the environment we propose has to be phonetically plausible too and not arbitrary.

[148] PIE **CLHC* yields the sequence *CīrC* in Sanskrit, cf. **strh₃-nó-* > *stīrṇá-* 'laid down' (Beekes 2011: 151). Similarly, Clayton (2022: 40, 69) has argued for the general lengthening of **i* (and **u*) before *r* in a closed syllable. These regular developments could have influenced the tendency of **H̥* → *ī* in the vicinity of /r/ – against a regular development of **H̥* > *ī* next to /r/, we have forms like *iṣira-*; the count of *-ira-* formations also outnumbers that of *-īra-* in Vedic (12 vs. 3) (Macdonell 1910: 130). See also Paṇini's rule (ADh. 7.2.38) governing the optional lengthening of augment *i* (cf. fn. 16) after roots ending in long *r̥* (*Vasu* VII: 1376–1377).

[149] This is not to say it is impossible to find an environment that also accounts for all the exceptions, but that a suitable one eludes me.

3.2.3 *Secondary explanations for *°CHC° → °CīC°*

Given the difficulty in coming up with a suitable environment governing the split $\underset{\circ}{H} \rightarrow i, \bar{\imath}$ here (and also the presence of certain doublets showing both the vowels), we need to try and account for the cases of *ī* as secondary development, independent from the process of laryngeal vocalization (i.e. $\underset{\circ}{H} > i$, $i \rightarrow \bar{\imath}$) . This has been done convincingly in the literature so far for all the classes listed above, except for certain forms like *gabhīra-* and the *-nī-* suffix in the weak forms of the ninth present class. I will address the former in the next section §3.2.4 and the latter in some detail in §3.3; for the others, I offer a brief summary here, with references to their more detailed treatment:

- Stem-final *ī* in the root presents is due to analogical spread of the vowel from the final syllables of corresponding 2sg./3sg. imperfects where *ī* would be regular, as we detailed in §2 (Jamison 1988: 223; Cantera 2018)[150]. For instance, present forms 2sg. *bravīṣi,* 3sg. *bravīti* after the imperfects 2sg. *abravīs,* 3sg. *abravīt*, and once the *ī* is established in these forms, it can spread elsewhere in the present paradigm too, as in 1sg. *bravīmi* << ***bravimi*[151]. Jamison (1988: 223) notes that a great majority of the medial *ī* in these presents are in the 2sg./3sg. forms, which is as expected, considering the analogical

[150] This also marks a victory for our overall methodological choice of treating both *i* and *ī* as regular reflexes of the vocalized laryngeals instead of treating only one of them as such, cf. §1.2, 1.3. Without the solution provided by the 2sg./3sg. imperfects here (with their regular *ī*), it would be very difficult to explain the unexpected *ī* in the root presents here.

[151] Jamison (1988: 223) treats the stem-final *ī* of intensives similarly, cf. 3sg.act. *vā́vadīti* √*vad-* 'speak' < **uedH-*, remade from earlier ***vā́vaditi* under the influence of the regular 3sg. °*īt* forms, and the root presents that had already adopted the long vowel. We noted earlier in the section that these intensives already have a pattern of using connecting *ī* in open syllables and *i* in closed syllables and while the discussion then was in relation to the laryngeal reflex within the reduplicated stem, I consider such a (morpho-phonological) rule of this class to have influenced the lengthening of *i* before the ending too. The fact that there are no intensives attested in °*iti*, °*isi,* °*imi* etc. also speaks towards it – whenever a connecting vowel is used before the consonantal terminations in this class, it is always *ī* and never *i* (Macdonell 1910: 391–391). This is to be contrasted with the case of root presents where we find both vowels in use, e.g. *ániti* vs *ámīti*. Note that by our formulation, we should expect the short vowel *i* before the athematic 2pl.midd. endings of (primary) *-dhve* and (secondary) *-dhvam* (since they form closed syllables with the preceding vowel), but there are no attestations of forms with these endings in this class of verbs (ibid.).

model. Similar spread also accounts for the s-aorist forms of √*grabh*-, from the root aorist forms 2sg. *ágrabhīt*, 3sg. *ágrabhīt*[152].

- *ī* in certain nominal/adjectival derivatives can be explained as influence from verbal forms where forms in *ī* are the norm (the verbal root/stem would be associated with the long vowel which would then be generalized to the nominal derivatives as well[153]), but more frequently, it is the result of metrical lengthening[154] from the equivalent forms with *i*, done to fit the needs of the meter and thus a feature of the poetic language (Jamison 1988: 226; Kuiper 1947: 204; Kuiper 1955: 33–35). Considering the nature of the popular Vedic meters – which mandate long syllables only in cadence[155] – we should then expect to find the forms with *ī* restricted mostly to the cadence while those with *i* would be found in other places too. Kuiper (1947: 204) demonstrates that this is indeed the case for doublets like *várīman*- and *váriman*- in the Rigveda: the former always stands in the trochaic cadence of a Triṣṭubh *pāda* and the iambic cadence of Jagatī or Anuṣṭubh, while the latter is found before the cadence. Even for the instances where forms with *ī* occur before the cadence, as in the cases of *prasavītár*-[156] (cf. *savitár*-), the RV Padapāṭha and Prātiśākhya clearly mark the form as ***prasavitar*- (ibid.), which lends further support to the idea that these were really metrically lengthened forms. This poetic idiom is also likely to be utilized more for longer word forms like ***prasavitar*- (which has three short

[152] For 3sg.aor.ind.midd. (*adhy*)*agīṣṭa* 'learn' √*gā*- 'go' < **°h₁e-gʷh₂-s-te*, we have to seek the source of *ī* elsewhere since we do not find a regular **H* > *ī* in its parallel root aorist paradigm (cf. §2.1.1). As per Narten (1964: 108), it is actually a later *s*-aorist formation, reshaped under the influence of adjacent words like *adhīte* 'learn' √*i*- 'go'.

[153] This is certainly the case for derivatives from √*grabh*- listed in the Table 3 – in fact, pre-consonantal *ī* is found pervasively in derivatives from this root (as we saw for *s*-aorist formations from this root too). Jamison (1988: 226) also cites the formation of *str̥ṇī-ṣáni*- formed after the weak stem of the ninth class present verb √*str̥*- 'strew', which could have influenced the length of the vowel for formations like *starīman*-. To this, I can further add forms like inf. *śarītos* (after aorist forms like *áśārīt*, cf. also future forms like *śarĭ̄ṣyati*) and n. *amīva*- (after iprf. *ámīt*, cf. also prs. *ámīti*).

[154] Lengthening of vowels for the sake of the meter is a recognized phenomena in Vedic compositions like the Rigveda (Kobayashi 2018: 328) and should be considered a part of the poet's repertoire, or a form of poetic license.

[155] Long syllables can still be used towards the beginning of the *pāda* (verse line) and in the final position, where both short and long syllables are allowed (Macdonell 1916: 436–443).

[156] Attestations at RV 4.53.6 and 7.63.2 (*VedaWeb*).

syllables in succession already, even before we take the terminations into account), for rhythmic reasons and to create a more metrically useful variant[157].

- In the preconsonantal weak stem of the reduplicated presents (for roots of type *Cā* < **CeH*), stem-final *ī* is commonly thought to be a reshaping of earlier **i* by structural analogy with ninth class presents, cf. 3sg.act. *minā́ti, mimā́ti* vs. 3sg.mid. *minī́te*, ***mimite >> mimī́te* (Gunkel 2018: 88–89[158]; Praust 2004: 381–382; Whitney 1889: 248). The attested doublets for the root √*hā-* as reported earlier (with both *i* and *ī* forms), point to a fairly late analogy in Pre-Indic.

3.2.4 *Alternative etymologies*

Among the examples listed in Table 3, it is not possible to explain the *ī* in few of the words (namely *gabhīra-*, *śarīra-* and *aśīti-*) with the strategies in §3.2.3[159]. One might take these to be instances of metrical lengthening like the other nominal derivatives (e.g. *varīman-* and °*savītár-*, cf. supra), but such cases of lengthening were all instances of doublets (or near doublets), with both *ī* and *i* attested within the same paradigm and immediate derivatives, if not for the same case function. Words like *gabhīrá-* and *śárīra-* that are attested only with *ī* in the Vedic corpus (Macdonell 1910: 130) and also used in the same form fairly well in later Sanskrit literature[160] (*MWSE*: 346, 1057; *DCS*) are not good candidates to treat as cases of metrical lengthening[161] –

[157] Root aorist forms like *ádhīmahi* and *ádīmahi* are likely the product of metrical lengthening as well, cf. fn. 230 as part of the discussion for initial syllables.

[158] Gunkel (2018) compares the metrical distribution of *mimī́hi* with other words of the same metrical/phonological shape and concludes that *mimī́hi* aligns instead with forms like *kr̥ṇuhi* 'make', *tanuhi* 'stretch' – forms with a short vowel medially (idem: 76, 87–88). This is a concrete evidence for restoring an earlier, perfectly regular ***mimihi.*

[159] Given the presence of /r/ next to *ī* in two of these words (cf. also **pélh₁-nes-* → *párīṇas-* 'abundance'), we could try to motivate these via regular sound change in such an environment, but we already ruled that out in §3.2.2 , cf. fn. 148.

[160] Contrast this with Whitney's (1889: 438) comment on forms in *-īman-*, that they are "hardly met with outside of the Rigveda".

[161] Their metrical positioning in Rigveda may still show an inclination for *pāda* cadence (Nikolaev 2019: 192; *VedaWeb*) but given the abundance of later attestations with long vowel, the Rigvedic distribution is likely just a consequence of the words already having *ī*, and not that the vowel was stretched to fit the *pāda*. One could still argue for the latter position, and say that the long forms established in the Vedic literature could then have been adopted in later Sanskrit works too, but for this, we have no other clear parallels. Moreover, the fact that related forms with long *ī* exists in Nuristani languages – e.g. Waigali *Gambī́r* 'name of a valley and village in Tregam', cf.

these words are also without any corresponding verbal forms to supply a potential *ī*. In their Middle Indic continuations though, we do find forms with a short vowel (alongside those with long), suggesting that Pre-Indic could have had just *i* here – for *gabhīrá-*, there is M. *gahira* (cf. Nepali *gairo* 'deep') (Turner 1962–1985: 215; Nikolaev 2019: 192) and *śárīra-* is found as Gā. *śarira-* (Turner 1962–1985: 715; Baums and Glass 2002–), but these forms are generally taken as Prākrit innovations[162].

Given the difficulty of explaining the long *ī* of these forms secondarily and also of establishing original forms with short *i*, we have no choice but to resort to other etymologies here that eschew laryngeal vocalization altogether[163]. For *gabhīrá-*, a compelling alternative is to propose a formation with the complex Caland suffix *-*ilo-*, cf. *$g^{wh}m̥b^{h}h_1$-*i-ló-* > **gabhHirá-* > **gabhiHrá-* > *gabhīrá-*, with laryngeal metathesis yielding the long *ī* – the Caland status of the root here is secured by YAv. *jaiβi.vafra-* 'having deep snow', with its compositional first member in *-i* (idem: 191)[164]. We can treat *śarira-* similarly (though there does not seem to be parallel Caland formations here like that of *gabhīra-*) but for *áśīti-*, such an explanation would not work since it uses a non-caland suffix *-ti* (cf. fn. 114). I confess that I do not have a good account for *áśīti-*, but numerals tend to show phonetic irregularities, as evidenced by the diverse modern Indic forms of *áśīti-* itself (Turner 1962–1985: 40).

A similar strategy works for the cases of *go-pīthá-* 'protection' and *nṛ́-pīti-* 'protection (of men)' – not listed in Table 3 – which are seemingly derived from *-*ph₂-t°*, cf. √*pā-* 'protect' < **peh₂-*. These should be seen as reflecting an extended form of the root instead[165] i.e. **peh₂i-*, which we can posit already based on other evidence (cf. Ackerman 2018: 103)[166]. Thus, the

---

Skt. *gambhīra-* 'deep' with the full-grade of the root in *gabhīra-* (Turner 1962–1985: 216) – also speaks for an early-enough *ī* in these words.

[162] Thus Pischel (1900: 75) and Van den Bossche (1999: 22) who list M. *gahira* as a case of vowel shortening just before an accented syllable (cf. Skt. *gahīrá-*). There is also the possibility that the vowel in these Prākrit forms were analogically shortened – see Nikolaev (2019: 192) with reference to Bloch.

[163] Kümmel (2016: 221) acknowledges that *gabhīrá-* (and *párīnas-*) should not go back to an interconsonantal laryngeal but does not offer alternatives.

[164] In fact, *gabhīra-* is one of the words Nussbaum (1976: 64–65) uses as an example in his discussion of complex Caland suffixes; he notes that the length of *ī* is problematic, but does not explicitly give the explanation put forward here. In his treatise of the word, Nikolaev (2019) – cf. fn. 11 – also does not discuss this possible etymology of *gabhīra-*, perhaps because it would not match up directly with the the proposed Greek cognate of δυσπέμφελος (idem: 191).

[165] On the topic of PIE root extensions, see Fortson (2010: 77–78) and Ackerman (2018).

[166] Wackernagel (1896: 20) sees the *ī* in *gopītha-* 'protection' as a copy from the homonym *gopīthā-* 'draught of milk' (**peh₃i-* 'drink'), but this explanation would not work for forms in °*pīti-* 'protection'.

laryngeal metathesis utilized here for the medial *ī* is directly parallel to other established instances of it, like in *pītá-* 'drunk' < **ph₃i-tó-* and *gīta-* < **g$^{(w)}$Hi-tó-* 'sung' (Lubotsky 2018: 1884; *LIV*$_2$: 183).

We have now seen that **H̥ → ī* in some traditional etymologies can be revised and reinterpreted as coming from **Hi > iH* instead. It may seem that such a reinterpretation can explain cases of *ī* with ease, but such a strategy should be used with care and only when we have exhausted all other possibilities, ideally in conjunction with independent evidence that backs our proposal of a real **i.* At any rate, a vast majority of **H̥ → ī* can be explained via the results of §3.2.3 (along with §3.3) and words like the ones treated in this section are a tiny minority.

3.3 The problem of *-nī-* in the present ninth class

3.3.1 *Background*

In the present ninth class of Sanskrit verbs, the stem suffix alternates between *-nā-* in the strong forms and *-nī-* in the weak forms, when the suffix stands in front of endings beginning with consonants – e.g. 3sg.prs.ind.act. *punā́-ti* vs. 3sg.prs.ind.midd. *punī-té* to √*pū-* 'cleanse' (Macdonell 1910: 348–349; Whitney 1889: 260–261)[167]. Some early western scholars thought the suffix here was in actuality *-nai-* < PIE **-nāi-*, with *-nā-* reflecting the full grade variant before consonants and *-nī-* its zero grade – similar to the synchronic alternation seen in forms like 3sg.prs.ind.act. *gā́y-ati* / 1sg.aor.inj.midd. *gā-s-i* vs. pst.pass.ptc. *gī-tá-* made to √*gai-* 'sing', as noted by the ancient Indian grammarians (Macdonell 1910: 19, 348). After Saussure's seminal work linking the stem alternation in this class to the one in Class V (*-nó-/-nu-*) as well as VII (*-ná-/-n-*) (Meier-Brügger 2013: 107–109), and the subsequent discovery of PIE laryngeals, we now know that this class goes back to the Indo-European nasal present formations for roots ending in laryngeals: the original alternation was of the type *CC-né-H-* / *CC-n-H-*, with the standard PIE ablaut pattern[168] (Lundquist and Yates 2018: 2161; Beekes 2011: 258). It is easy to explain the strong suffix *-nā-* as the regular outcome of the sequence **-neH-*° in Sanskrit (Beekes 2011: 147; Gotō 2013: 106), but as was noted in the previous section, the weak suffix *-nī-* poses

[167] Pāṇini notes the alternation in ADh. 6.4.113 (*Vasu* VI: 1291), cf. fn. 18.

[168] Thus, for the PIE root **peuH-* 'cleanse': 3sg.prs.ind.act. **pu-né-H-ti* > Skt. *pu-nā́-ti;* 3sg.prs.ind.mid. **pu-n-H-tó-i* > Skt. *pu-nī-té* (*LIV*$_2$: 480).

a problem if we are to derive it from *-*nH*-, given that the regular outcome of laryngeal vocalization in Sanskrit for medial syllables is short vowel *i*, not long *ī* [169].

In §3.2.1, we saw other instances of Sanskrit *ī* seemingly going back to an interconsonantal laryngeal and we managed to explain a bulk of them as analogical spread from final syllables where it would be regular (as in *brávīṣi* after *ábravīt*) or in texts like Rigveda, as lengthening of the regular vowel *i* for the sake of the meter (e.g. *várīman*- next to its doublet *váriman*-). But the ninth class forms in *-nī*- do not lend themselves easily to such explanations, if at all. Owing to their attestation in the weak present forms, where the finite endings are capable of adding extra syllable(s) on their own, *-*nH*- in this class would be always restricted to non-final syllables[170]. Also, there are no doublet verbal forms in **-*ni*- attested alongside *-nī*- to justify the possibility of metrical lengthening – in fact, the vowel in the weak stem is unfailingly *ī* for all roots belonging to the class (Macdonell 1910: 348–351). Thus, the quantity of the vowel in *-nī*- presents a particularly thorny problem for our understanding of laryngeal vocalization in Sanskrit.

3.3.2 *Origins of -nī- in sound change?*

A formulation like $H̥ > ī$ in the vicinity of nasals[171] would provide a straightforward explanation of the *-nī*- suffix, but as discussed already in §3.2.2 – where we looked at the general possibility of interconsonantal laryngeals yielding *ī* in environments other than closed final syllables – we cannot accept such a sound change due to the amount of counterexamples involved. In this light, it may be best to treat the development of *ī* here as something specific to the ninth class. Praust (2004: 377–379) attempts to do just that, by proposing that for roots ending in a stop followed by

[169] In Iranian, the laryngeal drops out in contexts like these (§3.1) so the comparative data is not a help, cf. 3sg.prs.ind.mid OAv. *vərəṇtē* ~ Skt. *vṛṇīté* < **h₁ur-n-H-té* (**h₁uerH*- 'cover') (Beekes 1988a: 168). There is a form 2pl.prs.imp.act. OAv. *zānatā* ~ Skt. *jānītá* < **ǵn-n-h₃-té* (**ǵneh₃*- 'know') that appears to indicate vocalization of the laryngeal, but the Gatha verse where it is attested is one syllable too long – so the form here is really /zānta/, which is as expected (ibid.).

[170] The only conceivable place in the paradigm where they could occur in a potential final syllable is the 3pl.iprf.ind.act. form with the ending variant *-nt* i.e. forms of type **h₁é-pu-n-H-nt* but we know that in such sequences of °*CHnt*, it is the nasal that vocalizes and not the laryngeal, cf. §2.1.1 (also, nom.sg.f.prs.act.ptc. *punatī* < **pu-n-H-n̥t*-). At any rate, the attested 3pl.iprf.ind.act. form for *pū*- 'cleanse' is *ápunan* < **h₁é-pu-n-H-ent* and it uses the full grade of the ending (Macdonell 1910: 351).

[171] Especially of the 1pl. forms going back to *-*nH-mes,* from where it could have spread throughout the weak paradigm of the ninth class.

a laryngeal (as in *$g^{h}rebh_{2}$-), *-nī-* was a regular development by way of an epenthetic vowel that developed between the nasal-infix and the root-final laryngeal in PIE times itself[172] (e.g. 3sg.prs.ind.midd. *$g^{h}\mathring{r}b$-n-h_{2}toi > *-n∂h_{2}toi > -nīte*). In other words, in the sequence °*CnHC*° of such formations, the nasal did not vocalize – as is usual for Sanskrit, cf. *$ǵnh_{1}$-tó- > *jah_{1}tó- > *jāta-* 'born' (Beekes 2011: 151) – presumably to keep the nasal element of the stem intact throughout the paradigm. For other types of roots that do not end in a stop plus laryngeal (as in **peuH-*), **-ni-* would have been the regular outcome, but by analogy with roots of type *$g^{h}rebh_{2}$, they became *-nī-* too (Praust 2004: 380–381). While this is the analysis followed by others of late (Gunkel 2018: 89), it is not obvious to me how a phonetic development of this sort would be restricted to ninth class verbs only. Also, the direction of analogy for **-ni- >> -nī-* in roots of type **peuH-* is unconvincing, since by Praust's (2004: 381) own admission, there are more roots of type **peuH-* (**CeRH-*) than *$g^{h}rebh_{2}$- (**CeTH-*).

3.3.3 *-nī- as a purely analogical creation*

If we are to restrict the development of the long vowel in *-nī-* to the ninth class only, it should be now clear that we need to eschew approaches rooted in sound change, and be open to the possibility of it being a purely analogical creation i.e. a remodeling of an earlier **-ni-*. This is not a new idea: Wackernagel (1896: 20) proposed early on that the vowel length in *-nī-* was to match that of the strong suffix *-nā-*[173]. While Jamison (1988: 224) rejects Wackernagel's proposal to use strong forms as the analogical model – bringing attention to the fact that other Sanskrit weak forms actually grade their vowels to be lower than that of the strong (cf. the *-nó-/-nu-* alternation in present Class V verbs) – her attempt to motivate the formation is wanting too: she proposes that vowel in earlier **-ni-* got lengthened before the finite endings to avoid confusion with *i*-liaison, a phenomena common only in latter-day Sanskrit and that too for the perfect

[172] This is similar in spirit to our account of **°CHC#* > Skt. *°CīC#* in §2.3, but that one is dated to Proto-Indo-Iranian times and it is possible to account for its exceptions, as we saw in §2.4.

[173] For a possible typological parallel of weak forms copying only the vowel length of the strong in nasal presents, see Yoshida's (2013: 367–369) account of the history of Hitt. 3sg.prs.ind.midd. *zinnattari* 'is finished'.

system (cf. 1pl.prf.ind.act. *cakrimá* next to RV *cakr̥má* √*kr̥*- ‘do, make’)[174]. In what follows, I’ll attempt to specify a better model as well as motivation for the analogy at work here.

Observing the regular sound changes from PIE to Sanskrit, we can arrive at the following present paradigm for the two types of root we talked about in the preceding section (**CeRH*- vs. **CeTH*-):

	***peuH*-**	***g^{h}rebh$_2$*-**
1sg.	**pu-né-H-mi > pu-nā́-mi*	**g^{h}r̥b-né-h$_2$-mi > gr̥bh-ṇā́-mi*
2sg.	**pu-né-H-si > pu-nā́-si*	**g^{h}r̥b-né-h$_2$-si > gr̥bh-ṇā́-si*
3sg.	**pu-né-H-ti > pu-nā́-ti*	**g^{h}r̥b-né-h$_2$-ti > gr̥bh-ṇā́-ti*
1pl.	**pu-**n-H**-més > **pu-**ni**-más(i)*	**g^{h}r̥b-**n-h$_2$**-més > *gr̥bh-**aH**-más > **gr̥bh-**ā**-más(i)*[175]
2pl.	**pu-**n-H**-th$_1$é > **pu-**ni**-té*	**g^{h}r̥b-**n-h$_2$**-th$_1$é > *gr̥bh-**aH**-té >> **gr̥bh-**ā**-té*
3pl.	**pu-n-H-énti > pu-n-ánti*	**g^{h}r̥b-n-h$_2$-énti > gr̥bh-ṇ-ánti*[176]

In the postulated 1pl. and 2pl. Sanskrit forms, the structural similarity across the paradigms is no longer transparent, owing to the nasal vocalization in forms of **g^{h}rebh$_2$*- and laryngeal vocalization in forms of **peuH*-. Such irregularity across paradigms is susceptible to analogical leveling[177], especially since the two paradigms still look the same in the singular. What must have happened next is the creation of *-nī*- as a conflation of ***-ni*- and ***-ā*-, and its adoption in both the paradigms.

---

[174] In Vedic Sanskrit, *i*-liaison was not as obligatory before perfect endings beginning with consonants as it was in Classical Sanskrit; as a rule, it earlier occurred only with perfect stems ending in a prosodically long syllable (i.e. with a long vowel or multiple consonants): e.g. 2sg.prf.ind.act. *tatan-tha* vs. 2sg.prf.ind.midd. *tatn-i-ṣe* for √*tan*- ‘stretch’ and 2sg.prf.ind.act. *ā́s-i-tha* √*as*- ‘to be’ (Yoshida 2013: 366–367; Macdonell 1910: 356). In contrast to this, the long vowel *ī* is consistently present in the ninth class weak present stems. For proposed earlier forms like ***punite*, it is hard to justify confusion with *i*-liaison also because the *i* there would be in a position not predicted by the Vedic rules of the liaison (not to mention the fact that as a morphophonological rule, the *i*-liaison was surely coupled with the reduplicated perfect stem, as a feature of the perfect endings, while ***punite* is quite dissimilar from a typical perfect formation in both the structure of its stem as well as the endings it takes).

[175] Via intermediate stage *°*CaHC*° already in PIIr., which later yielded the long vowel *ā* in Sanskrit (Beekes 2011: 151; Lubotsky 2018: 1876).

[176] This could have passed through a preform ***gr̥bhaṇanti* – cf. *tanú*- < **tnh$_2$-(e)u*- ‘long, thin’ (Beekes 2011:152) – before being remade under the influence of forms like *punanti*, but since the mechanics of it are not relevant for the discussion at hand, we are leaving it out.

[177] More elegantly formulated as Sturtevant’s paradox: “sound change is regular but creates irregularity while analogical change is irregular but creates regularity” (Matthews 2014: 385).

An easier way out may perhaps have been to just adopt the **-*ni*- variant for forms of *$g^{h}rebh_{2}$-, but the rise of -*nī*- makes sense if we take the analogy here as being operational when the intermediate sequence of *°*CaHC*° had not yet yielded the long vowel *ā* in forms like **$g_{\mathring{r}}bh$-ā-*más*. At such a stage, *$g_{\mathring{r}}bh$-*aH-más* would be the form in that paradigm, and if **pu-ni-más* was already the realization in the other paradigm[178], we can argue for a reshaping **pu-ni-más* >> **pu-niH-más* > *punīmás*, that restored the laryngeal in the weak forms of **peuH*-[179]. Such a transition is especially compelling since at this point, the laryngeal would still be present in the strong forms of both the paradigms (as **-naH*-), making the weak forms of **peuH*- the only place where it would be missing. Then when the laryngeal was lost later with the lengthening of the preceding vowels, the allomorphs -*nī*- and **-*ā*- became too dissimilar and -*nī*- was standardized across both the paradigm types.

3.3.4 *Parallels for the analogy*

The account of -*nī*- put forward so far may seem speculative, but there are clear parallels to the process elsewhere. It is now widely believed that the prs.midd.ptc. suffixes -*māna*- (for thematic stems) and -*āna*- (for athematic stems) both go back to *-*$mh_{1}no$-, and while -*āna*- is a regular outcome in the athematic sequence *°*C*-$m_{\mathring{}}h_{1}no$-, thematic *°*V*-$m_{\mathring{}}h_{1}no$- should yield the suffix **-*mina*-; the attested -*māna*- is then commonly explained as a remodeling of **-*mina*- based on -*āna*- (Klingenschmitt 1975: 161–163; Mayrhofer 1981: 435; Beekes 2011: 113–115; Lowe 2015: 24). Now **-*mina*- may not be attested in Sanskrit but is evidently present in old Prākrit forms like Aś. *palakamāmīna*- ‘exerting oneself’ (cf. Skt. *parakramamāna*-) and AMg.

[178] The assumption here is that the laryngeal vocalization had already occurred for forms like **pu-ni-más(i)*, before the loss of post-vocalic laryngeal in *$g_{\mathring{r}}bh$-*aH-más(i)* in Pre-Indic (for our model of laryngeal vocalization – PIE **pu-nH-més* > Pre-In. **pu-nHi-más(i)* > Pre-In. ***pu-ni-más(i)*, cf. §3.1 – this further implies that pre-vocalic laryngeals were lost before post-vocalic ones in Pre-Indic). It is intuitive to think that laryngeal loss first occurred in complex clusters like *°*CHC*°, before they were lost in *°*VHC*°, but for this order of changes in Pre-Indic, I do not have concrete proof at the moment. For the late retention of laryngeals in *°*VHC*° and *°*CHC*° contexts, see §2.3.4 (cf. fn. 88) and §3.1 respectively.

[179] My thanks to Prof.dr. Alwin Kloekhorst for this elegant suggestion, and for inspiring me to think of these sound changes as composed of distinct stages which can all participate in processes like analogy, that characterize a living language. I have tried to apply such a principle elsewhere in this thesis too, as in §2.4.1 where I talked about the analogical changes leading to the *i*-stem reanalysis of *sanis*.

āgamamīṇa- ‘coming’ (cf. Skt. *āgácchamāna-*) (Lowe 2015: 24)[180]. The consistent long *ī* of the Prākrit forms needs to be explained as well and we can take it as a case of ***-mina-* copying just the vowel length of *-āna-* – exactly parallel to how we described the creation of *-nī-* from earlier allomorphs ***-ni-* and ***-ā-*. Again, the transition makes sense if we view it as made up of following stages:

*°*V-mḫ₁no-*	> *°*V-mina-*	>> *°*V-miHna-, *°*V-maHna-*	> Pkt. °*V-mīna-*, Skt./Pkt. °*V-māna-*
*°*C-m̥h₁no-*	> *°*C-aHna-*	> *°*C-aHna*	> Skt. °*C-āna-* >> Pkt. °*C-māna-*[181]

For reference, I also present here the evolution of *-nī-* suffix, as we described it earlier:

*°*V-n-Ḫ-C°*	> *°*V-ni-C°*	>> *°*V-niH-C°*	> Skt. °*V-nī-C°*
*°*C-n̥-H-C°*	> *°*C-aH-C°*	> *°*C-aH-C°*	> *°*C-ā-C°* >> Skt. °*C-nī-C°*

It is clear from the Sanskrit and Prākrit forms that during conflation of **-mi°* and **-ā°* (or **-aH°*) in the participle suffix, both *-mī°* and *-mā°* were likely candidates – Sanskrit must have regularized *-māna-* everywhere while Prākrit retained some forms in *-mīna-*. Also interesting are the athematic participle forms in *-īna-*[182] (besides the more common *-āna-*), which speaks to the fluidity of the analogy working here and the kind of influence ***-mina-* and *-āna-* exerted on each other. If something similar happened in the weak paradigm of the ninth class, perhaps we should also expect ***-nā-* there, besides *-nī-*. But it is easy to see why speakers would avoid this potential combination: *-nā-* was already established firmly as the marker of the strong forms in this class. Yet another example of a new Sanskrit morpheme resulting from a conflation is the primary 3pl.midd. ending *-rate,* out of variants *-re* and *-ate* which both happen to be attested in

[180] All the attested Prākrit forms seem to use *-mīna-*. Pischel’s Prākrit grammar does list one form with the expected short vowel – AMg. *aṇādhāẏamiṇa-* in Āyāraṅgasutta 1.7.1.2 (Pischel 1957: 387) – but the *i* here is a typo for *ī*, as confirmed by the German version of the grammar as well as the original Prākrit text (Pischel 1900: 300; Jacobi 1882: 32). *-māna-* is widely attested in Prākrit too, but as per Pischel (1957: 96, 387) variants in *-mīna-* are to be found in the Aśokan inscriptions and in the oldest Ardha-Māgadhī, mostly restricted to the Jain text Āyāraṅgasutta.

[181] Prākrit has generalized the thematic *-māna-* everywhere and the older *-āna-* is seldom utilized there (Pischel 1957: 387). Gotō (2012: 27) cites a form prf.midd.ptc. *sasr̥māṇa-* √*sr̥-* ‘flow’ as an “unparalleled mixture of an athematic stem and suffix *-māna-*” already in Rigveda, besides the regular *sasrāṇa-*.

[182] The main attestation is that of Skt. *āsīna-* √*ās-* ‘sit’ (RV 10.27.13c, with the usual *āsāna-* also attested elsewhere in the Rigveda) (Bloch 1965: 251; VedaWeb). This variant is retained in Prākrit as well, cf. Pā. *āsīna-* (Oberlies 2011: 257). More importantly, Prākrit contributes another entry to the type: M. *melīna-* √*mil* ‘combine’ (Pischel 1957: 96, 387; Von Hinüber 1986: 310).

Sanskrit[183] (Gotō 2013: 86). It seems to me that his kind of process was not an isolated instance of Pre-Indic morphology and against this background, the scenario proposed for the ninth class should feel plausible.

3.3.5 *Evidence for the analogy*

In the last two sections, I have proposed that *-nī-* is a conflation of older allomorphs ***-ni-* and ***-ā-* (< **aH*), which were regular outcomes of **-n-H-* in post-vocalic and post-consonantal positions respectively. Compared to the previous analogical explanations of *-nī*, this proposal has the main advantage that it works solely within the weak paradigm – the creation of *-nī-* was modeled after each of the suffix variant ***-ni-* and ***-ā-*, motivated by a need to unite the paradigm across roots of different shapes (which started to diverge after regular sound changes). What kind of evidence do we have though, of an analogy like this occurring in the ninth class? In this section, we will discuss some potential traces of the older ***-ni-* and ***-ā-*, along with other indirect evidence that can corroborate the analogy.

1. A remarkable form *minīt* (√*mī-* 'damage' < **meiH-*) is attested once in the Atharvaveda (AVŚ 6.110.3d ~ AVP 19.21.13d), for the expected 3sg.prs.inj.act. ***mināt* (Macdonell 1910: 350; Roth and Whitney 1924: 134; Bhattacharya 2016: 1474). Whitney (1889: 263) reports of a similar form *aśnīs* (√*aś-* 'attain', expected 2sg.prs.inj.act. ***aśnās*), used after *mā* in the Hindu epic Mahābhārata. These forms have hitherto been understood as neologisms, modeled either after other verbal formations in *°īC* (e.g. 3sg.prs.inj.act. *anīt* to √*an-* 'breathe'; 3sg.aor.inj.act. *vadhīt* to √*vadh-* 'slay') (Hoffmann 1967: 63; Hollenbaugh 2020: 798–799)[184] or corruptions from the weak paradigm forms in *-nī-* (e.g.

[183] *-re* < **ro-i* is is the variant going back to the "stative" middle paradigm in PIE while *-ate* < **n̥to-i* stems from the "normal" middle (Beekes 2011: 269). The process that gave rise to *-rate* clearly took place after the realization of **n̥* > *a* was complete, since earlier combinations like **ro-nto* (before the addition of *-i*) would result in *-ranta* (which is attested once in the reduplicated aorist form 3pl.midd.ind. *a-vavr̥t-ranta* (Gotō 2013: 112)). Thus, the creation of *-rate* involved a conflation of **-r°* and **-at°* forms where the vowel of the first form was lost. This is similar to our explanation of the suffix *-māna-* from earlier ***-mina-* and *-āna*.

[184] Hoffmann (1967: 63) actually takes *minīt* as a new aor.inj. formation from the present stem, rather than a prs.inj. substitute for ***mināt*, as was mentioned earlier (i.e. *mi-n-īt* and not *mi-nī-t*). His reasoning is that a prs.inj. could not have stood in the context of *minīt*'s attestation, because of its inhibitive semantics; the context demands a preventative reading that only the aor.inj. can supply. While this fits well with his overall proposal (idem: 70, 91) for the functional division of prs.inj. and aor.inj. in Vedic – a proposal that is also generally accepted (Clackson 2007:

1pl.prs.ind.act. *minīmási*) (Thieme 1941: 84–85). But a case can be made for treating these as archaisms, from a time when the analogy that produced *-nī-* in the weak paradigm was still shaping up, leading to production errors even in the strong forms[185]. A strong parallel is provided by the athematic prs.midd. participle forms in *-īna-* (cf. §3.3.4), which stand beside the participle formations in *-āna-* and *-māna-*/*-mīna-*. For details on the attestation of *minīt* – especially for the AVP parallel – see §Appendix I.

2. Prākrit 1pl.prs.ind.act. ending variant *-i-mo* – as in M. *jāṇimo* ~ Skt. *jā-nī-máḥ* √*jñā-* 'know' (Pischel 1957: 361) – could be reflecting older **-ni-* from the ninth class. Oberlies (1999: 46) touches on this possibility in his catalog of potential archaisms that Middle Indic preserves but Sanskrit does not[186]. The termination, standing besides the more frequent *-ā-mo* (cf. M. *jāṇ-ā-mo*[187]) is fairly productive though and found with original ninth class verbs as well as others (e.g. AMg., M. *vand-i-mo* ~ Skt. *vándāmahe* √*vand-* 'greet'; M. *pucch-i-mo* ~ Skt. *pr̥chhā́maḥ* √*prach-* 'ask') (Van den Bossche 1999: 64). Pischel (1957: 95) – and following him, Van den Bossche (1999: 19, 64) – are of the opinion **ā* changed to Pkt. *i* after accent here[188], thus giving **-ā-mas* > Pkt. *-i-mo*; Pkt. *-i-mo* in other contexts is then to be explained via analogical spread.

3. There are no direct traces of the older weak stem paradigm in ***-ā-* (e.g. ***gr̥bhāmás(i)* and ***gr̥bhāté*, proposed in §3.3.3), but the present stem here seems to be preserved elsewhere, like in the closely related Sanskrit present stems of type *gr̥bhāyá-* 'take'[189],

162) – such a division of the two stems does not seem to stand up to scrutiny and there are enough cases of prs.inj. being used in a preventative function (and aor.inj. in inhibitive), cf. Hollenbaugh (2020: 779–781, 790–792, 799).

[185] Cases of weak forms using the strong suffix *-nā-*, like 2pl.prs.imp.act. *punāta,* next to *punītá* (Macdonell 1910: 349–351; VedaWeb), can be taken as similar production errors, or even as attestations of ***-nā-* in the weak stem – the other candidate possible in the conflation of earlier ***-ni-* and ***-ā* (cf. §3.3.4).

[186] Mayrhofer (1955: 237) and Von Hinüber (2001: 278–279) are also open to the possibility, though Bloch (1965: 233) is skeptical, citing the limitation of Pkt. *-i-* here to the 1st person – besides the 1pl. forms, it is also to be found in 1sg.prs.ind.act. forms like M. *jāṇimi* (~ Skt. *jānā́mi*), but rarely (Pischel 1957: 95, 361).

[187] Synchronically, this is to be taken as a thematicized present in the language (in Prākrit, Old Indic's athematic inflection survives only in traces), and not a transfer from the old ninth class strong stem in *-nā-* (Mayrhofer 1951: 137; Von Hinüber 2001: 289–290). This is clear from the relevant 2.sg.prs. form: M. *jān-a-si* (Pischel 1957: 360–361). In general, transfer to the thematic conjugation is a process that has already started in the Rigveda, for the ninth class (Macdonell 1910: 349).

[188] They also propose the change for gen.pl. of the pronouns – e.g. AMg., M. *tesiṁ* ~ Skt. *téṣām* (Van den Bossche 1999: 19), but there does not seem to be examples from other morphological domains.

[189] Whitney (1889: 263, 390) lists more examples of such *-āyá-* formations and they stand mostly beside the ninth class presents, and that too to roots ending in stops – which, as we saw in §3.3.3, yields the allomorph ***ā*.

commonly derived as a *-*ie/o*- extension of the ninth class present stems since the time of Saussure (apud Jasanoff 2003: 123): *g^{h}r̥bn̥h_2-*ié/ó*- > *gr̥bhāyá*-[190]. It is also quite likely that such a stem underlies the 2sg.prs.imp.act. forms in -*āna*, as in *gr̥hāná* 'seize', which are peculiar to the ninth class and formed to roots ending in consonants as well (Whitney 1889: 261–262). Beekes (1999: 15) derives *gr̥hānā́* from the base *g^{h}r̥bn̥h_2 > *gr̥hā*[191], extended with the particle -*ná*[192]; *LIPP* (550, 552) offers a similar view, sourcing the particle to **ne* 'near'[193].

4. An older form **-*ni*- could be justified for certain pādas in the Rigveda, if -*nī*- is attested in pāda positions expected to be short according to the meter[194]. Additionally, if the analogy that gave rise to -*nī*- (i.e. **-*ni*- >> -*nī*-) became established during the timeframe of Rigveda composition, we should perhaps see such traces of **-*ni*- concentrated in the oldest layers[195] of the text, with the usage of -*nī*- increasing in expected long positions as we move chronologically through its various stratas. To test these hypotheses, I computationally analyzed the metrical distribution of the suffix over

[190] Jasanoff (2003: 123) actually sees these formations a bit differently, deriving them from the nasal stem as *i*-presents first, that followed the *h_2*e*-conjugation (in his theory of IE verb) and then got thematicized via the 3sg. in -*n̥h_2-i-é*. For a criticism of Jasanoff's approach here, see Shatskov (2017: 242). Some of the -*āya*- formations may also go back to original athematic presents with an ablauting *i*-suffix – Kloekhorst (2006: 115) remarks that a reconstruction of *sph_1-ói-e*- neatly accounts for the aspiration of *sphāya*- 'to become fat', but it remains to be seen whether such a formation could be reflected in other verbs of this class. Also, athematic *i*-presents are not widely reconstructed for PIE and remain a feature of the Leiden school (Beekes 2011: 255), being generally absent from other handbooks (Fortson IV 2010: 95–97; Lundquist and Yates 2018: 2159–2165).

[191] The medial *h* here is a weakening of earlier *bh*, cf. fn. 131.

[192] Gotō (2013: 106) explains the formation with strong stem instead, as *gr̥bh-n̥ā + -ná*, "with the loss of the first -*n*-". This is unlikely though, given the attested forms of prs.midd.ptc. *gr̥h-n̥-ānā*- or 3pl.imp.ind.act. *gr̥h-n̥-ántu*. For a more detailed critique of such a dissimilation here, see Beekes (1999: 15, 17).

[193] The same particle is seemingly present in the 2pl.prs.imp.act. forms like *punītána* (next to *punītá*), but on the difficulty of uniting the particles involved here, see *LIPP* (235, 554).

[194] As we saw in §3.1, poetic meter can preserve linguistic archaisms in the Rigveda, and for some ninth class forms, we know that the meter already supports a short reading of the root vowel (matching the expected development) even though it may be written as long – e.g. *prīṇanti* in RV 9.74.4c is to be read as **priṇanti* (< **pri-nH-enti*) instead, to fit the Jagatī cadence and follow the meter (Gotō 2013: 107; VedaWeb). For the basic principles of the poetic meter in discussion here and elsewhere, see Macdonell (1916: 436–447).

[195] It is generally accepted that parts of Rigveda are older than the others (Jamison and Brereton 2014: 10–13), and based on the distribution of certain linguistic and metrical features in the text, scholars have tried to classify the text into various layers/stratas. For a summary of such efforts so far as well as a critique, see Hellwig, Scarlata, and Widmer (2021: 848–850 , 861–863).

all of Rigveda, taking also its stratas into account[196]. Details of this corpus analysis are included in §Appendix II; here I will just describe the major findings. Out of the total 152 attestations of *-nī-* in Rigveda, 3 were found in expected short (S) positions, thus breaking the meter (cf. Table 4, next page). These could be genuine traces of an older ***-ni-*, but the count is so low[197] that it is difficult to assign particular significance to them. Comparison with numbers from our control classes confirms the same: there is one[198] such instance of the ninth class strong suffix *-nā-* (out of 112 total attestations) , while for the fifth class strong suffix *-no-*[199], the count is three[200] (out of 200 total attestations). But we do observe more interesting results, when looking at the strata distribution of the suffix in other metrical positions (cf. Figure 1). Relative to *-nā-*, the usage of *-nī-* increases significantly[201] in expected long (L) positions, when moving from the older to the newer stratas of Rigveda (specifically in the transition from the strophic to the normal). This can be construed as an evidence of ***-ni-*: as the underlying analogy of ***-ni-* >> *-nī-* became established, the usage of the suffix also became more popular in expected L positions[202].

[196] For the strata-based analyses, I follow Arnold's (1905: ix, 4) division of Rigveda into five layers, which is chronologically: Archaic (A), Strophic (S), Normal (N), Cretic (N) and Popular (P).

[197] The dearth of ***-ni-* forms may very well imply that the process that reshaped ***-ni-* to *-nī-* took place long before Rigveda was composed. Or perhaps the *-nī-* forms were generalized for Rigveda early on, via forms like 1pl.prs.ind.act. *punīmasi* and 2pl.prs.ind.act. *punītana*, where the use of ***-ni-* would yield four consecutive short syllables – a pattern not as useful as the attested ones in *-nī-* (granted, these forms also occur as *punīmas* and *punīta*, but as per Whitney (1889: 206), the longer variants are older here).

[198] RV 10.153.3c (2.sg.iprf.ind.act. *astabhnāḥ*).

[199] In Sanskrit, *o* is considered a long vowel, with its historical origins in PIE diphthongs **eu* and **ou* (Kobayashi 2018: 328). The fifth class verbs alternate between strong stem in *-no-* and weak stem in *-nu*, going back to the same nasal present formation as the ninth, but for PIE roots ending in **u* (Lundquist and Yates 2018: 2161) – e.g. for **kleu-* 'hear': 3sg.prs.act. **ḱl̥-né-u-ti* > Skt. *śr̥-ṇó-ti;* 3sg.prs.midd. **ḱl̥-n-u-to-i* > Skt. *śr̥-ṇu-te* (*LIV*$_2$: 334). Crucially, the development of *-no-* here is entirely regular i.e. it does not have the curious vocalism of *-nī-*. Thus, it can provide apt control data for our study of the ninth class suffix.

[200] RV 1.35.9d (3.sg.prs.ind.act. *r̥ṇoti*), 1.122.9b (*sunóti*), 8.2.11c (1.sg.prs.ind.act. *śr̥ṇómi*).

[201] For the statistical tests performed in these analyses, see §Appendix II.

[202] In contrast, the usage of *-nī-* in expected X positions is significantly more in the older stratas (specifically the combination of archaic, strophic and normal) relative to both *-nā-* and *-no-*, potentially reflecting the vacillation of the suffix before the change ***-ni-* >> *-nī-* ran its course and before *-nī-* was firmly established as the shape of the suffix. But this is a weaker claim than the one forwarded for expected L positions (cf. Hypothesis 3 in §Appendix II).

Location	Text	Scansion[203]	Meter	Strata
8.2.11b	*índremáṁ sómaṁ śrī**ṇī**hi*[204]	LLL L|LL**L**S	Gāyatrī[205]	Strophic
7.97.2a	*ā́ daíviyā vṛ**ṇī**mahe ávāṁsi*[206]	L LSL ,S**L**S|L SLS	Triṣṭubh[207]	Strophic
9.84.1d	*urukṣitaú gṛ**ṇī**hi daíviyaṁ jánam*[208]	SLSL ,S**L**S |LSL SL	Jagatī[209]	Normal

Table 4. Rigveda attestations of *-nī-* in expected S positions

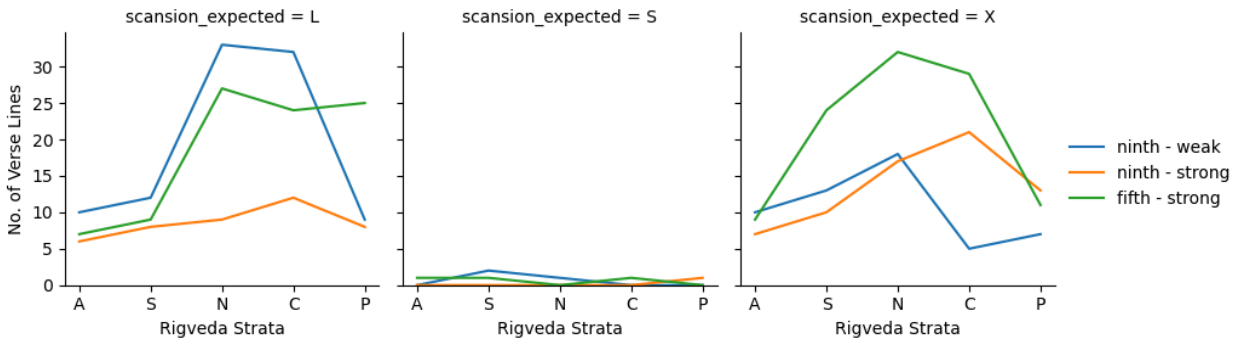

Figure 1. Frequency (in all the expected metrical positions) of ninth class weak suffix attestations by Rigveda strata, along with the same for each of the control classes

[203] Key for the notation used here: S stands for short syllables, L for long and X for short/long; the *comma* marks the caesura while the *pipe* signals the beginning of the cadence.

[204] 'Prepare…this soma here, o Indra,' (Jamison and Brereton 2014: 1026)

[205] 8 syllables of scheme XXXX|SLSX. Since the next pāda in the stanza (i.e 8.2.11c) follows a trochaic cadence (LSLX) (*VNH*: 635), the whole stanza can be classified as following a trochaic variant of Gāyatrī (like *VedaWeb* seems to do), making the evidence of this pāda contestable.

[206] 'We choose divine help' (Jamison and Brereton 2014: 1006)

[207] 11 syllables of scheme XXXX,XSX|LSLX (with early caesura) or XXXXX,XS|LSLX (late caesura).

[208] 'Sing to the heavenly people in the wide dwelling place.' (Jamison and Brereton 2014: 1318)

[209] 12 syllables of scheme XXXX,XSX|LSLSX (with early caesura) or XXXXX,XS|LSLSX (late caesura).

3.4 Cases of *Ø*

Compared to the cases of **H → ĭ* in medial syllables, there are not many examples for *Ø*:

Class	Example Developments	Other Reflexes
Nominal derivatives (in *-tar, -tu, -man*)	nom./acc.sg.n. **ǵenh₁-mn-Ø → jánma* 'birth', dat.*jánmane* abl./gen.sg.m. **ǵenh₁-teú-s → jantós* 'offspring' ins.sg.m. **meǵh₂-mn-eh₁ → mahnā́* 'greatness'[210] m. **h₁euH-mén- → omán-* 'protection' nom.sg.m. **péuH-tōr-Ø → pótā* 'Purifier' nom.pl.m. **uénH-tor-es → vantā́ras* 'enjoyer' m. **neiH-tor- → netár-* 'leader, bringer'	id. *jánima* inf. *jánitos* id. *mahimnā́, mahinā́* m. *avitár-* 'protector' m. *pavĭ́tár-* 'purifier' nom.sg.m. *vánitā* inf. *náyitum*
second member of compounds	**-dh₃-to- → (devá)-tta-* pst.ptc. 'given (by the gods)' **-dh₃-ti- → (bhága)-tti-* f. 'gift' **-sth₂-ti → (úpa)-sti-* 'subordinate' **-senh₂-ti- → (puru)-ṣ́ánti-* m. personal name	3sg.aor.midd. *ádita* f. *díti-* 'distributing' f. *sthíti-* 'standing' *sánitar-* 'winner'
weak forms of reduplicated presents	1pl.ind.act. **dʰe-dʰh₁-més → dadhmás(i) √dhā-* 'place' 3sg.ind.midd. **dʰe-dʰh₁-tói → dhatté* 2sg.ind.midd. **dʰe-dʰh₁-sói → dhatsé* 1pl.ind.act. **de-dʰh₃-més → dadmás(i) √dā-* 'give'	1pl.prf.ind.act. *dadhimá* 2pl.prf.mid. *dadhidhvé* 2sg.prf.midd. *dadhiṣva* 1pl.prf.ind.act. *dadimá*
others	**sokʷh₂-io- → sakhyá-* n. 'friendship' **krouh₂-i̯o- → kravya-* 'raw flesh' **solh₂uo- → sárva-* adj. 'all' **h₁esh₂-n-os → asnas* gen.sg. 'blood'	– *kraviṣ-* 'id.' – –

Table 5. Attestations of *Ø* from interconsonantal laryngeals in medial syllables[211]

[210] Seemingly shows the deletion of medial *-m* too – reduction of a post-consonatal *°mn°* cluster like this is regular already in PIE (Byrd 2015: 74).

[211] For a more comprehensive list of attestations for laryngeal loss, see Mayrhofer (2005: 99–101), where the data is grouped by the type of laryngeal.

Various scholars have tried to relate the loss (and vocalization) of the laryngeals to the position of the accent in the word. In regards to the loss, two simplest positions possible are: (a) **°CHC°ˊ > °CC°ˊ*: loss in pre-tonic positions[212] (b) **ˊ°CHC° > ˊ°CC°*: loss in post-tonic positions (Lipp 2009: 485–486; Cantera 2018: 488). A brief look at the data is enough to conclude that neither formulation can explain all of the data – a pre-tonic loss is apt for the weak forms of reduplicated presents (e.g. *dadhmás*, *dhatté*) while a post-tonic formulation suits the loss in the second member of compounds (e.g. *°tta, °sti*), with examples of one acting as counterexamples for the other. For both the formulations, one can always rely on analogy as well as accent shifts to eliminate the exceptions, but it is difficult to determine which of the two (if any) represented the original state of affairs, since there are too many exceptions in either direction.

Proposals tying the loss of laryngeals to the syllable structure (and phonotactics) are also to be found in literature, and since these formulations are more specific, they fare better with the data at hand. An influential formulation is that of Hackstein (2002) which proposes loss of laryngeals at right-syllable boundaries already in PIE: **CH.CC > *C.CC*[213]. This nicely accounts for forms like dat.sg.n. *jánmane* < **genh₁.mn.ei*[214]; nom.sg.n. *jánima* then shows the later Indic vocalization of the laryngeal and nom.sg.n. *jánma* is to be taken as a new formation after the weak-stem. This may also explain the doublets like *pótar-* and *pavitar-*, with the root **peuH* losing the laryngeal before weak forms like dat.sg. **peuH.trei* > ***pótre* (cf. *potrá-* 'soma vessel of the *potar*' < **peuH.tró-*), after which the strong forms like nom.sg. *pótā* were made[215]. Moreover, the fact that distinction between *seṭ* and *aniṭ* roots was becoming somewhat blurred in

[212] As far as I am aware, no one has tried to propose this exactly, but I include it here for the sake of completion. Beekes (1981: 285) has a complementary proposal, that laryngeal could have vocalized in post-tonic positions in PIIr.

[213] This formulation is a modification of an earlier proposal **°CHCC°ˊ > °CC°ˊ* by Schmidt and Peters (apud Aufderheide and Keydana 2016: 131–133), which has some noticeable exceptions (cf. Byrd 2015: 94), neatly resolved by Hackstein now. For the phonetic motivation of Hackstein's rule as well as its place within general PIE phonology, see Byrd (idem: 95ff; 2018: 2066). In direct contrast to this is Beekes's (1981: 282–284) proposal that in the sequence **CHCC*, the laryngeal actually vocalized already in PIIr –cf. fn. 134.

[214] The rule famously explains Iranian variants of the 'daughter' word: New Persian *duxtar* < PIIr. **dʰuktrés* < PIE **dhugh₂trés* (gen.sg. form here., cf. strong forms in §3.1). It is usually thought that such an allomorph is not continued in Indic, but Pkt. *dhūdā* 'daughter' < **dhūtā* may be preserving it, cf. Sen (1954: 14). The Pkt. form is normally thought to reflect an (irregular) contraction of the usual *duhitā* though (Oberlies 1999: 39–41).

[215] For the hysterodynamic form assumed here as well as an alternate explanation of *pótar-* as an analogical formation (to *hótar-* 'pourer, sacrificer'), see Clayton (2022: 63–64).

Sanskrit (cf. fn. 19) could have influenced the creation of *aniṭ* forms here[216], as Clayton (2022: 64) also notes.

There are other even more specific rules proposed for PIE[217], that can explain more cases of laryngeal loss:

1. Pinault's Law: **H* > *Ø* before **i̯* in internal syllables, as in *sakhyá-*[218] (Pinault 1982). As per Byrd (2015: 236), this likely applied only for **h₂* and **h₃*.
2. Saussure Effect: **°.HRo° > *°.Ro°*, **°oRH.° > *°oR.°*, as in *sárva* (Byrd 2018: 2065).
3. **sHn > sn*, as in *asnas* (Mayrhofer 1986:159).[219]
4. **°Th₁T° > *°TT°* in non-initial syllables (Jasanoff 2003: 77), as in *dhatté*.[220] Forms like *dadhmás* as well as *datté* (to √*dā-*) are analogical creations based on forms where this rule applied[221]. Perfect forms like *dadhimá* and *dadhiṣva* probably post-date the rule in PIE and reflect regular vocalization, but even if we take them as early-enough creations (and subject to laryngeal loss), their *i* can be explained as analogical spread from other perfect forms where the use of the vowel is widespread.

It is not clear what the exact phonetic/phonological motivations of rules like these are, and instead of specifying multiple phonological rules like this, it may also be possible to collapse at least some of these into a single rule, taking phonotactics, prosody and syllable position into account. In this regard, see Byrd (2018: 2065–2066) for the work done so far on some of these rules.

---

[216] For *vantāraḥ/vanitā*, Beekes (1988b: 63) points out the loss of laryngeal forms in adjacent form of *vana-* < **uenH-e/o-* which could also have prompted the creation of the *aniṭ* variant in *-tar-* forms.

[217] For other language examples, see Byrd (2018: 2065).

[218] Aspiration here is from the paradigm of *sákhi-* 'friend' (Byrd 2018: 2065).

[219] Beekes (1988b: 63) asserts that the laryngeal loss in *asnas* is analogical though.

[220] If we accept that the desiderative suffix was **-h₁s*, a further example is *uí-urt-h₁s-a-ti* → *vívrtsati* 3sg. desiderative √*vr̥t-* 'turn' (Jasanoff 2003: 77), cf. also pst.ptc. *vr̥tta-*.

[221] A good explanation for the laryngeal loss in second-member of the compounds still eludes us though. None of the rules above explain it and we could just settle for accepting it as a feature of the compounds, like scholars from Wackernagel (1896: 82–83) to Olsen (2018: 264–265) seem to do. One could also formulate other rules like Balles (2012: 22) does: that the laryngeal was deleted between dentals – cf. also Kuiper's (1947: 207) observation that cases of loss to be found mainly in a combination of dentals/nasals (or both) – perhaps also qualified by the restriction that it occurs only in medial syllables (to allow for cases like *díti-*, *sthíti-*). While such a formulation does fit the compound examples in Table 5, simplex cases like *atithi-* and *janitar-* would now have unexpected vocalization. An alternative is to just adopt Lipp's (cf. supra) loss of post-tonic laryngeal loss (of PIIr. date), now that we have rules to account for its earlier exceptions (e.g. *dadhmás* via rule no. 4 above).

4. Development in Initial Syllables

4.1 Data

For initial syllables, the data for interconsonantal laryngeals is rather limited. Besides the famous cases of the PIE word for 'father' **ph₂-ter-*, it is the Ø-grade of the roots of shape **CeH* and **CeHC* that supply the attested contexts **#CHC°*:

√ Shape	Sanskrit	Avestan
–[222]	nom.sg.m. **ph₂-tér-Ø → pitā* 'father'	OAv. *pᵃtā*, YAv. *pita*
**CeH*	pst.ptc. **dʰh₁-tó- → hitá-, -dhitá* 'placed' (√*dhā* < **dʰeh₁-*) cf. 2sg.aor.imp.midd. *dhiṣvá*; *sthitá-*, *díti-* (§1.1)	1du.aor.ind. *dvaidī*[223]
	pst.ptc. **sH-tó- → sitá* 'bound' (√*sā-* < **seH-*[224]) cf. **ḱh₃-tó- → śitá-* 'sharpened' (√*śā-* < **ḱeh₃-*)	Av. *hita-*[225] –
**CeHC*[226]	3sg.aor.inj.act. **ḱh₂s-e-t → śíṣat* 'instruct' (√*sās-* < **ḱeh₂s-*) cf. ptc.act. *śiṣant-,* pst.ptc. *śiṣtá-*	OAv. 2sg.imp. *sīšā*[227] OAv. 3sg.opt. *sīšōiṯ*
	**sHdʰ-ró → sidhra-* 'successful' (√*sādh-* < **seHdʰ*) cf. *sidhma-, siddha-*	–

Table 6. Examples of **#CHC* development[228]

[222] It is difficult to assign PIE roots to the kinship terms in **°ter* (Lundquist and Yates 2018: 2113).

[223] This dual middle form is derived as **dh₁-uedʰh₂ →* Av. *dvaidī* /dvadi/, with the interconsonantal laryngeal disappearing (Beekes 1988a: 86) In the other cases of the word's paradigm, full-grade of the root has been generalized (idem: 180–181). Same was the fate of Av. ptc. *dāta-*, cf. Av. *stāta-* ← **sth₂-tó* as well.

[224] *LIV₂* (518) identifies the laryngeal here as **h₁*, while Olsen (2018: 261) and Kümmel (2016: 223) opt for **h₂*; I leave the laryngeal unspecified. cf. 2du.aor.imp.act. *sitam* from the same root, also with **sHt°*.

[225] It is sometimes thought that Av. *hita-* 'bound' could go back to **s(H)ita-* with an original *i* (Beekes 1988a: 86; Kümmel 2016: 223), but Olsen (2018: 261) considers the match of Av. personal name *Vištāspa-* 'with unbound horses' – from **ui-sh₁to°*, with the usual loss of laryngeal in medial syllables for Avestan, cf. §3.1 – and Skt. *ví-ṣitāso áśvāḥ* 'unbound horses' convincing enough to treat *hita* as a formation from the same root.

[226] One can also assign the case of **dh₃ǵʰ-mo → jihmá-* 'oblique' to this group, but with Gr. δοχμός 'id.' as the only potential cognate (Beekes 1988b: 62; *EWAia* I: 591), it is difficult to argue for a PIE root **deh₃ǵʰ-*.

[227] The underlying form here is /sisa/. In Avestan, /i/ is often lengthened before /š/ and also in open, word-initial syllables in Avestan (de Vaan and García 2014: 16).

[228] Main sources for the compilation: Lubotsky (2018:1883); Beekes (1988a:86); Mayrhofer (2005:78,121).

Here, the laryngeal reflex always seems to be *i* in Sanskrit, and *i* or Ø for Avestan. Some forms in Sanskrit do show a *Ø* reflex, or even *ī* seemingly, but they can all be explained away:

- **H → Ø* is attested in the present formations of √*sā-* 'bind' (cf. *sitá-,* Table 6): e.g. 3sg.prs.ind.act. *syáti* ← *sHi-e-ti* (*LIV*₂: 173). According to Beekes (1988a: 86, 236), *#*CHi̯*° always yields #*Ci̯*° in Indo-Iranian, as also seen in Av. 2pl.prs.imp.midd. *syōdūm* /sya-dvam/ 'cut down', Skt. 3sg.prs. *dyáti* √*dā-* 'divide' < **deh*₁-. The phenomena is reminiscent of Pinault's law by which a laryngeal was deleted already before yod in PIE (the difference being Pinault's Law was restricted to medial syllables, cf. §3.4).

- **H̥ → ī* appears to be the development for passive formations in *-ya-*, as in 3sg.prs.ind.pass. *dhīyáte* ← **dʰh*₁*-ie-te*. But we know these to be later formations in Indic, because PIE *#*CHi̯* always yields *Ci̯* in Indo-Iranian (see the previous case of *syáti*). Even if *dhīyate* was created after this sound change ran its course, its long vocalism is to be understood as lengthening of stem-final *i* in **dhiyate*, before the suffix *-ya-*, cf. §3.2.1; an example of the lengthening going back to an original *i* in this class: 3sg.prs.ind.pass *mīyate* √*mi-* 'fix' (Jamison 1988: 215–216). *ī* in other passive forms like *dīyate, sthīyate* (also going back to **CeH* roots) can be explained away similarly[229].

- A root aorist form 1pl.midd. *dhīmahi* exists with long vocalism, and while there was confusion earlier as to whether this form represented an injunctive (**dʰh*₁*-medʰh*₂) or an optative (**dʰh*₁*-ih*₁*-medʰh*₂) (Macdonell 1910: 500), the *communis opinio* now is to regard it as an optative (Hoffmann 1967: 254–255; Gotō 2013: 109; Haas 2023: 61–63). Thus, the *ī* in *dhīmahi*[230] does not go back to a vocalized laryngeal.

---

[229] For the forms pst.ptc. *hīná-* √*hā-* 'leave' < **ǵʰeh*₁- act. (cf. gd. *hitvā*) and gd. *mītvā* √*mā-* 'measure' < **meh*₁ (cf. pst.ptc. *mita-*), see Wackernagel (1896: 20) – the *ī* in the former is likely under the influence of *-līna* < √*lī-* 'cling' < **leiH-* (*LIV*₂: 405) while the latter has a doublet *mitvā-* attested earlier (Adh. 7.4.40, cf. fn. 18), suggesting *mītvā* is a later reshaping. These forms, especially *hīna-* could also be from an extended root **ǵʰeh*₁*i-*, cf. **peh*₂*i-* for *(nṛ́)-pītaye*/*gopīthá-* as well as established cases of laryngeal metathesis like *pītá-* and *gīta-* 'sung' (§3.2.4). Also note that these are to be contrasted with forms like pst.ptc. *bhītá-* √*bhī-* 'fear' (**bʰeih*₂*-*) and *nītá-* √*nī-* 'lead' (**neiH-*) which have an internal **i* already in the root and where the Ø-grade sequence *°*iH*° regularly yields the long vowel.

[230] 1pl.aor.ind.midd. *ádhīmahi* and 3du.aor.ind.act. *ádhītām* are attested with *ī* as well, once each in the Rigveda (Lubotsky 1997a: 747). Forms with *i* also exist within their paradigm and are more frequent: 2sg.midd. *ádhithās* (3×), 3sg.midd. *ádhita* (3×) (idem: 746–747). It is attractive to explain the former as just lengthened variants of earlier **ádhi*°. Jamison (1988: 225) attributes the reshaping here to "differential lengthening before morpheme boundary", similar to how she explained the *-ñi-* suffix for the ninth class presents (cf. §3.3.3). I consider

4.2 The problems with **#CHC° > #CiC°*

Ignoring the Avestan development for a moment (cf. Table 3), it looks like we can safely assume *i* as the regular development of the interconsonantal laryngeal in initial syllables for Sanskrit. We can even propose the same development pathway as the medial syllables (cf. §3.1): PIE **#CHC°* > PIIr. **#CHC°* > Pre-In. **#CHiC°* > Skt. **#CiC°* – a later timeline for the vowel epenthesis makes sense; if it had already occurred by Proto-Indo-Iranian times, we should see a consistent *ī* reflex via the laryngeal metathesis[231], like for final syllables (cf. §2.3). There is a problem though: with the vowel epenthesis to the right – and parallel to our stance in medial syllables, cf. §3.1 – we should expect to see a (tenues)[232] aspirated consonant in the resulting **CHV* context i.e. ***phitar-* instead of *pitar-* 'father'[233]. A way out of the contradiction is to restrict the laryngeal aspiration to inlaut, like Beekes (2011: 149) seems to do. Kobayashi (2004: 108) tries to motivate the development differently by suggesting that the laryngeal causes aspiration of a preceding stop only when the stop and the laryngeal span syllable boundary (as in PIE **rot.h₂o-* > **rat.Ha* > *ratha* 'chariot')[234], and not when they are tautosyllabic (as in the case of 'father',

---

it more likely that these are cases of metrical lengthening (cf. §3.2.3), especially for the quadrisyllabic form *ádhīmahi*, since it yields a more useful metrical shape of SLSS instead of SSSS. The attestation of these forms is not at odds with this hypothesis: *ádhīmahi* is found in the iambic cadence of a Gāyatri stanza (RV 4.32.19) while *ádhītām* is in a *pāda*-final position of a Triṣṭubh (10.4.6) (VedaWeb) – the vowel *ī* is exactly in places where the meter demands a long syllable. The lengthening may also have been influenced by the relative propensity of the just discussed optative *dhīmahi,* attested 23 times in the Rigveda (Lubotsky 1997a: 747). For the structurally similar root √*dā-* 'give' < **deh₃-*, a form *adīmahi* also exists with an exact doublet of *adimahi*, but without the optative ***dīmahi* (Macdonell 1910: 367, 369).

[231] We know that the laryngeal metathesis occurred in initial syllables, cf. **ph₃i-tó-* > *pītá-* 'drunk', with original *i*-extension to the root **peh₃-* (Lubotsky 2018: 1884).

[232] We do not talk about mediae aspiration here since *díti-* < *dh₃-ti-* (§1.1, cf. fn. 3 too) seems to be the only case of initial mediae going back to **CHC* and *h₃* likely did not aspirate (fn. 43).

[233] Mayrhofer (apud Olsen 2018: 260) proposed that the vowel epenthesis in such words was before the laryngeal (written as *ₑH*) which would explain the lack of aspiration of the consonant preceding the laryngeal. However, we ruled out left-epenthesis in general in §2.3.3, because it does not maximize the syllable onset. Another possibility is that of laryngeal directly vocalizing in this context, but if epenthesis was the route for vocalization in final and middle syllables (as discussed in §2.3.1 and §3.1), it would be odd for the language to adopt a different mechanism here. Tichy (apud Cantera 2018: 488) tries to limit direct vocalization to the vocative only, but already in PIE – **ph₂ter* > **pə́ter*, which would then later develop into Skt. *pítar.* Such a vocative can provide a model from where /p/ could have been generalized to other forms that had epenthesis later and thus aspiration, but I cannot accept a special development only in the vocative and that too already in PIE.

[234] Here, Kobayashi is following Gippert's (1997: 63, 72–73) conclusion that words like *ratha-* still had the laryngeal preserved till Pre-Indic, as seen by the metrical presence of its first syllable in long positions. Gippert (ibid.) thinks the aspiration process passed through an intermediate cluster of the type *°tʰ.H°* in these words, before the laryngeal disappeared.

throughout its history). But for both formulations, we now have to deal with the apparent exception of *sthita-* 'standing' ← **sth₂-tó-* (instead of the expected ***stita-*)[235], and as Kobayashi (ibid.) himself warns us, there are not enough examples to come to a firm conclusion regarding the conditioning for laryngeal aspiration. For now, we can try to maintain the idea of inlaut-only aspiration by explaining the aspiration of *sthita-* as spread from medial syllables where it would be regular, cf. 3sg.prs.ind.act. *tiṣṭhati*, 3sg.aor.ind.midd. *ásthita*[236]. The existence of later Middle-Indic forms like Aś. nom.pl.m. *stitā* 'standing' and Niya Pkt. *stita-* (Turner 1962–1985: 795) suggests that we are on the right track here.

More problematic are the Avestan parallels[237], where we see both *i* and the *Ø* reflex of the interconsonantal laryngeal, as is also clearly visible in the hysterodynamic paradigm of 'father' laid out below[238]:

	PIE	Sanskrit	Old Avestan		Young Avestan	
			i	*Ø*	*i*	*Ø*
nom.	**ph₂-tḗr-Ø*	*pitā́*	–	*pᵃtā / tā*	*pita*[239]	*pᵃtă̄(ca)*[240]
acc.	**ph₂-tér-m*	*pitáram*	–	*pᵃtārəm*	*pitarəm*	pl. *fᵛδrō*
dat.	**ph₂-tr-éi*	*pitré*	*piθrē*[241]	*fᵛδrōi*[242]	*piθre*	pl. *ptərᵊbiiō*

[235] Based on *sthita-*, we can perhaps say the aspiration was blocked only in absolute initial positions like in the case of **ph₂ter-*. Another possibility is of revising our earlier position (§3.1) and eliminating tenues aspiration altogether for **CHC* by dating the transition to **CHiC* only after **CHV* aspiration was complete in Pre-Indic, but this is adhoc too. One would then also need to rely on analogy to explain all the attestations of tenues **CHC* aspiration (e.g. *pr̥thivī-*), which would also not work for forms like *raphita-* 'miserable', that do not have related forms with aspiration (Mayrhofer 2005: 114).

[236] For Kobayashi's formulation, these forms act as additional counterexamples, since there is aspiration despite the laryngeal and preceding stop being tautosyllabic.

[237] The data for **#CHC°* seems to be even more limited in Iranian; the ones cited in Table 6 seem to be the extent of it (Beekes 1988a: 86).

[238] Compilation of Avestan forms is based on Cantera (2018: 487-88), which has the attestation sources too.

[239] The *i*-form is seen in YAv. nom./acc.du. *pitarə* too (Beekes 1981: 281–282), as well as OP *pitar-* 'father' (Lubotsky 2018: 1883).

[240] The *Ø* reflex of the laryngeal is seen in YAv. nom.pl. *pᵃtarō* too. Beekes (1988a: 86) suggests these forms may be loans from OAv.

[241] /piθrai/ (Beekes 1988a: 235).

[242] Beekes (1988a: 235) gives the underlying form as /fθrai/. The initial cluster here is the result of **ptr*. **p* is preserved before **t* in general in Avestan (as in the OAv. nom./acc. case forms here, also YAv. *hapta* 'seven' < **septm̥*), but not in **ptr* – there it turns into the fricative *f* as is usual for **p* before other consonants, cf. **pro* > Av. *fra* (Skt. *prá*) (de Vaan and García 2014: 28, 31). **t* also turns into a fricative *θ* before consonants, which undergoes voicing after *f* (idem: 31). Thus, the final result is *fδr*.

The divide in the Avestan reflexes and how they came about need to be explained as well, if we want to truly understand the full development of the cluster from PIE to Sanskrit, via the intermediate stage of Proto-Indo-Iranian. Given the shared reflex of *i* in both Sanskrit and Avestan, it would be ideal to derive it from a common Proto-Indo-Iranian epenthesis, like how we did for final syllables (cf. §2.5). But unlike final syllables, the reflex is not a long vowel in either of the languages, and as discussed previously, we cannot simply pin the epenthesis to Proto-Indo-Iranian here[243].

4.3 Explaining the Avestan data

Kümmel (2016: 222–223) has proposed that for **#CHC°*, the laryngeal had first disappeared in Proto-Indo-Iranian already and then only epenthesis occurred in the cluster[244], conditioned by factors that need to be clarified still – Kümmel thinks it to be plausible in forms like dat.sg. PIE **ph₂-tr-éi* > Pre-PIIr. **ptrái* > PIIr. **pitrái*[245] > OAv. *piθrē*, with a cluster of more than two consonants still after the loss of the laryngeal, and also in forms like PIE **dʰh₁tó-* > Pre-PIIr. **dʰta-* > PIIr. **dʰita-* > Skt. *hita-*, where the initial laryngeal loss would result in an illicit initial syllable sequence. On the other hand, for the permissible initial cluster of nom.sg. **ph₂-tḗr* > PIIr. **ptā́*[246]*,* no epenthesis was necessary and OAv. *ptā* preserves this state[247]; the YAv. equivalent of *pita* then must show a later epenthesis in the initial syllable. Thus, the PIIr. paradigm of 'father' had the stem alternation of strong **ptár-* and weak *pitr-* in its paradigm, which accounts for the OAv. distribution; Sanskrit must have generalized the *i* of the weak stem in the strong cases too, akin to what YAv. did.

---

[243] We can still date the *i*-epenthesis to Proto-Indo-Iranian but *after* laryngeal metathesis ceased to be active. This is too adhoc though and we have no evidence of the latter assumption.

[244] This is similar to the proposal of Aufderheide & Keydana (2016: 125, 51) – cf. fn. 128 – but unlike Kümmel, their proposal is for all syllable positions, arguing for *i*-epenthesis as a later, distinct process in Indic. Also note that this is another way solve the lack of aspiration of *pitar-*, cf. 4.2.

[245] Kümmel (2016: 222–223) is actually not clear on whether this epenthesis is applicable to Proto-Indo-Iranian already or is of Pre-Iranian date only. Considering the Sanskrit form *pitré*, it is attractive to date this epenthesis to PIIr. already – we would not need to pose the epenthesis again in Indic for this form.

[246] It is clear that an initial onset of **pt* was permissible in PIE from cases like **ptero-* 'wing' > Gr. πτερόν 'id', Arm. *t'ert'* 'leaf, foliage' (Byrd 2015: 98). For Kümmel's proposal, PIIr. must have inherited its tolerance for such clusters from PIE.

[247] This also means the alternate dative form of OAv. *fəδrōi* (reflecting **ptrai*) was a later analogical creation under the influence of the strong forms.

Such a vowel alternation in the stem should remind us of similar paradigmatic alternations that we saw in the case of medial syllables, cf. §3.4. Since Kümmel leaves the exact conditioning of the epenthesis open, we can try and see if any of the formulations in §3.4 can explain the data in initial syllables better, their counterexamples notwithstanding. We find that Beekes's (1981: 282–284; cf. fn. 213) rule of PIIr. vocalization in the sequence **CHCC* accounts the data here the best[248]. In fact, Kümmel's formulation of the initial vowel alternation in the 'father' word essentially matches that of Beekes, though Beekes did not view it as laryngeal loss first and then epenthesis[249]. Kümmel's proposal here is to be considered an improvement, since he explicitly incorporates the notion of permissible syllable structure in his explanation, and frames the change in terms of laryngeal deletion first, which matches our formulation of laryngeal deletion in **°CH.CC°* for medial syllables.

4.4 The possibility of independent development in Sanskrit and Avestan

Still, the initial vocalism of Av. *hita-* and OAv. *sīšā* (along with their Sanskrit counterparts) are problematic under Kümmel's formulation[250]. While it is possible to account for them secondarily[251], more concerning to me is the proposed mechanism itself which presupposes a laryngeal loss first and then only epenthesis even for heavy clusters: **#CHC(C)° > *#CC(C)° > *#CiC(C)°*. If the initial laryngeal deletion yields a problematic cluster **#CC(C)* still, I find it more likely that epenthesis would have been carried out in the first stage itself, yielding

[248] The general conditioning rules utilized by Beekes (**CHCC > CiCC*; *CHC' > CC*) generates the attested paradigm of OAv. 'father' quite well: the *Ø* reflex in the strong cases follows the rules while in the weak cases, *i* is to be taken as the regular development. This is not surprising, since his rules were formed with the 'father' word in mind (Beekes 1988a: 86–87; 1981: 281–283, 285). As for Lipp's rule by which laryngeals vocalized in pre-tonic positions, cf. §3.4, the conditioning there explains OAv. dat.sg. *fəδrōi* as regularly descended from **ph₂-tr-éi*, which is fine. What is odd is the fact that the predicted forms in the prominent cases of nom. and acc.sg. – OAv. ***pitā,* ***pitārəm* – are simply not attested, and the implication is that speakers chose to replace them with the *i*-less forms.

[249] For Beekes (1988a: 87), it is a case of laryngeal vocalization in the weak cases and lack of it in the strong; Parallel to Beeeks's formulation here is Byrd (2015: 97-101), who works on PIE itself and posits the vowel alternation in the word's surface form there, strong stem **ptér-* vs **pəh₂tr-*.

[250] This is because initial clusters **st° < sHt°* and **ćs < *ḱh₂s°* seem to be permissible in PIIr. (Kümmel 2016: 223).

[251] According to Kümmel (2016: 223), OAv. *sīšā* reflects PIE **ḱh₂s-e-* > Pre-PIIr. **ćša-* > PIIr. **tša-* >> PIIr. **ćisa-*, with the final reshaping done already in PIIr. to preserve the paradigmatic unity, under the influence of forms like PIIr. **ćištá-* < Pre-PIIr. **ćštá-* < PIE *ḱh₂s-tó-*, where the epenthesis vowel would be regular (for the PIIr. change of **ćš > *tš*, see (Lubotsky 2018: 1885)). On the other hand, Av. *hita* is taken as reflecting **s(H)ita-* instead, but this is less convincing – cf. fn. 225.

**#CHiC(C)°*. We rightly dismissed this as a formation for PIIr. earlier (since it should yield *ī*) and given the difficulty in dating the epenthesis to PIIr. otherwise, we should perhaps also be open to the possibility of independent development in both Sanskrit and Avestan i.e.:

PIE **#CHC°* > PIIr. **#CHC°* > Pre-In. **#CHiC°* > Skt. *#CiC°*
> Pre-Ir. **#CC°*, **#CHiC°* > Av. *#CC°*, *#CiC°*

I do not see this possibility being discussed much in the literature[252] and while it seems to just move the unresolved question of the Avestan distribution to Pre-Iranian, the development for Sanskrit now safely follows the same late epenthesis model as that of the medial syllables. As to the exact conditions when epenthesis occurred or not in Pre-Iranian, I cannot pursue it further in a thesis devoted to Sanskrit, but I do note that *i*-epenthesis and anaptyxis (both not phonemic though) were an attested phenomena in Avestan (Beekes 1988a: 51; de Vaan and García 2014: 17–19). It may also be that *Ø* was the only reflex of **#CHC°* in Iranian (matching the Iranian development in middle syllables, in symmetry with our proposal for Indic[253]) with all instances of *i* there to be explained as secondary[254]. The final possibility is that of *i* being the sole, regular reflex and *Ø* the secondary – here, Olsen's[255] (2018: 261–263) attempt to explain the *Ø* forms of OAv. 'father' as instances of laryngeal loss when the word is "in close connection with a preceding word"[256] is noteworthy. To solve the riddle of Avetsan development, the evidence from

[252] Kobayashi (2004: 138) does regard the development in Iranian as independent, but with a different choice of epenthesis vowel for Iranian – /ə/ vs. /i/ in Indic. Also, his proposal is for all syllable positions and not just initial.

[253] We proposed that *i* is the regular development in both initial and middle syllables for Indic.

[254] Models like that of Aufderheide & Keydana (2016: 149) – which advocate for laryngeal loss as regular Indo-Iranian outcome of **#CHC°* (cf. fn. 128) – do seem to allow for independent *i*-epenthesis even in Iranian, to explain the *i* in YAv. paradigm of 'father', for example.

[255] In Olsen's (2018: 262) view, past scholarship has given undue importance to the *Ø* reflexes in the Avestan word for 'father': "it seems exaggerated to seek the explanation of the development of interconsonantal laryngeals in *one* irregular and even internally unclear paradigm in *one* single language" (emphasis hers). I do not accept Olsen's (2018: 264) general proposal for the Indo-Iraninan development in initial syllables though, by which a prop-vowel developed next to the laryngeal: **#CHC° > *#CHᵢC° > *#CiC°*. This may sidestep the problems we had dating *i*-epenthesis to PIIr. (since laryngeal metathesis should give *ī* with it), but positing an epenthetic vowel of different length just for initial syllables is inconsistent with the general model of *i*-epenthesis we used successfully in medial and especially final syllables, which was also dated to PIIr. times.

[256] In such cases, the idea is that the laryngeal in the initial syllable of the word is treated as if it were in medial syllables (here the regular development in Iranian is *Ø*) – for example, PIE **ǵénh₁tōr ph₂tḗr* → OAv. *ząθā ptā* 'engenderer father' (Olsen 2018: 261–263, 266). Olsen (idem: 262) is trying to revive an old theory of Meillet here – cf. Ravnæs (1981: 251) as well – and to this end, she analyzes all the instances of *i*-less forms in the Gathas, concluding that there is only one exception to the prosodic rule she is proposing. I find the premise interesting and

other Iranian languages, including more recent ones, may also prove to be crucial – based on the diverse reflex of **#CHC°* across some Iranian languages[257], Cantera (2018: 487) leans towards the development in initial syllables not being the same in every Iranian language; if true, this also implies a late (Pre-Iranian) retention of the laryngeal in this context.

there seems to be similar phenomena elsewhere by which a word is influenced by the preceding one, cf. Schindler's formulation of Lindeman's rule in Vedic as Siever's law (Beekes 2011: 139). Olsen does not bring up the case of OAv. dat.sg. *piθrē* though and whether it appears in close connection to the previous word (it should not, under her formulation). Also, I would have liked to see a discussion of *dvaidī* (Table 6) with its laryngeal loss, as well as explicit Gathic parallels of similar phenomena in the context of other Iranian sound changes.

[257] The cases Cantera (2018: 487) reports are that of Yidgha-Munǰi *liī* 'he gave' < **dīta* (going back to **ī*!) and Waxī *δɛt* < **dita*-.

5. Conclusions

In Sanskrit, interconsonantal laryngeals regularly yield the vowel *ī* in final syllables and *i* elsewhere. This development, along with the parallel outcomes of Avestan as well as the intermediate ones in Proto-Indo-Iranian, can be summarized as:

PIE	Proto-Indo-Iranian	Sanskrit	§	(Avestan)
*°*CHC*# >	*°*CHiC*# > *°*CiHC*# >	°*CīC*#	§2.2.2, §2.3	(°*CīC*#)
*°*CHC*° >	*°*CHC*° >	*°*CHiC*° > °*CiC*°	§3.1	(°*CC*°)
*#*CHC*° >	*#*CHC*° >	*#*CHiC*° > *#*CiC*°	§4.2, §4.4	(#*CC*°, #*CiC*°?)

The pāda (*mā́ no*) *vadhīḥ pitáram janitā́ram*[258] ← **ued^{h}h₁-s ph₂tér-m ǵénh₁-tor-m* faithfully captures the development in all the positions outlined above. The PIE laryngeals "vocalized" in these clusters by way of an epenthetic vowel /i/ added to the right of the laryngeal, with the eventual loss of the laryngeal in Sanskrit. The timeline of the epenthesis determined the quantity of the vocalic outcome. If the epenthesis had already occurred by Proto-Indo-Iranian times – as was the case in final syllables – *ī* was the final result via laryngeal metathesis. On the other hand, if epenthesis occurred only after Proto-Indo-Iranian, as was the case in middle syllables and possibly in initial, the result was *i*. The development in initial syllables is not as well understood as in the other positions – the Sanskrit evidence there fits well with late epenthesis but the approach works only if we can show that the Avestan double reflex of *i* and *Ø* in this position is an independent Iranian development. Further research needs to be done on the Iranian side to better understand the Proto-Indo-Iranian situation here, but the task is made difficult by the dearth of data for initial syllables in both Sanskrit and Avestan.

The cases of *i* in final syllables and *ī* in medial as well as initial positions, seemingly going back to an interconsonantal laryngeal, are all secondary developments of Sanskrit. A bulk of them can be explained as analogical developments, as laid out in the following table:

[258] Translation: 'Do not slay our father, the progenitor'. This is a *pāda* constructed to serve as an example here, but it is based on actual attestation of *mā́ no vadhīḥ pitáram* in RV 1.114.7 (*VedaWeb*) and the set phrase *pitar-janitar-* in RV 4.1.10, 4.17.12, etc. (Olsen 2018: 258) – also see §Appendix I for verses with similar themes. Incidentally, the *pāda* follows the meter Triṣṭubh with a scansion of L L SL, SSL |LSLL, but we need to assume a long scansion for the first syllable of acc.sg.m. *janitāram* < **jan.Hi.tā.ram,* with laryngeal marking the position still (cf. the case of *duhitar-* in §3.1). An attested parallel for the root involved is that of nom.pl.m. *jánāh* 'people' < **ján.Hās* whose first syllable also needs to be scanned long in places like RV 4.38.9 (Gippert 1997: 68; *VedaWeb*).

Case	**Example**	**§**
Reanalysis of (potential) root nouns or *-*(e)h₂*-stem nouns as *i*-stem nouns	nom.sg.m. **sénh₂-s* > ***sanīs* >> *sanis*, cf. *jánis*	§2.4.1 §2.4.2
Reshaping of neuter *s*-stem forms based on other *s*-stem and *i*-stem nouns	nom./acc.sg.n.**kreuh₂-s* > **kravHis* > **kraviHs* >> PIIr. **kravis* > Skt. *kravis*	§2.4.3 §2.5.2
Spread of *ī* from final syllables of verbal forms in 2sg. °*īs*, 3sg. °*īt* (< *°*CHC*#)	2sg.prs.ind.act. **mléuh₂-si* > ***bráviṣi* >> *brávīṣi*, cf. *ágrabhīṣma, gr̥bhīta*	§3.2.3
Creation of weak ninth class present suffix *-nī-* from a conflation of earlier allomorphs ***-ni-* and ***-aH-* (> *-ā-*)	3sg.prs.ind.midd. **pu-n-H-tó-i* > ***punité* >> *punīté*	§3.3
Reshaping of weak stem of reduplicated presents, after ninth class presents	3sg.prs.ind.midd. **mi-mh₁-tó-i* > ***mimite* >> *mimīte*	§3.2.3

For other cases of such apparent exceptions, following strategies work well:

Metrical lengthening of *i* to *ī*, observed frequently in nominal derivatives and sometimes even for verbal forms	loc.sg.m. **h₁uerHmen-Ø* > *variman* → *varīman*, cf. 1pl.aor.ind.midd. *ádhīmahi*	§3.2.3 fn. 120
Morphophonological lengthening of *i* to *ī*, in denominative and passive formations (before the suffix *-ya-*) and in intensives (for open syllables)	3sg.prs.ind.pass. **dʰh₁-ie-te* > ***dhiyáte* → *dhīyáte*, cf. *janīyati*; 3sg.impf.ind.act. **h₂uer-h₂uer-t* > ***avarivar* → *avarīvar*, cf. *vā́vadīti*	§4.1 §3.2.1 fn. 84
Alternative derivation going back to real *i*	1pl.aor.midd. *dhīmahi* as optative (**dʰh₁-ih₁-*), not injunctive (**dʰh₁-*); nom.sg.m. (*ni-*)*dhis* as an original *i*-stem formation (**°dʰh₁-i-s*), not root (**°dʰh₁-s*) adj. *gabhīrá-* with complex suffix **-i-ló-*	§4.1 §2.4.1 fn. 45 §3.2.4

Finally, a *Ø* reflex of an interconsonantal laryngeal is a result of regular laryngeal loss in the cluster, either in PIE itself or during the course of its PIIr. development. This covers cases like *syáti* < **sh₁i-e-ti* (§4.1) or *sakhyá-* < **sokʷh₂-io-* (§3.4), with loss of **H* before **i̯*, as well as the alternation of *janman-* with *janiman-* (< **ǵenh₁-mn-*) (§3.4), which goes back to a PIE loss of the laryngeal in **CH.CC* positions.

All in all, it is possible to identify the regular reflexes of interconsonantal laryngeal in Sanskrit and systematically deal with all the exceptions[259]. Some parts of the explanation are more contentious than the others – the uncertainty around the development in initial syllables was already mentioned and a closer look at the Iranian development there may yield more concrete answers in the future. Similarly, the study would have benefitted from an exhaustive analysis of **H̥* > *i* cases that potentially underwent metrical lengthening in Rigveda; it could not be carried out in this thesis for reasons of time and space, but for someone so inclined, the computational analysis that I did for the ninth class *-nī-* suffix (in search of a preform ***-ni*; cf. §3.3.5, §Appendix II) should serve as an example. And while we explored the development of interconsonantal laryngeals in relation to some of the Indo-Iranian sound changes (e.g. laryngeal metathesis, aspiration, secondary palatalization), the implications of the proposals here on the relative chronology of other sound changes remains to be seen.

[259] As for the aspiration effect of the laryngeal in **CHC* positions, we can conclude that **h₂* (and possibly **h₁*) aspirated a preceding mediae already in PIIr (§3.1). A tenues in the same position developed aspiration only in Pre-Indic – after the cluster transition to **CHiV*, parallel to tenues aspiration in **CHV* sequences – and that too in inlaut only (§3.1, §4.2). Attested cases of tenues aspiration in initial syllables are to then be taken as analogical developments.

Appendices

I. The case of *minīt*[260]

The attestation at AVŚ 6.110.3[261] (Roth and Whitney 1924: 134; Sanskrit Lexicon n.d.):

a. *vyāghré 'hny ajaniṣṭa vīró*	SLL LS, SS|LS LL (11T)[262]
b. *nakṣatrajā jā́yamānaḥ suvī́raḥ* |	LLSL, LSL|L SLL (11T)
c. *sá mā́ vadhīt pitáraṁ várdhamāno*	S L SL, SSL |LSLL (11T)
d. *mā́ mātáraṁ prá **minīj***[263] *jánitrīm* ||	L LSL S S|L SLL (10*)[264]

On a tiger-day was born the hero,
the son of stars, being born heroic.
Let him not, as he grows, slay (his) father,
let him not hurt (his) mother, the progenitor[265].

sá	*mā́*	*vadhīt*	*pitáram*	*várdhamānaḥ*
sá- ~ tá-	mā́	√vadh^{i}-	pitár-	√vṛ̊dh-
NOM.SG.M	PCL	3SG.AOR.INJ.ACT	ACC.SG.M	NOM.SG.M.PRS.MIDD.PTC

mā́	*mātáram*	*prá*	*minīt*	*jánitrīm*
mā́	mātár-	prá	√mī-	jánitrī-
PCL	ACC.SG.F	PREVERB	3SG.PRS.INJ.ACT[266]	NOM.SG.F

[260] My many thanks to Dr. Carmen Spiers for reviewing the translations here and answering all my questions. I am particularly indebted to her for verifying the attestation in Paippalāda manuscripts, and also making me aware of the *sa*-figé construction in Vedic (cf. fn. 270).

[261] Pādas ab here have a parallel in AVP 19.20.2ab (Bhattacharya 2016: 1467), the only difference being the presence of *sarvavīraḥ* in AVP instead of the *jā́yamānaḥ* here.

[262] 11 syllables with these vowel restorations: *vi̯yāghre ahni̯*. T is the meter Triṣṭubh abbreviated and * marks irregularity in the meter; for the rest of the scansion notation used here, see §Symbols.

[263] Sandhi form for *minīt,* before the voiced consonant of the following *jánitrīm*.

[264] The pāda needs one more syllable for the meter, but it is not obvious how we can fix it. Patañjali (apud Thieme 1941: 85) proposed a reading *minīmi* here with a 1sg. ending apparently (with *-nī-* still in the strong case) – this fixes the meter but does not fit well with the verse semantics.

[265] Translations of the cited passages here are mine.

[266] For the prs.inj. reading here, see §3.3.5, cf. fn. 184.

The Śaunaka attestation has an immediate parallel in AVP 19.21.13[267] (Bhattacharya 2016: 1474; GRETIL 2020):

a. *un muñca pāśāṁs tvam*[268] *agna eṣāṁ* L LS LL, SS |LS LL (11T)
b. *trayas tribhir utthitā*[269] *yebhir āsan |* SL SS, LSL |LS LL (11T)
c. *māyaṁ*[270] *hiṁsīḥ pitaraṁ vardhamāno* LL LL, SSL |LSLL (11T)
d. *mā mātaraṁ pra* ***minīr***[271] *yā janitrī ||* L LSL, S SL |LSLL (11T)

O you Agni, release their bonds,
the three with three (bonds) by which they were born[272].
(You) here, do not harm (your) father as you grow,
do not hurt (your) mother, who is the progenitor.

mā́	*ayam*	*hiṁsīḥ*	*pitáram*	*várdhamānaḥ*
mā́	ayám	√hiṁs-	pitár-	√vṛ̊dh-
PCL	NOM.SG.M	2SG.AOR.INJ.ACT	ACC.SG.M	NOM.SG.M.PRS.MIDD.PTC

mā́	*mātáram*	*prá*	*minīḥ*	*yā́*	*jánitrī*
mā́	mātár-	prá	√mī-	yá-	jánitrī-
PCL	ACC.SG.F	PREVERB	2SG.PRS.INJ.ACT	NOM.SG.F	NOM.SG.F

[267] Pādas ab here have a parallel in AVŚ 6.112.2ab (Roth and Whitney 1924: 135; Sanskrit Lexicon n.d.) instead and not in AVŚ 6.110.3 (Bhattacharya 2016: 1474).

[268] To be treated as disyllabic $t_u vam$ for the meter, as is usual for this word in Vedic poetry.

[269] AVŚ 6.112.2b (the parallel Śaunaka pāda) has nom.pl.m. *útsitā* here, from *útsita-* 'entangled'. That does seem to be a better semantic fit for the line, so should we change the AVP version to be that, instead of *útthitā* from *útthita-* 'risen, born'? Perhaps there was a manuscript error here, but Bhattacharya (2016: 1474) is silent regarding the possibility.

[270] *ayam* here can technically be interpreted as a vocative, yielding the translation 'O this one here, do not…'. But usage of deictic pronouns with non-3rd person reference is attested in Sanskrit (Hock 1997: 55-58) – parallel to the similar usage of demonstrative *sá-/tá*, a phenomena dubbed *sa*-figé (ibid.; Whitney 1889: 190) – and I translate *ayam* in apposition to the implied 2nd person subject of the pāda, since it also makes for a more natural reading. Yet another possibility is for *ayam* to refer to the 2nd person subject (Agni) from pādas ab: '(Being) this (Agni) here, do not…'.

[271] Sandhi form for 2sg. *minīḥ,* before the voiced consonant of the following *yā́.* Here, Bhattacharya (2016: 1474) proposes that 3sg. *minīd* (sandhi form of *minīt*) and 3sg. *hiṁsīt* (for pāda c) were the forms in the original composition, with the manuscript's 2sg. attestations as later amendments or errors. This brings the pādas closer to the Śaunaka version, but it is perfectly possible to make sense of the verse with the 2sg. reading so I maintain the manuscript version here.

[272] 'entangled', if we are to follow AVŚ here (cf. fn. 269), or more literally 'standing up'.

The Paippalāda version does not have the metrical issue of Śaunaka (cf. fn. 264), because of the presence of the extra relative pronoun *yā* in pāda d. This implies that the Śaunaka version preserves the older composition, since it is unlikely that an already-present *yā* would be eliminated, yielding in a metrically irregular pāda[273].

Bhattacharya (2016: 1474) also draws attention to another parallel in AVP 19.20.2 (idem: 1467; GRETIL 2020), whose first two pādas are the same as the Śaunaka stanza. Rest of the stanza is reproduced below:

c. *sa mā hiṁsīḥ pitarau vardhamānas tasya*	S L LL, SSL |LSLL LS (13*)[274]
d. *te devāḥ prati gṛhṇantu homam* ||	L LL SS LLS LL (10*)

It is possible to resolve the metrical irregularities in this Paippalāda version (cf. fn. 274), but since the same is much trickier for Śaunaka, it is likely that the Śaunaka version is again the older one (cf. fn. 273)[275]. I will not go into other details of the hemistich, but for us, it is interesting that a form in *minī-* is not present here, like in the previously cited verses. If AVŚ 6.110.3 was indeed the older composition, perhaps its final pāda was pruned off[276] when AVP 19.20.2 was composed, because of the fault in its meter as well as the presence of an aberrant form like *minīt*.

[273] *lectio difficilior* in action.

[274] If we remove *tasya,* the pāda follows Triṣṭubh. The pronoun could be a later addition here, but as Dr. Spiers suggested to me, we should take it as belonging to pāda d instead and eliminate the other pronoun *te* there – this has the advantage of fixing the meter for that pāda as well, without jumping through hoops there.

[275] Bhattacharya (2014: xv, lxiii-lxiv) has compared the overall Paippalāda hymn here (19.20) with the attested parallels from AVŚ and concludes that it is actually the AVP that preserves the original hymn structure and thematic unity (which also matches the widely-held view that AVP represented the mainstream Atharvaveda tradition at one point). However, Bhattacharya's suggestion need not run counter to my own here, which is in regards to the linguistic forms employed in these pādas: in fact, if we are to follow his suggestion elsewhere that AVP kept on adding new material to the 19th kaṇḍa (subject-matter mostly related to householder's ritual) after the split of the two recensions (Bhattacharya 2014: lvi-lvii), it would also make sense that obscure forms like *minīt* as well as metrical faults in the pādas would be edited out as part of the living tradition. In this view, the retention of these features in the AVŚ version is to be taken as fossilized relics, owing to the relatively unimportant position of AVŚ during this time.

[276] During the process, the pāda's semantic content was merged into AVP 19.20.2c here: '(You) here, do not harm (your) parents as you grow', cf. the use of acc.du.m. *pitárau* 'parents' instead of Śaunaka's acc.sg.m. *pitáram* and acc.sg.f. *mātáram*, spread across two pādas.

II. Traces of ninth class **-*ni*- in the Rigvedic meter[277]

This section details the computational corpus analysis I carried out to check if the Rigvedic meter preserves any traces of a pre-form **-*ni*- for the Sanskrit ninth class weak suffix -*nī*, cf. §3.3.5. For the raw data as well as all the code utilized, please refer to the following Github repository: https://github.com/anupdhml/sanskrit_ninth_class_meter

Hypotheses

If Rigveda or parts of it were indeed composed when the proposed **-*ni*- was still used in the ninth class forms (§3.3.3), we should expect at least some of the following to be true:

1. The usage of -*nī*- in expected short (S) positions should be significant enough, especially in stanzas belonging to the oldest layers of Rigveda. For pādas where such a fault in the meter is attested, we can justify changing the suffix vowel to be *i*, in order to match the meter, and thus these pādas can be said to preserve the older **-*ni*-.
2. The usage of -*nī*- in expected long (L) positions should increase significantly as we move through the stratas of Rigveda, from the older to the newer, as the analogy that gave rise to -*nī*- became more established. Compared to 1, this is an indirect way of inferring the presence of an older **-*ni*-, since we are depending on attestation patterns over strata rather than observing (and possibly emending) the vowel quantity directly in the pāda.
3. The usage of -*nī*- in expected short/long (X) positions should be significantly more in the oldest layers of Rigveda, perhaps reflecting the poet's awareness of the variability of the suffix vowel, when the analogy that gave rise to -*nī*- was shaping up. However, note that this is a weaker claim than in 1 and 2, since filling the expected X positions during composition is a secondary concern; words are chosen primarily to fit the demands of the expected S and L positions.

To determine whether these usage numbers of the weak suffix (-*nī*-) are significant, I am going to compare it with the same numbers for the closely associated strong suffix (-*nā*-) and the fifth class strong suffix (-*no*-), both of which have regular long vowels historically (§3.3.5, fn. 199).

[277] The computational study here was born out of a class I took with Prof.dr. Carole Tiberius and Dr. Enrique Manjavacas Arevalo. My thanks to both of them for reviewing my approach here and answering all my questions, especially in regards to statistical testing.

Data and Methodology

For the study, I utilize the following digital corpora and tools: The Morphologically Glossed Rigveda (Casaretto et al. 2023), *VedaWeb* – Online Research Platform for Old Indic Texts[278], and The Rigveda – Metrically Restored Text (Thomson and Slocum 2006)[279]. The study itself was composed of the following six distinct stages, all fully automated – the details of each are documented in the corresponding Python notebook file (linked below), which can also be used to reproduce its final results:

1. raw_corpus.ipynb: Retrieve the raw text for the two versions of Rigveda (cf. fn. 278) that we are using, used to quickly validate the results in subsequent stages.
2. roots.ipynb: Parse and compile a list of ninth and fifth class roots/stems based on the comprehensive listing given by Whitney (1887: 213–214).
3. roots_with_attestations.ipynb: Using *VedaWeb*'s grammar search api, search the Rigveda for the finite verb forms associated with each of the ninth and fifth class stems[280], recording the RV location (*book.hymn.stanza*) where they are attested.
4. verse_lines.ipynb: Compile the exact pādas with the verbal attestations, saving its text as well as other metadata like stanza meter and strata, obtained via the *VedaWeb* api.
5. verse_lines_with_meter.ipynb: For each of the pādas, programmatically generate its metrical scansion (i.e. whether each syllable is long or short)[281], noting down meter

[278] Along with a very convenient web platform to explore various versions of Rigveda, *VedaWeb* exposes a web API to search through the underlying data, and also makes its raw data sources easily available. I make use of all three facilities in this study, relying mainly on these two versions of Rigveda that it hosts: the metrically restored van Nooten & Holland (*VNH*) text, and Lubotsky's Padapāṭha text prepared as part of his Rigvedic concordance (Lubotsky 1997a: vii–ix). The former tries to reflect Rigveda in its compositional form as much as possible while the latter removes all the sandhi between words and is useful for checking the underlying forms of the words which is sometimes not as transparent in the recited version (*saṁhitāpāṭha*).

[279] Presenting just the raw text of the entire Rigveda, this was originally derived from the *VNH* text. I use it as an additional source of the text, to validate the contents of the one in *VedaWeb* especially when things are not clear there (e.g. in its use of diacritics that marks the text restoration done).

[280] Under the hood, this relies on the morphological glosses provided by the Casaretto et al. (2023) corpus; the Rigveda version utilized is Lubotsky's Padapaṭha (since this is the version that preserves the underlying stem form transparently at word boundaries).

[281] *VedaWeb* does provide a basic scansion of the lines, but since we are ultimately interested in the expected scansion (cf. fn. 282) of our stem vowels, we need our own custom code that parses each line down to the syllable level. To ensure the accuracy and robustness of this piece of crucial code, we test it against a wide array of lines across all the popular meters, and as a sanity-check, we also validate our basic scansion results against the ones

failures (if any); also record the expected scansion[282] of our stem vowels based on their position in the meter. This stage produces the final dataset for our main analyses.

6. analysis.ipynb: Analyze the overall as well as per-strata counts of *-ni-* in each of the expected metrical positions (S, L, X), in relation to the control suffixes *-nā-* and *-no-*, focussing on pādas composed in one of the popular meters[283].

Results

The major findings have already been discussed in §3.3.5; here, I include the details on the statistical tests performed to make those inferences. To test the statistical significance of our data distribution (i.e. whether the trends we see there are by chance or really indicative of our hypotheses), we rely on Fisher's exact test[284] (Field, Miles, and Field 2012: 770) comparing the results for the ninth weak class with each of our control classes. For the p-values produced by the test, we select a significance threshold of 0.1[285]. The results for each of our hypotheses are listed in the tables here, with the significant results highlighted:

	Expected S (✗ meter)	Expected L/X (✓ meter)	p-value
-nī-	3	149	–
-nā-	1	111	0.639
-no-	3	197	1.0

Table H_1: Comparing overall frequency of metrically correct vs. incorrect attestations of *-nī-*

recorded in *VedaWeb*. Here, the differences with *VedaWeb* are found to be minimal, and for all the cases where there are differences, our version is the correct one. For details, see the associated Python notebook file.

[282] Namely, one of short (represented by S or ◡), long (L or —) and short/long (X). The actual scansion for our stem vowels is always long (since both *ā* and *ī* are long vowels).

[283] Namely, one of Triṣṭubh, Jagatī, Gāyatrī and Aṇuṣṭubh, also ignoring later meter variants like Epic Aṇuṣṭubh (Arnold 1905: 166–169; Gunkel 2018: 77). These popular meters account for the bulk of Rigveda and are the only ones used enough to allow statistical analyses (Macdonell 1916: 436–447; *VNH*: vii).

[284] For the small sample size that we have (in the low hundreds), non-parametric tests like the Fisher's exact test are suitable (Hellwig 2012: 44). The usual Fisher's exact test is done against 2x2 contingency tables (Field, Miles, and Field 2012: 770) but for some of our comparisons, we need to use a version generalized for mxn tables (Noutahi 2018).

[285] This may be slightly generous than the value of 0.05 seen usually in the literature (as in Gunkel's (2018: 83) corpus study), but here, we are following the value adopted by Hellwig, Scarlata, and Widmer (2021: 853) in their evaluation of Rigvedic stratas – the bulk of our analyses also revolve around stratas.

	Archaic (A)	Strophic (S)	Normal (N)	Cretic (C)	p-value
-nī-	10	12	33	32	–
-nā-	6	8	9	12	0.071
-no-	7	9	27	24	0.799

Table H_2: Comparing strata frequency of *-nī-* in expected L positions[286]

	A + S + N (archaic-strophic-normal)	C + P[287] (cretic-popular)	p-value
-nī-	41	12	–
-nā-	34	34	0.003
-no-	65	40	0.072

Table H_3: Comparing strata frequency of *-nī-* in expected X positions

All in all, these results are to be taken as a weak evidence for an older ***-ni-*. A significant presence of the suffix in expected S positions (Hypothesis 1) would have been an emphatic endorsement of the proposal, but we have confirmations only for the weaker hypotheses 2 and 3, and even there, the results for Hypothesis 2 are significant only for one of our control classes.

Despite the study's apparent failures, the methodology employed here should be instructive to those interested in answering philological questions using digital tools and computational methods, specifically for studies pertaining to Rigveda and dealing with language archaisms as preserved in poetic meter[288]. When paired with the insights from traditional Indo-European linguistics, computational tools and techniques not only enable exhaustive study of texts like Rigveda, but also open up a systematic way of validating our theories empirically, by placing the data front and center.

[286] The trends here are not simply following Rigveda's underlying frequency distribution of all pādas over strata; we ruled out that possibility by comparing the per-strata pāda counts with that of the suffixes, via Fisher's exact test again. For details, see the analysis Python notebook file.

[287] When not including the counts for popular strata (as was done for Hypothesis 2, cf. Table 3), the reported p-values against comparisons with ninth strong and fifth strong classes are 0.003 and 0.011 respectively, which are also below our significance threshold of 0.10.

[288] Also, the byproducts of this study – the datasets as well as the python scripts/libraries, especially the ones related to Vedic meter analysis – should be readily usable in other contexts to answer novel research questions.

References

DCS = Hellwig, Oliver. 2010–2021. *DCS - The Digital Corpus of Sanskrit.* Accessed August 20, 2023. http://www.sanskrit-linguistics.org/dcs/index.php.

EWAia = Mayrhofer, Manfred. 1992–2001. *Etymologisches Wörterbuch des Altindoarischen*. 3 vols. Heidelberg: Winter.

LIPP = Dunkel, George E. 2014. *Lexikon der Indogermanischen Partikeln und Pronominalstämme. Band 2: Lexikon*. Heidelberg: Winter.

LIV$_2$ = Rix, Helmut, and Martin J. Kümmel. 2001. *Lexikon der Indogermanischen Verben. Die Wurzeln und ihre Primärstammbildungen*. 2nd edition. Wiesbaden: Reichert.

MWSE = Monier-Williams, Monier, Ernst Leumann, and Carl Cappeller. 1899. *A Sanskrit-English Dictionary: Etymologically and Philologically Arranged with Special Reference to Cognate Indo-European Languages*. Oxford: Clarendon Press. Available at: http://www.sanskrit-lexicon.uni-koeln.de/monier/.

NIL = Wodtko, Dagmar S., Britta Irslinger, and Carolin Schneider. 2008. *Nomina im Indogermanischen Lexikon.* Heidelberg: Winter.

Vasu = Vasu, Srisa C. 1891–1898. *The Ashṭādhyāyī of Pāṇini. Edited & Translated into English.* 8 vols. Delhi: Motilal Banarsidass. Available at: https://sanskritdictionary.com/panini/.

VedaWeb = Kölligan, Daniel, Claes Neuefeind, Uta Reinöhl, et al. n.d. *VedaWeb. Online Research Platform for Old Indic Texts.* University of Cologne. Accessed August 20, 2023. https://vedaweb.uni-koeln.de.

VNH = van Nooten, Barend A., and Gary B. Holland. 1994. *Rig Veda: A Metrically Restored Text with an Introduction and Notes*. Harvard Oriental Series 50. Cambridge, MA: Harvard University Press.

Ackermann, Katsiaryna. 2018. "Root Variation vs. Root Extension – a Putative - *i* -Infix?" *Historische Sprachforschung* 131 (1): 98–144.

Allen, Sidney W. 1953. *Phonetics in Ancient India*. London Oriental Series 1. London: Oxford University Press.

Arnold, Edward V. 1905. *Vedic Metre in Its Historical Development*. Cambridge: Cambridge University Press.

Aufderheide, Tim F., and Götz Keydana. 2016. “Die *i*-Epenthese im Altindoarischen: Laryngalvokalisierung Oder „Verbindungsglied“?” *Historische Sprachforschung* 129 (1): 125–53.

Balles, Irene. 2012. “Zu Einigen Fällen von (Vermeintlichem) Laryngalschwund Im Indogermanischen.” In *Iranistische und Indogermanistische Beiträge in Memoriam Jochem Schindler*, edited by David Stifter and Velizar Sadovski, 9–30. Verlag der Österreichischen Akademie der Wissenschaften.

Baums, Stefan, and Andrew Glass. 2002–. “A Dictionary of Gāndhārī.” 2002–. https://gandhari.org/dictionary. Accessed August 20, 2023.

Beekes, Robert S.P. 1981. “The Neuter Plural and the Vocalization of the Laryngeals in Avestan.” *Indo-Iranian Journal* 23 (4): 275–87.

———. 1982. “On Laryngeals and Pronouns.” *Zeitschrift für Vergleichende Sprachforschung* 96 (2. H): 200–232.

———. 1986. “The Importance of Sanskrit for the Laryngeal Theory.” In *Essays on Indo-European Linguistics: Proceedings of the Seminar on Indo-European Linguistics Held on 1-2 February 1986*, edited by S.R. Banerjee, 77–87. Calcutta: Asiatic Society.

———. 1988a. *A Grammar of Gatha-Avestan*. Leiden: Brill.

———. 1988b. “Laryngeal Developments: A Survey.” In *Die Laryngaltheorie Und Die Rekonstruktion Des Indogermanischen Laut-Und Formensystems*, edited by Alfred Bammesberger, 59–105. Heidelberg: Winter.

———. 1989. “The Nature of the Proto-Indo-European Laryngeals.” In *The New Sound of Indo-European: Essays in Phonological Reconstruction*, edited by Theo Vennemann, 23–34. Berlin: De Gruyter Mouton.

———. 1999. “The Imperative Skt. *gṛ̥hāṇa*.” *Münchener Studien zur Sprachwissenschaft* 59: 15–19.

———. 2009. *Etymological Dictionary of Greek (with the assistance of Lucien van Beek)*. 2 vols. Leiden Indo-European Etymological Dictionary Series 10. Leiden: Brill.

———. 2011. *Comparative Indo-European Linguistics. An Introduction. 2nd Edition. Revised and Corrected by Michiel de Vaan*. Amsterdam: Benjamins.

Bhattacharya, Dipak. 2016. *Paippalāda Saṃhitā of the Atharvaveda: Consisting of the Nineteenth and Twentieth Kāṇḍas*. Calcutta: Asiatic Society.

———. n.d. “On Preparing an Informative Critical Apparatus.” Accessed August 20, 2023. https://www.academia.edu/12101081.

Blevins, Juliette, and Andrew Garrett. 1998. “The Origins of Consonant-Vowel Metathesis.” *Language* 74 (3): 508–56.

Bloch, Jules. 1965. *Indo-Aryan from the Vedas to Modern Times*. Paris: Adrien-Maisonneuve.

Byrd, Andrew M. 2015. *The Indo-European Syllable*. Leiden: Brill.

———. 2016. “Schwa Indogermanicum and Compensatory Lengthening.” In *Sahasram Ati Srajas. Indo-Iranian and Indo-European Studies in Honor of Stephanie W. Jamison*, edited by Dieter Gunkel, Joshua T. Katz, Brent Vine, and Michael Weiss, 18–28. Ann Arbor: Beech Stave.

———. 2018. “The Phonology of Proto-Indo-European.” In *Handbook of Comparative and Historical Indo-European Linguistics*, edited by Jared Klein, Brian Joseph, and Matthias Fritz, 3:2056–79. Berlin: De Gruyter Mouton.

Cantera, Alberto. 2018. “The Phonology of Iranian.” In *Handbook of Comparative and Historical Indo-European Linguistics*, edited by Jared Klein, Brian Joseph, and Matthias Fritz, 1:481–503. Berlin: De Gruyter Mouton.

Cardona, George. 1997. *Pāṇini: His Work and Its Traditions. Volume One. Background and Introduction*. 2nd edition. Delhi: Motilal Banarsidass.

———. 2018. “The Documentation of Indic.” In *Handbook of Comparative and Historical Indo-European Linguistics*, edited by Jared Klein, Brian Joseph, and Matthias Fritz, 1:309–25. Berlin: De Gruyter Mouton.

Cardona, George, and Dhanesh Jain. 2007. “General Introduction.” In *The Indo-Aryan Languages*, edited by George Cardona and Dhanesh Jain. London: Routledge.

Casaretto, Antje, Jakob Halfmann, Natalie Korobzow, Daniel Kölligan, and Uta Reinöhl. 2023. “The Morphologically Glossed Rigveda - The Zurich Annotation Corpus Revised and Extended. Hosted by VedaWeb - Online Research Platform for Old Indic Texts.” University of Cologne. https://vedaweb.uni-koeln.de. Accessed August 20, 2023.

Clackson, James. 2007. *Indo-European Linguistics: An Introduction*. Cambridge: Cambridge University Press.

Clayton, John. 2022. “Labiovelar Loss and the Rounding of Syllabic Liquids in Indo-Iranian.” *Indo-European Linguistics* 10 (1): 33–87.

Colarusso, John. 2013. “The Typology of Gutturals.” In *Base Articulatoire Arrière / Backing and Backness*, edited by Jean Léo Léonard and Samia Naïm, 93–109. Lincom Studies in Phonology. Munich: LINCOM Europa.

Crane, Gregory R. n.d. “Perseus Digital Library.” Tufts University. Accessed August 20, 2023. https://www.perseus.tufts.edu.

Degener, Almuth. 2002. “The Nuristani Languages.” In *Indo-Iranian Languages and Peoples*, edited by Nicholas Sims-Williams. Proceedings of the British Academy 116. Oxford: Oxford University Press.

Field, Zoë, Jeremy Miles, and Andy Field. 2012. *Discovering Statistics Using R*. London: Sage.

Fortson IV, Benjamin W. 2010. *Indo-European Language and Culture: An Introduction*. 2nd edition. Oxford: Wiley-Blackwell.

Gippert, Jost. 1997. “Sound Law and Analogy. Papers in Honor of Robert S. P. Beekes on the Occasion of His 60th Birthday.” In *Laryngeals and Vedic Metre*, edited by Alexander Lubotsky, 63–79. Amsterdam: Rodopi.

Gotō, Toshifumi. 2012. “Grammatical Irregularities in the Rigveda, Book IV.” In *Indic across the Millennia: From the Rigveda to Modern Indo-Aryan: 14th World Sanskrit Conference, Kyoto, Japan, September 1st-5th, 2009, Proceedings of the Linguistic Section*, edited by Jared S. Klein and Kazuhiko Yoshida, 23–36. Bremen: Hempen Verlag.

———. 2013. *Old Indo-Aryan Morphology and Its Indo-Iranian Background*. Wien: Verlag der Österreichischen Akademie der Wissenschaften.

Grestenberger, Laura. 2014. “Zur Funktion Des Nominalsuffixes *-*i*- Im Vedischen und Urindogermanischen.” In *Das Nomen Im Indogermanischen. Morphologie, Substantiv versus Adjektiv, Kollektivum. Akten der Arbeitstagung der Indogermanischen Gesellschaft Vom*, edited by Norbert Oettinger and Thomas Steer, 14:88–102. Wiesbaden: Reichert.

———. 2017. “On ‘*i*-Substantivizations’ in Vedic Compounds.” In *Usque Ad Radices Indo-European Studies in Honour of Birgit Anette Olsen*, edited by Bjarne Simmelkjær, Sandgaard Hansen, Adam Hyllested, Anders R. Jørgensen, Guus Kroonen, Jenny H. Larsson, Benedicte N. Whitehead, Thomas Olander, and Tobias M. Søborg, 193–206. Copenhagen: Museum Tusculanum.

GRETIL. 2020. “Atharvaveda-Samhita, Paippalada Recension (Input by Arlo Griffiths, Thomas Zehnder, Philipp Kubisch, Duccio Lelli, Alexander Lubotsky, Carmen Spiers, and Michael

Witzel).” GRETIL - Göttingen Register of Electronic Texts in Indian Languages. 2020. http://gretil.sub.uni-goettingen.de/gretil.html#sa_paippalAdasaMhitA. Accessed August 20, 2023.

Gunkel, Dieter. 2018. “Localizational Evidence for the Restoration of Rigvedic **mimihí* ‘measure.’” In *Vina Diem Celebrent: Studies in Linguistics and Philology in Honor of Brent Vine*, edited by Dieter Gunkel, Stephanie W. Jamison, Angelo O. Mercado, and Kazuhiko Yoshida, 76–92. Ann Arbor: Beech Stave.

Haas, Dominik A. 2023. “Translating the Gāyatrī-Mantra.” *Asian Literature and Translation* 10 (1): 47–91.

Hackstein, Olav. 2002. “Uridg. *CH.CC > *C.CC.” *Historische Sprachforschung* 115 (1): 1–22.

Harðarson, Jón A. 1987. “Das uridg. Wort Für ‘Frau.’” *Münchener Studien zur Sprachwissenschaft* 48: 115–37.

Hellwig, Oliver. 2012. “Computational Processing of Sanskrit - Challenges and Perspectives.” In *Indic across the Millennia: From the Rigveda to Modern Indo-Aryan: 14th World Sanskrit Conference, Kyoto, Japan, September 1st-5th, 2009, Proceedings of the Linguistic Section*, edited by Jared S. Klein and Kazuhiko Yoshida, 37–48. Bremen: Hempen Verlag.

Hellwig, Oliver, Salvatore Scarlata, and Paul Widmer. 2021. “Reassessing Rigvedic Strata.” *Journal of the American Oriental Society* 141 (4): 847–65.

Hock, Hans H. 1997. “Nexus and ‘extraclausality’ in Vedic, or ‘*sa*-Figé’ All over Again: A Historical (Re)Examination.” In *Historical, Indo-European, and Lexicographical Studies. A Festschrift for Ladislav Zgusta on the Occasion of His 70th Birthday*, edited by Hans H. Hock, 49–78. Trends in Linguistics. Studies and Monographs 90. Berlin: De Gruyter Mouton.

———. 2021. *Principles of Historical Linguistics*. Berlin: De Gruyter Mouton.

Hoenigswald, Henry M. 1965. “Indo-Iranian Evidence.” In *Evidence for Laryngeals*, edited by Werner Winter, 93–99. Hague: Mouton.

Hoffmann, Karl. 1967. *Der Injunktiv Im Veda: Eine Synchronische Funktionsuntersuchung*. Heidelberg: Winter.

Hollenbaugh, Ian. 2020. “A New Approach to Prohibitive Constructions in the Ṛgveda and the Atharvaveda.” *Journal of the American Oriental Society* 140 (4): 777–802.

Holopainen, Sampsa. 2019. “Indo-Iranian Borrowings in Uralic: Critical Overview of Sound Substitutions and Distribution Criterion.” Helsinki: University of Helsinki.

Hume, Elizabeth. 2001. “Metathesis: Formal and Functional Considerations.” In *Surface Syllable Structure and Segment Sequencing*, edited by Elizabeth Hume, Norval Smith, and Jeroen Van de Weijer, 1–25. Leiden: Holland Institute of Generative Linguistics.

Insler, Stanley. 1971. “Some Problems of Indo-European **ə* in Avestan.” *Language* 47 (3): 573–85.

Jacobi, Hermann. 1882. *The Âyâraṃga Sutta of the Çvetâmbara Jains*. Vol. 1. London: Pali Text Society.

Jakob, Anthony. 2017. “The Metathesis of **-Hu-* and **-Hi-* in PIE.” Leiden: Leiden University.

Jamison, Stephanie W. 1988. “The Quantity of the Outcome of Vocalized Laryngeals in Indic.” In *Die Laryngaltheorie Und Die Rekonstruktion Des Indogermanischen Laut-Und Formensystems*, edited by Alfred Bammesberger, 213–26. Heidelberg: Winter.

Jamison, Stephanie W., and Joel P. Brereton. 2014. *The Rigveda: The Earliest Religious Poetry of India*. Vol. 1. Oxford: Oxford University Press.

Jasanoff, Jay H. 1989. “Old Irish *bé* ‘Woman.’” *Ériu* 40: 135–41.

———. 2003. *Hittite and the Indo-European Verb*. Oxford: Oxford University Press.

Kale, Moreshvar R. 1969. *A Higher Sanskrit Grammar, for the Use of Schools and Colleges*. 7th edition. Delhi: Motilal Banarsidass.

Kiparsky, Paul. 2007. “Pāṇini is slick, but he isn’t mean.” *Nagoya Studies in Indian Culture and Buddhism: Sambhasa* 26: 1–28.

Klingenschmitt, Gert. 1975. “Tocharisch und Urindogermanisch.” In *Flexion und Wortbildung. Akten der V. Fachtagung der Indogermanischen Gesellschaft, Regensburg, 9.-14. September, 1973*, edited by Helmut Rix, 148–63. Wiesbaden: Reichert.

Kloekhorst, Alwin. 2006. “Hittite *pai-/pi-* ‘to give.’” *Indogermanische Forschungen* 111: 110–19.

———. 2007. *Etymological Dictionary of the Hittite Inherited Lexicon*. Vol. 5. Leiden Indo-European Etymological Dictionary Series. Leiden: Brill.

———. 2018. “Anatolian evidence suggests that the Indo-European Laryngeals **h*$_2$ and **h*$_3$ were uvular stops.” *Indo-European Linguistics* 6 (1): 69–94.

———. 2020. “Evidence for a Phonemic Glottal Stop in Hittite as the Outcome of PIE *h_1: A Reassessment.” *Historische Sprachforschung* 133 (1): 111–43.

Kobayashi, Masato. 2004. *Historical Phonology of Old Indo-Aryan Consonants*. Study of Languages and Cultures of Asia and Africa Monograph Series 42. Tokyo: Research Institute for Languages and Cultures of Asia and Africa. Tokyo University of Foreign Studies.

———. 2018. “The Phonology of Indic.” In *Handbook of Comparative and Historical Indo-European Linguistics*, edited by Jared Klein, Brian Joseph, and Matthias Fritz, 1:325–44. Berlin: De Gruyter Mouton.

Kocharov, Petr. 2018. “A Comment on the Vocalization of Word-Initial and Medial Laryngeals in Armenian.” In *Farnah. Indo-Iranian and Indo-European Studies in Honor of Sasha Lubotsky*, edited by Lucien van Beek, Alwin Kloekhorst, Guus Kroonen, Michaël Peyrot, Tijmen Pronk, and Michiel de Vaan, 123–36. Ann Arbor: Beech Stave.

Kuiper, Franciscus B.J. 1947. “Traces of Laryngeals in Vedic Sanskrit.” In *India Antiqua, a Volume of Oriental Studies Presented by His Friends and Pupils to Jean Philippe Vogel, C.I.E. on the Occasion of the Fiftieth Anniversary of His Doctorate*, 198–212. Leiden: Brill.

———. 1955. “Shortening of Final Vowels in the Rigveda.” *Mededelingen der Koninklijke Nederlandse Akademie van Wetenschappen, Afd. Letterkunde* 18.11: 253–89.

Kümmel, Martin J. 2014. “Laryngeal Traces without Laryngeals in Vedic Metre?” In *Vedic and Sanskrit Historical Linguistics*, edited by Elizabeth Tucker and Jared Klein, 2014:25–44. Delhi: Motilal Banarsidass.

———. 2016. “Zur „Vokalisierung“ der Laryngale im Indoiranischen.” In *Sahasram Ati Srajas. Indo-Iranian and Indo-European Studies in Honor of Stephanie W. Jamison*, edited by Dieter Gunkel, Joshua T. Katz, Brent Vine, and Michael Weiss, 216–26. Ann Arbor: Beech Stave.

———. 2018. “The Survival of Laryngeals in Iranian.” In *Farnah. Indo-Iranian and Indo-European Studies in Honor of Sasha Lubotsky*, edited by Lucien van Beek, Alwin Kloekhorst, Guus Kroonen, Michaël Peyrot, Tijmen Pronk, and Michiel de Vaan, 162–72. Ann Arbor: Beech Stave.

———. 2022a. “Indo-Iranian.” In *The Indo-European Language Family: A Phylogenetic Perspective*, edited by Thomas Olander, 246–68. Cambridge: Cambridge University Press.

———. 2022b. “On New Reconstructions of PIE ‘Laryngeals’, Especially as Uvular Stops.” *Acta Linguistica Petropolitana* 18 (1): 199–215.

Lipp, Reiner. 2009. *Die Indogermanischen und Einzelsprachlichen Palatale im Indoiranischen. Band II: Thorn-Problem, Indoiranische Laryngalvokalisation*. Heidelberg: Winter.

Litscher, Roland. 2007. “κρέας, *kravíḥ* and the original nom.-acc. sg. of the IE *s*-stem neuters.” In *Greek and Latin from an Indo-European Perspective*, edited by Antonia Ruppel, Benedicte Nielsen, and Matthew McCullagh, 107–20. Cambridge: Cambridge Philological Society.

Lowe, John J. 2015. *Participles in Rigvedic Sanskrit: The Syntax and Semantics of Adjectival Verb Forms*. Oxford: Oxford University Press.

Lubotsky, Alexander. 1981. “Gr. *pḗgnumi*: Skt. *pajrá-* and Loss of Laryngeals before Mediae in Indo-Iranian.” *Münchener Studien zur Sprachwissenschaft* 40: 133–38.

———. 1992. “The Indo-Iranian Laryngeal Accent Shift and Its Relative Chronology.” In *Rekonstruktion und Relative Chronologie. Akten der VIII. Fachtagung der Indogermanischen Gesellschaft, Leiden, 31. August–4. September 1987*, edited by Robert S.P. Beekes, Alexander Lubotsky, and Jos Weitenberg, 261–69. Innsbruck: Institut für Sprachwissenschaft der Universität.

———. 1995. “Sanskrit *h* < **dh*, *bh*.” In *sthāpakašrāddham: Professor GA Zograph Commemorative Volume*, edited by N.V. Gurov and Ja.V. Vasil’kov, 124–44. St. Petersburg: Peterburgskoe Vostokovedenie.

———. 1997a. *A Ṛgvedic Word Concordance*. 2 vols. American Oriental Series 82–83. New Haven: American Oriental Society.

———. 1997b. “The Indo-Iranian Reflexes of PIE **CRHUV*.” In *Sound Law and Analogy. Papers in Honor of Robert S. P. Beekes on the Occasion of His 60th Birthday*, 139–54. Amsterdam: Rodopi.

———. 2018. “The Phonology of Proto-Indo-Iranian.” In *Handbook of Comparative and Historical Indo-European Linguistics*, edited by Jared Klein, Brian Joseph, and Matthias Fritz, 3:1875–88. Berlin: De Gruyter Mouton.

Lundquist, Jesse, and Anthony Yates. 2018. “The Morphology of Proto-Indo-European.” In *Handbook of Comparative and Historical Indo-European Linguistics*, edited by Jared Klein, Brian Joseph, and Matthias Fritz, 3:2079–2195. Berlin: De Gruyter Mouton.

Macdonell, Arthur A. 1910. *Vedic Grammar*. Grundriss der Indo-Arischen Philologie und Altertumskunde 4. Strassburg: Karl J. Trübner.

———. 1916. *A Vedic Grammar for Students*. Oxford: Oxford University Press.

Matthews, Peter H. 2007. *The Concise Oxford Dictionary of Linguistics*. 2nd edition. Oxford: Oxford University Press.

Mayrhofer, Manfred. 1951. *Handbuch des Pāli, mit Texten und Glossar: Grammatik*. Vol. 1. 2 vols. Heidelberg: Winter.

———. 1955. "Das Problem Indogermanischer Altertümlichkeiten im Mittelindischen." In *Studia Indologica: Festschrift Für Willibald Kirfel Zur Vollendung Seines 70. Lebensjahres*, edited by Otto Speis, 219–41. Bonn: Selbstverlag des Orientalischen Seminars der Universität Bonn.

———. 1981. "Laryngalreflexe Im Indo-Iranischen." *STUF-Language Typology and Universals* 34 (1–6): 427–38.

———. 1986. *Indogermanische Grammatik*. Vol. 1, Part 2: *Lautlehre*. Heidelberg: Winter.

———. 2005. *Die Fortsetzung Der Indogermanischen Laryngale Im Indo-Iranischen*. Wien: Verlag der Österreichischen Akademie der Wissenschaften.

Meier-Brügger, Michael. 2013. *Indo-European Linguistics*. Berlin: Walter de Gruyter.

Meissner, Torsten. 2006. *S-stem Nouns and Adjectives in Greek and Proto-Indo-European: A Diachronic Study in Word Formation*. Oxford: Oxford University Press.

Morgenstierne, Georg. 1926. *Report on a Linguistic Mission to Afghanistan*. Instituttet for Sammenlignende Kulturforskning Series, C 1–2. Oslo: H. Aschenhough & Co. (W. Nygaard).

Narten, Johanna. 1964. *Die Sigmatischen Aoriste Im Veda*. Wiesbaden: Harrasowitz.

Nelson, David N. 2018. *Nuristani Studies*. Tôkyô Daigaku Gengogaku Ronshû (TULiP) Monograph Series 1. Tokyo: Department of Linguistics, University of Tokyo.

Nikolaev, Alexander. 2019. "Deep Waters: The Etymology of Vedic *gabhīrá-*." *Historische Sprachforschung* 132 (1): 191–207.

Noutahi, Emmanuel. 2018. "Fisher's Exact Test for MxN Contingency Table (1.4.3)." Zenodo. https://doi.org/10.5281/zenodo.2587757.

Nussbaum, Alan J. 1976. "Caland's 'Law' and the Caland System." Cambridge, MA: Harvard University.

Oberlies, Thomas. 1999. “Middle Indo-Aryan and (the) Vedic (Dialects) (Miscellanea Palica VII).” *Historische Sprachforschung* 112 (1. H): 39–57.

———. 2011. *Pāli: A Grammar of the Language of the Theravada Tipitaka. With a Concordance to Pischel's Grammatik Der Prakrit-Sprachen*. Vol. 3. Berlin: Walter de Gruyter.

Olsen, Birgit A. 1993. “Vedic and Laryngeals. *irajyáti* and *iradhanta* – *badhnā́ti* and *ubhnā́ti*.” In *Indogermanica et Italica: Festschrift Für Helmut Rix Zum 65. Geburtstag*, 362–72. Innsbruck: Innsbrucker Beiträge zur Sprachwissenschaft.

———. 2018. “The Development of Interconsonantal Laryngeals in Indo-Iranian and Old Avestan *zqθa pta*.” In *Farnah. Indo-Iranian and Indo-European Studies in Honor of Sasha Lubotsky*, edited by Lucien van Beek, Alwin Kloekhorst, Guus Kroonen, Michaël Peyrot, Tijmen Pronk, and Michiel de Vaan, 256–69. Ann Arbor: Beech Stave.

Petit, Daniel. 2013. “The Reconstruction of the Proto-Indo-European Laryngeals.” In *Base Articulatoire Arrière / Backing and Backness*, edited by Jean Léo Léonard and Samia Naïm, 69–90. Lincom Studies in Phonology. Munich: LINCOM Europa.

Pinault, Georges-Jean. 1982. “A Neglected Phonetic Law: The Reduction of the Indo-European Laryngeals in Internal Syllables before Yod.” In *Papers from the Fifth International Conference on Historical Linguistics, Galway, April 6–10 1981*, 265. Amsterdam: Benjamins.

Pischel, Richard. 1900. *Grammatik Der Prakrit-Sprachen*. Strassburg: Karl J. Trübner.

———. 1957. *A Grammar of the Prākrit Languages*. Translated by Subhadra Jhā. Delhi: Motilal Banarsidass.

Praust, Karl. 2004. “Zur Historischen Beurteilung von Griech. κλῑ́νω, der altindischen 9. Präsensklasse und zur Frage Grundsprachlicher „ni-Präsentien“.” In *Artes et Scientiae. Festschrift Für Ralf-Peter Ritter Zum 65. Geburtstag*, edited by Peter Anreiter, Marialuise Haslinger, Heinz Dieter Pohl, and Helmut Winberger, 369–90. Vienna: Praesens.

Pulju, Timothy J. 1995. “Problems in the Reconstruction of Indo-European Stop Consonants.” Rice University.

———. 1997. “Indo-European **dA* > **dh*.” *Journal of Indo-European Studies* 25 (3 & 4): 387–99.

Rau, Jeremy. 2003. “Vedic Sanskrit *aśīti-* ‘80.’” *Münchener Studien zur Sprachwissenschaft* 63: 139–44.

Ravnæs, Erling. 1981. “The Development of *ə*/Interconsonantal Laryngeal in Iranian.” *Indo-Iranian Journal* 23 (4): 247–73.

Reynolds, Elinor, Paula West, and John S. Coleman. 2000. “Proto-Indo-European ‘Laryngeals’ were vocalic.” *Diachronica* 17 (2): 351–87.

Roth, Rudolf von, and William D. Whitney. 1924. *Atharva Veda Sanhita. Dritte, Unveränderte Auflage (Nach der von Max Lindenau Besorgten Zweiten Auflage)*. Bonn: Dümmlers Verlag.

Sanskrit Lexicon. n.d. “Atharvaveda-Samhita, Saunaka Recension.” Cologne Digital Sanskrit Dictionaries. Accessed August 20, 2023. https://sanskrit-lexicon.github.io/avlinks/.

Scarlata, Salvatore. 1999. *Die Wurzelkomposita im Rg-Veda*. Wiesbaden: Reichert.

Sen, Sukumar. 1954. “Four Indo-Aryan Etymologies.” *Indian Linguistics* 14: 600–601.

Shatskov, Andrey. 2017. “Hittite Nasal Presents.” Leiden: Leiden University.

Sihler, Andrew L. 1995. *New Comparative Grammar of Greek and Latin*. Oxford: Oxford University Press.

Skjærvø, Prods Oktor. 2018. “The Morphology of Iranian.” In *Handbook of Comparative and Historical Indo-European Linguistics*, edited by Jared Klein, Brian Joseph, and Matthias Fritz, 1:503–49. Berlin: De Gruyter Mouton.

Thieme, Paul. 1941. “Beiträge zur Vedaexegese.” *Zeitschrift Der Deutschen Morgenländischen Gesellschaft* 95 (1): 82–116.

Thomson, Karen, and Jonathan Slocum. 2006. “The Rigveda: Metrically Restored Text.” Linguistics Research Center, The University of Texas at Austin. 2006. https://lrc.la.utexas.edu/books/rigveda/. Accessed August 20, 2023.

Turner, Ralph L. 1962–1985. *A Comparative Dictionary of the Indo-Aryan Languages*. London: Oxford University Press. Available at: https://dsal.uchicago.edu/dictionaries/soas/.

Vaan, Michiel de, and Javier M. García. 2014. *Introduction to Avestan*. Leiden: Brill.

Van den Bossche, Frank. 1999. *A Reference Manual of Middle Prākrit Grammar, the Prākrits of the Dramas and the Jain Texts*. Wetteren: Uitgeverij Universa.

Von Hinüber, Oskar. 2001. *Das Ältere Mittelindisch im Überblick*. 2nd edition. Vol. 467. Vienna: Verlag der Österreichischen Akademie der Wissenschaften.

Wackernagel, Jacob. 1896. *Altindische Grammatik I: Lautlehre*. Göttingen: Vandenhoeck & Ruprecht.

Weiss, Michael. 2016. "The Proto-Indo-European Laryngeals and the Name of Cilicia in the Iron Age." In *Tavet Tat Satyam. Studies in Honor of Jared S. Klein on the Occasion of His Seventieth Birthday*, edited by Andrew M. Byrd, Jessica DeLisi, and Mark Wenthe, 331–40. Ann Arbor: Beech Stave.

Werba, Chlodwig H. 2005. "Sanskrit *duhitár-* Und Ihre (Indo-)Iranischen Verwandten. Zur 'Vokalisierung' Der Laryngale Im Ur(Indo)Arischen." In *Indogermanica. Festschrift Gert Kleingenschmitt. Indische, iranische und indogermanische Studien dem verehrten Jubilar dargebracht zu seinem fünfundsechzigsten Geburtstag*, edited by Günter Schweiger, 699–732. Taimering: Schweiger VWT.

Whitney, William D. 1887. *The Roots, Verb-Forms, and Primary Derivatives of the Sanskrit Language: A Supplement to His Sanskrit Grammar*. Leipzig: Breitkopf and Härtel.

———. 1889. *Sanskrit Grammar: Including Both the Classical Language, and the Older Dialects, of Veda and Brahmana*. Cambridge, MA: Harvard University Press.

Witzel, Michael. 2005. "Notes on Vedic Dialects, 2." In *Indogermanica. Festschrift Gert Kleingenschmitt. Indische, iranische und indogermanische Studien dem verehrten Jubilar dargebracht zu seinem fünfundsechzigsten Geburtstag*, edited by Günter Schweiger, 733–43. Taimering: Schweiger VWT.

Yoshida, Kazuhiko. 2013. "Return of Wackernagel: The weak affix *-nī-* in Sanskrit ninth class presents." *Tokyo University Linguistic Papers* 33: 363–73.