Adventures in ablaut: Brugmann's Law, analogy, and the hunt for o-grades in Indo-Iranian*

Laura Grestenberger, University of Vienna
Laura.Grestenberger@univie.ac.at

1 Introduction

1.1 The Neogrammarian hypothesis

- Hale 2007: sound change is regular *because* phonetically conditioned and *only* if its domain is the (diachronic) *phonology* of a language. Per definition, sound change (in the Neogrammarian sense) does not make reference to the lexicon or the morphology and is, indeed, regular in its domain
- ... at the same time, the interaction of sound change and analogy remains an all-time classic problem of comparative reconstruction
- Today's goal:
  - Use Brugmann's Law to show that the definition of the environment of a given diachronic phonological rule depends on comparative reconstruction that must necessarily refer to morphology
  - Argue that since we can't avoid analogy, we need to understand how and when it applies (Albright 2005, 2008, Reiss 2006, Garrett and Blevins 2009 ...)
  - Use a case study (Kiparsky 2009's revision of Brugmann's Law) to show why this is necessary

1.2 Brugmann's Law basics

- Because of the merger of all PIE non-high short vowels as $*a$ (and non-high long vowels as $*\bar{a}$), Indo-Iranian is famously not the IE branch where looking for $o/e/\bar{o}/\bar{e}$-grades is fun
- Reconstruction of ablaut in Indo-Iranian is closely linked to independently motivated properties of morphological categories through comparative reconstruction, and even that is not always enough
  - Reflexes of $*h_1er$ 'arrive, get somewhere' (LIV^2: 238) vs. $*h_3er$ '(begin to) move', $*h_1ep$ 'seize' (LIV^2: 237) vs. $*h_3ep$ 'work, produce' (LIV^2: 298), etc.
  - Cases like Ved. $\bar{a}jí$- m./f. 'race' in which several reconstructions are morphologically possible (R(o), R($\bar{e}$))
- A time-honored way of identifying $*o$-grades in Indo-Iranian: **Brugmann's Law (BL)**

*This is an extended version of the handouts from my talks at the Cornell Department of Linguistics on April 20, and at the workshop *The regularity principle in sound change: Approaching the Neogrammarian controversy in the 21st century*, University of Cologne, July 20–21, 2017. I am very grateful for the comments I received there and on other occasions, and in particular would like to thank José Luis García Ramón, Mark Hale, Jay Jasanoff, Alan Nussbaum, Charles Reiss, Rémy Viredaz, and Michael Weiss for comments and discussion. Further comments are welcome!

> "Als gesetz lässt sich aufstellen: bei ungestörter weiterentwicklung wird a_1 in den europ. sprachen so wie im armenischen zu *a*, *e*, im arischen zu *a*; a_2 dagegen im armenischen, griechischen, italischen und slavischen zu *o*, im keltischen, germanischen und baltischen zu *a*, **im arischen in allen offenen silben zu *ā*** (z.b. *bhár-ā-masi* = φέρ-ο-μεν, *dā́r-u* = δόρ-υ, *pā́d-am* = πόδ-α), **hingegen in allen geschlossenen silben zu *a*** (z.b. *dadárça* = δέδορκα, *ábharam* = ἔφερον)." ([1]Brugman 1879: 2–3, emphasis mine. a_1 = PIE **a*/**e*, a_2 = PIE **o*)

See Mayrhofer 1986: 146ff., 2004: 7ff., Hajnal 1994, Volkart 1994 on the *Forschungsgeschichte*.

(1) **o*-grades and Brugmann's Law

	open syllable		closed syllable	
	Vedic	Greek	Vedic	Greek
verb	*bhár**ā**masi*	φέρ**ο**μεν	*ábhar**a**m*	ἔφερ**ο**ν
	*bhár**ā**mahe*	φερ**ό**μεθα	*bhár**a**nti*	φέρ**ο**υσι
	*jāg**ā́**ra*	ἐγρήγ**ο**ρε	*dad**á**rśa*	δέδ**ο**ρκε
noun	*d**ā́**ru*	δ**ό**ρυ	*ad**á**ntaḥ*	ἔδ**ο**ντες
	*p**ā́**dam*	π**ό**δα	*n**á**ktam*	νύκτα < **nók^{u}-t-m̥*
	*bh**ā**ráḥ*	φ**ό**ρος	***a**ṅkáḥ*	**ὄ**γκος
	*áśm**ā**nam*	ἄκμ**ο**να	*vác**a**ḥ*	ἔπ**ο**ς
num./indecl.	*ghā*[2]	(PIE **g^{h}o*)	***a**ṣṭá-*	**ὀ**κτώ

1.3 Brugmann & laryngeals

1.3.1 "Regular" exceptions

A number of "regular" exceptions to BL have been explained using laryngeal theory since Kuryłowicz 1927, e.g., the "exceptional" 3sg. passive aorist form *ájani* (RV, synchronically expected *ájānі* is attested once in the AV).

(2) 3sg. passive aorist[3]

BL		PIE	no BL		PIE
á.kā.ri 'was made'	<	**k^{u}o.rV*	*á.ja.ni* 'was born'	<	**ĝon.h$_1$V*
á.vā.ci 'was said'	<	**u̯o.k^{u}V*	*a.ro.ci* 'shone'	<	**lo̯u.kV*
á.sā.di 'sat'	<	**so.dV*	*á.dar.śi* 'appeared'	<	**dor.k̂V*

- *ájani* is archaic—the *synchronically* productive rule for forming passive aorists from *CaR*-roots = *a-Cār-i* (even if the root is synchronically a *seṭ*-root), e.g.:
  - *átāri* 'was brought across' for **átari* (**terh$_2$*)
  - *śāri* 'broke' for **śari* (**k̂erh$_2$*)

[1]He used the Dutch spelling "Brugman" until 1882.

[2]See Hale 1999.

[3]I've decided to stay agnostic on what the inherited 3sg. ending was, but it seems unavoidable that it began with/was a vowel. Jasanoff 2003: 207ff. argues that the PIE ending was the 3sg. middle ending **o* which was replaced by **i* via analogy in Proto-Indo-Iranian. Another popular explanation is that the 3sg. reflects old nominal **i*-stems of the type Gk. τρόφις 'fat, nourished' (favorably Kümmel 1996).

1.3.2 Perfect

(3) Perfect singular active

	Vedic *kar*		PIE $*k^{u}er$	Vedic *darś*		PIE $*derk\hat{}$
1sg.	*cakára*	<	$*k^{u}e.k^{u}or.h_2e$	*dadárśa*	<	$*de.dork\hat{}.h_2e$
2sg.	*cakártha*	<	$*k^{u}e.k^{u}ort.h_2e$	*dadárś[i]tha*	<	$*de.dork\hat{}.th_2e$
3sg.	***cakā́ra***	<	$*k^{u}e.k^{u}o.re$	***dadárśa***	<	$*de.dor.k\hat{}e$

- Analogical extension of 3sg. root vowel *ā* to *seṭ*-roots (synchronically *CaR*, *CaU̯*, *CaT*, cp. Kümmel 2000), e.g.:
  - 3sg. *jajā́na* 'has created' for **jajána* ← **ĝe-ĝónh₁-e* (Gk. γέγονε)
  - 3sg. *jagā́ra* 'has devoured' for **jagára* ← $*g^{u}e$-$g^{u}órh_3$-*e*

1.3.3 **-e̯ie/o-* ("causatives")

(4) *áya*-verbs in Vedic

a. Vedic: no BL		PIE	b. Vedic: BL		PIE
janáya- 'beget'	<	**ĝon.h₁é.i̯e/o-*	*dhāráya-* 'holds, supports'	<	$*d^{h}o.ré.i̯e/o$-
dhanáya- 'let go, run'	<	$*d^{h}on.h_2é.i̯e/o$-	*gāmáya-* 'bring'	<	$*g^{u}o.mé.i̯e/o$-
jaráya- 'make old'	<	**ĝor.h₂é.i̯e/o-*	*sādáya-* 'seat, make sit'	<	**so.dé.i̯e/o-*

- No BL, like (4-a): *darśaya-* (AV) 'show' < $*dork\hat{}é.i̯e/o$-, *bodháya-* 'wake sbdy. up' < $*b^{h}ou̯d^{h}é.i̯e/o$-, *rocáya-* 'let shine' < $*leu̯ké.i̯e/o$-, etc.
- As with the perfect & passive aorists, *seṭ*-roots of the shape *CaR*, *CaT*... synchronically take *vṛddhi*, e.g., *tāráya-* 'bring across' < **torh₂é.i̯e/o-*.
- ... at the same time roots that end in nasals begin to generalize *guṇa* (e.g., *gamáyati* 'makes go, brings' for *gāmáyati*, both RV; *ramáyati* for *rāmáyati* 'cause to be still', both RV, etc.)
- Jamison 1983: 204 argues against the "laryngeal explanation" of (4-a) because
  - it does not account for "short vowel forms" like *namáyati* 'makes bow' and *gamáyati* 'makes go' (that is, *guṇa*-forms to *aniṭ*-roots)
  - it does not account for "long vowel forms" like *tāráyati* 'makes cross' and *párā bhāvayati* 'makes perish' (that is, *vṛddhi*-forms to *seṭ*-roots)
- ... but there is no reason to believe that the "laryngeal explanation" must cover *all* Indo-Iranian exceptions. Jamison herself provides plausible inner-Indic explanations for the extension of *guṇa* to *aniṭ*-roots, and we have already seen that *bhū* was "apophonically inert" in PIE, so the its causative must be recent and hence not subject to "regular" BL.
- The verbs in (4-a) have cognates outside of IIr., making it more likely that they are indeed "BL forms" rather than synchronically deverbal to full grade thematic presents (Jamison's alternative explanation): *janáyati* = OE *cennan* 'beget', *dhanáyati* = (possibly) Celt-Ib. *uer-ðoniti* 'leads across' (LIV^2: 144), *jaráyati* = OCS *sъ-zoriti* 'causes to ripen' (LIV^2: 165)

2 Finding **o*-grades

Kiparsky 2009, 2010 proposes a "compositional" approach to accent-ablaut classes in PIE and Sanskrit, based on some fairly simple rules[4]:

[4] In the following, page numbers refer to Kiparsky 2009, which is available on the author's website.

(5) *Basic Accentuation Principle (BAP)*: erase all accents but the leftmost one, and put an accent on the leftmost syllable of an unaccented domain

(6) *Oxytone Rule*: accent the rightmost syllable of an inflectional stem

(7) *Zero grade*: *e, o* → Ø before an accented morpheme

- Note that (7) is "conditioned not by the ictus, the single audible accent of the word, but by the invariant underlying accents of its component morphemes" (p. 8)

Throughout the discussion, it is not always clear which reconstructed/attested stage of PIE, PIIr. or Indic his proposed accent rules are supposed to capture ((7) is intended for PIE and Sanskrit). This is especially evident in his discussion of Brugmann's Law (pp. 11–15):

> "With Kuryłowicz, I believe it is not a sound change, but a morphonological process that has been added to the inherited ablaut system within Indo-Iranian." (p. 11)

- If it is "not a sound change", where does it come from? Unless Brugmann's Law was a PIE rule, it *must* have been a sound change at *some* point, unless we assume that the vowel system of PIIr. = that of PIE.
- What K. seems to refer to here is the fact that some of the *outcomes* of Brugmann's Law were "morphologized" so that roots with a particular structure take vṛddhi in certain grammatical categories (e.g., *aya*-stems, the 3sg. perfect active, the passive aorist, *a*-stem nouns ...), independent of whether or not they had an etymological **o*. This has long been known; we'll return to this problem below.
- So the conclusion seems to be that some BL forms in IIr. are the result of a diachronic process ("sound change"), while others are due to a synchronic process (a synchronic morphonological rule), and it seems that K. is interested in the latter
- But if his BL is "not a sound change", but a synchronic rule that has been added to the "inherited ablaut system within Indo-Iranian", why does K.'s definition of Brugmann's Law, (8), make reference to *o* rather than *a*? This is a vowel of PIE, not of Proto-Indo-Iranian. The definition below suggests that Brugmann's Law was in fact a sound law/applied when the "pre-IIr." vowels **o*, **e*, **a* where still distinct
- On the other hand, if (8) is supposed to be a synchronic rule of Vedic (or PIIr.), then it should make reference to *any* IIr. (*)*a* (whether from PIE **e*, **a*, or **o*). This is evidently not going to work (no lengthening of PIIr. **a* in categories that historically had **e*-grade, e.g., no **bhárati*, etc.).

(8) *Brugmann's Law* (Kiparsky 2009: 11)
"Fleeting *o* is lengthened in an open syllable when not followed by an accented morpheme."

- "Fleeting *o*" means that the vowel can ablaut — in PIE/pre-PIIr. or PIIr.? The fact that it's *o* and not *a* suggests that it's PIE or early/"pre"-IIr. (cp. the examples below), but what's relevant for the rule to work as a synchronic extension of the ablaut system is is root ablaut in Indo-Iranian
- Whether or not a root (or suffix) ablauts in Indo-Iranian is not necessarily going to tell us whether it could ablaut in PIE.
  - Example: the root *bhav* 'be(come)', which does ablaut in Indo-Iranian (3sg. pres. *bhávati*, 3sg. aor. *ábhūt*, 2sg.ipv. *bodhí*) was probably "apophonically invariant in late Proto-Indo-European, at least as far as the verbal system was concerned" (Jasanoff 1997: 176), and

that Indo-Iranian is in fact the only branch in which this root ablauts (cp. Greek φύω, aorist φῦ 'grow', Lat. *fuit*, etc.). Root/suffix ablaut in the daughter languages cannot straightforwardly be equated with root/suffix ablaut in PIE.

- So the version of Brugmann's Law in (8) seems to say that ablauting *o* (a PIE sound) is sensitive to the position of the accent *in Indo-Iranian*, given that (8) "has been added to the inherited ablaut system within Indo-Iranian" and all of K.'s examples make reference to the position of the accent in Vedic.
  - Or rather, that PIIr. speakers distinguished between different /a/-phonemes? Ablauting *a* vs. non-ablauting *a*? Difficult to implement without referring to morphological category/root structure (no **bhárati*)
- Finally, if (8) *is* a ("Neogrammarian") sound change, why is it sensitive to *morphological* information such as whether or not a vowel **o* can ablaut? K. has criticized the notion that "sound change operates blindly" elsewhere (e.g., Kiparsky 1995), but certainly not to the extent that, e.g., "**o* > *a* except in feminine verbal abstracts" can be a possible sound change. By the same token, "**o* > *ā* iff **o* can ablaut" should likewise be excluded.

(9) K.'s data

a. "Fleeting -*o*- lengthens"[5]:
acc. **pód-m̥* > *pā́dam* 'foot', acc. **su̯ésor-m̥* > *svasāram* 'sister', acc. **néptor-m̥* > *náptāram* 'nephew', acc. **h₂ek̂-mon-m̥* > *áśmānam* 'stone', acc. **tétk̂-on-m̥* > *tákṣāṇam* 'carpenter', nom.pl. **gʷṓu̯-es* > *gā́vaḥ* 'bulls', nom.pl. **du̯ór-es* > *dvā́raḥ* 'doors', nom.pl. **h₃óp-es* > *ā́paḥ* 'waters', acc.sg. **u̯óĝʰ-m̥* > *vā́ham* '-puller', acc. **sókʷ-h₂oi̯-m̥* (*sic*) > *sákhāyam* 'companion', acc. **h₃rḗĝ-on-m̥* > *rā́jānam* 'king', nom.acc. **h₂ói̯-u-* > *ā́yu* 'life(span)', nom.acc. **dór-u-* > *dā́ru* 'wood', nom.acc. **ĝón-u-* > *jā́nu* 'knee', nom.acc. **són-u-* > *sā́nu* 'back, ridge', **kʷetu̯óres* > *catvā́raḥ* 'four', 3sg.perf. **kʷekʷóre* > *cakā́ra*

b. "Fixed -*o*- does not lengthen":
póti- > *páti-* 'lord, master', **h₃eu̯i-* (*sic*) > **ávi-* 'sheep', **kʷóti* > *káti* 'how many?', *próti* > *práti* 'against', **pró-tero-* > Av. *fratara-* 'front', **nómo-* > *náma-* 'pasture', *h₃óp-os-* > *ápas-* 'work', *apás-* 'working', **tómos-* > *támas-* 'darkness', **dómo-* > *dáma-* 'house', **somó-* > *samá-* 'same', **kʷókʷr̥-* > *śákṛt-* (*sic*) 'excrement', **h₃égʷʰi-* > *áhi-* 'snake', **pro-bʰu(h₂)-* > *prábhu-* 'outstanding', *nagná-ta-* (*sic*) 'nakedness', **róso-* > *rása-* 'juice', **h₃ónos-* > *ánas-* '(heavy) cart', **stomn̥-* > Av. *staman-* 'mouth'.

c. "Variably fleeting -*o*- lengthens variably"
h₂us-os- > nom.acc.dual *uṣás-ā́/uṣā́s-ā* (gen.sg. *uṣáḥ/uṣásaḥ*) 'dawn'; **h₂uks-én-m̥* > *ukṣáṇam/ukṣā́ṇam* (acc.pl. *ukṣáṇaḥ/ukṣṇáḥ* 'bull'

d. No lengthening before accented morphemes
dat.sg. **gʷṓu̯-éi̯* (*sic*) > *gáve* 'cow, bull', dat.sg. **pod-éi̯* > *padé* 'foot', gen.abl.sg. **h₂ek̂-mon-ós* > *áśmanaḥ* 'stone', **du̯oi̯ós* > *dvayáḥ* 'twofold' (Gk. δ╒οιός)

(9-a) are uncontroversial and both approaches ("traditional" BL & Kiparsky's version) predict -*ā*- in these examples. The real problems are (9-b, d) (we'll also get back to (9-c)...)

[5] I'm excluding two of his examples: *vā́has-* n. 'offer' which in all likelihood goes back to a Narten *s*-stem **u̯ḗĝʰ-(o/e)s-* (Schindler 1975, Höfler 2012) and *nā́man-* n. 'name' which must be reconstructed with a root-final laryngeal (**h₁néh₃-mn̥-*, see Neri 2005). Note, moreover, that I assume that **o* from **h₃e* normally undergoes BL, unlike, for example, scholars of the Leiden school (cf. Lubotsky 1990). If once accepts the Leiden modification of BL, all cases with initial **h₃* in this list would also have to be excluded.

3 Exceptions

3.1 "Fixed -*o*- does not lengthen"

- Remember that there's a chronological problem here — this is PIE *-*o*- (*not* PIIr. or Sanskrit /o/ or /a/?!), but whether or not a root/suffix has a "fleeting" vowel is a synchronic property of Sanskrit.
- However, if the words in (9-b) *did* have PIE *-*o*- in open syllables, they would be genuine counterexamples to the traditional view.

3.1.1 ***poti-* 'lord, master'**

- Usually reconstructed as *o/e*-acrostatic **i*-stem **pót-i-/pét-i-*, but no evidence for R(*e*)
- Semantic split in Indo-Iranian: "husband" with open inflection (≈ acro) vs. "lord, master (of)" with closed inflection (≈ protero) has been interpreted as reflecting internal derivation: **pót-i-/*pét-i-* 'master' → **pét-i-/*pt-éi̯-* 'master over' (Tremblay 1998, 2003), but this is semantically unconvincing and the semantic split can easily be an IIr. innovation
- Pinault 2017: particle **-pot* 'exclusively, specifically' (Hitt. *-pat*, Lith. *-pàt*), an "emphatic and particularizing morpheme" (p. 348; cp. Benveniste 1966: 'self'), e.g., in "intensive/superlative" constructions like Ved. *viśā́m viśpátiḥ*, Av. *zantāuš zantupatāe* 'the head of the tribe who presides over the tribe', etc. This etymology would explain the "fixed *o*" of this word.
- The nominal *i*-stem inflection developed late, no root ablaut, open inflection (closed infl. = IIr. innovation), in which case the paradigm might have been something like (10):

(10) Pre-Graeco-Aryan **pót-i-*

	sg.		dual		pl.	
nom.	**pótis*	Ved. *pátiḥ*, Av. *paitiš*, Gk. πόσις, Lat. *potis*, Goth. *-faþs*, OLith. *patìs*	**pótih₁*	Ved. *pátī*, YAv. *-paiti*	**pót(e)i̯es*[6]	Ved. *pátayaḥ*, Yav. *pataiiō̄*, Gk. πόσεις
acc.	**pótim*	Ved. *pátim*, OAv. *paitīm*, Gk. πόσιν	**pótih₁*	Ved. *pátī*, YAv. *-paiti*	**pótins*	Ved. *pátīn*, Yav. *paitiš*, Gk. πόσιας[7]
voc.	**póti*, **póteu̯*	Gk. πόσι, Ved. *pate*, Yav. *-paite*	**pótih₁*	Ved. *pátī*	**pót(e)i̯es*	
instr.	**pótih₁*, **pótu̯eh₁*	Yav. *paiti* (Yt.10.80), Ved. *pátyā*	(**pótibʰi̯V-* ?)		**pótibʰi(-)*	
dat.	**pótu̯ei̯*	Ved. *pátye*, OAv. *paiθiiaē-*, Gk. πόσει (?)	(**pótibʰi̯V-* ?)		**pótibʰ(i̯)os*	Ved. *pátibhyaḥ*
abl.	**pótu̯e/os*		(**pótibʰi̯V-* ?)		**pótibʰ(i̯)os*	Ved. *pátibhyaḥ*
gen.	**pótu̯e/os*	Ved. *páty[ur]*[8], Gk. [πόσιος[9]]	(**pótu̯ou̯s* ?)		**pótu̯ōm*	
loc.	**pótĕu̯(i)*[10]	Ved. *pátyau*, Gk. dat. πόσεϊ, πόσει ?	(**pótu̯ou̯s* ?)		**pótisu*	

[6]The expected open inflection pl. forms of acrostatic **i*- and **u*-stems, **-i̯-es* and **-u̯-es* with S(Ø), were replaced with full grade allomorphs early on, but there are a few remnants: nom.pl. *mádhvaḥ* (*mádhu-* m. 'sweet') in RV 1.180.4, maybe 9.89.3 (Oldenberg 1912: 183), nom.pl. *aryáḥ* (*arí-* m. 'comrade') in RV 6.45.33.

[7]< **pótii̯(n̥s)*, maybe analogy with expected but unattested open infl. nom.pl. **pót(i)i̯es*? The ending could reflect old, resyllabified *-n̥s* or synchronic athematic *-as* (ultimately from the same source).

[8]Analogy with kinship nouns, e.g., *pitúr*, etc. OAv. *patōiš* = Ved. *páteḥ* with synchronically productive closed inflection.

[9]< **pótii̯os*, for expected **pótu̯os*.

[10]Cp. Schmidt 1885, 1889, Schindler 1994, Tremblay 2004, Grestenberger 2009.

- BL expected everywhere except for instr.dat.abl.gen.sg., gen.pl. and maybe gen.loc.dual.
- 17 BL vs. 7 non-BL slots (no reason to believe *a priori* that the allomorph with the most slots always wins out, though)
- RV 9.89.3b appears to have an instance of a heavy first syllable in a Triṣṭubh cadence: *hárim aruṣáṃ divó asyá* ***pátim*** "(They [=waters or cows] draw near the unbridled lion of honey,) the tawny, ruddy master of this heaven." (Jamison and Brereton 2014)
- No indication that there was a root-final laryngeal (but cp. Pinault 2017's reconstruction as **pot-(h₁)i-*), so maybe a remnant of the theoretically expected (but analogically eliminated) BL form **pātim*...?

Conclusion: while **poti-* did not have root ablaut at least at the Graeco-Aryan stage, it did have non-BL contexts early on in the weak stem of its paradigm → analogy is at least possible

3.1.2 **h₂ou̯i-* 'sheep'

Acrostatic **i*-stem **h₂óu̯-i-*/**h₂éu̯-i-* — the majority view is that this noun requires reconstruction with **h₂* (rather than K's **h₃*), resulting in Pre-Graeco-Aryan **ou̯i-*/*au̯i-* (Pinault 1997, NIL, and cf. below).

(11) **h₂óu̯-i-*/**h₂éu̯-i-*

	sg.		dual	pl.	
nom.	**h₂óu̯is*	CLuv. *ḫāwīš*, Gk. ὄις, Lat. *ovis*, OIr. *oí*, Goth. *awi-*, Lith. *avìs*, Arm. *hovi-*	**h₂óu̯ih₁*	**h₂óu̯i̯es*	Gk. ὄιες
acc.	**h₂óu̯im*	Gk. ὄιν, Lat.	**h₂óu̯ih₁*	**h₂óu̯ins*	Gk. ὄῑς
instr.	**h₂áu̯ih₁*, **h₂áu̯i̯eh₁*		(**h₂áu̯ibʰi̯V-*?)	**h₂áu̯ibʰi(-)*	Ved. *ávibhiḥ*
dat.	**h₂áu̯i̯ei̯*		(**h₂áu̯ibʰi̯V-*?)	**h₂áu̯ibʰ(i)os*	
abl.	**h₂áu̯is* (?), *h₂áu̯i̯e/os*		(**h₂áu̯ibʰi̯V-*?)	**h₂áu̯ibʰ(i)os*	
gen.	**h₂áu̯is* (?), *h₂áu̯i̯e/os*	Ved. *ávyas*, Gk. ὀιός	(**h₂áu̯i̯ou̯s* ?)	**h₂áu̯i̯ōm*	Gk. ὀίων (οἰῶν)
loc.	**h₂áu̯ĕi̯(i)*		(**h₂áu̯i̯ou̯s* ?)	**h₂áu̯isu*	

- Evidence for **h₂*: Hitt. *ḫawiyašši-* 'sheep-like', CLuv. *ḫāwī-*, Lyc. *χawa-* 'sheep'[11], Arm. *hovi-* (?)
- Evidence for *e*-grade (= *a*-grade): Toch. B $\bar{a}_u w$ f. 'sheep' < **ā́wä* < **áu̯is*; pl. *awí* < **āwíyä* < **āwäyä* < **h₂éu̯i̯es*, Pinault 1997, Lyc. *χawa-*, Yoshida 2013

Conclusion: This noun did not have "fixed *-o-*" (in PIE), the entire weak stem (15 slots) originally had R(*a*) < **h₂e* and therefore no BL context (16 if the acc.pl. originally belonged to the weak stem, see below)

- Even if Vedic *ávi-* goes back to **h₂ou̯i-* with generalized *o*-grade (cp. Greek, Latin), the inherited open inflection (securely reconstructed for gen./abl.sg, nom.gen.pl., very likely for instr.dat.sg.) would provide non-BL contexts (cp. **póti-* above)

[11] **h₃* was probably lost in Lycian, Melchert 1994, but skeptical Kloekhorst 2006.

3.1.3 *k^{u}óti* 'how many'; *próti* 'against', **pró-tero-* 'first', 'front-most', **pro-b^{h}u(h_2)-* 'outstanding'

- *k^{u}ó-*ti* 'how many': Ved. *káti*, but YAv. *caiti* < *k^{u}e-*ti*
  - No "fixed -*o*-" (in PIE & PIIr.), *k^{u}o-/k^{u}e-/k^{u}i- forms are found throughout the IE languages, including IIr.: PIE *-k^{u}e 'and' > Ved./Av. -*ca*, *-k^{u}*id* 'what?' > Ved. -*cit*, OAv. -*cīt*, PIE *k^{u}*is* 'who?' (Lat. *quis*, etc.) > OAv. *cīš* (besides Ved. *káḥ*, OAv. *kō*, *kas*-), PIE gen.sg. *k^{u}*es(i)o* > OAv. *cahiiā* (cp. OCS *česo*), etc.
  - generalization of non-BL forms in the Vedic indefinite/interrogative stem therefore not surprising
  - Possible BL remnants in the Ved. interrogative: pejorative prefixes *kim*-, *kat*-, *ka*-, ***kā*-**, e.g., RV *kat-payá*- 'swelling badly', Up. *ka-pūya*- 'smelling badly' (cp. YAv. *ka-mərəδa*- 'Daēuua-head'), etc. Pejorative *kā*- is attested late (Pāṇini, *Pañcatantra*, *Hitopadeśa*), e.g., *kā-puruṣa*- 'bad man' (*Rāmāyaṇa*, *Pañcatantra*), *kā-patha*- 'bad road' (*Rāmāyaṇa*, *Mahābharata*), cp. Pāṇini, *Aṣṭādhyāyī* 6.3.104–106 (P. also discusses the qualifying use of *kā*- 'slightly; -ish', e.g., *koṣṇa*- 'warm-ish' besides *kaduṣṇa*-).
    - Not the strongest evidence, but not clear what else *kā*- could be.
      - Not a form of the feminine interrogative paradigmn
      - Old instrumental *kā* (< *k^{u}oh_1, cf. OAv. *kā*)? But only *kéna* in Vedic, and motivation for an instrumental first member in this type of compound not clear
      - Nom.acc.pl.n. (cp. *kim, kat* as FMC)? Function/syntax likewise unclear, unlike in the possible comparandum *kā-cit-karā*- 'achieving everything'
- **pró-ti*: cp. Gk. πρότι, πρός, πρό (< **pr-o* ?), OCS *protivъ*, but Lat. *pretium* 'price, value' ... some traces of *e*-variants, though not as compelling as for *k^{u}o*(-ti)* above.
- Sandhi-variants: *káti* vs. *káty* (2/4x RV), *práti* vs. *práty* (38/247x in the RV), e.g., *práty as*- 'be close, similar to', *praty e-/i*- 'go towards', *pratyáñc*- 'facing', etc.
- **pró-tero*- 'first', 'front-most': YAv. *fratara*- not necessarily = Gk. πρότερος, cp. EWA II: 179: PIIr. **pratamá*-, **pratará*- younger than Ved. *prathamá*- 'first' (still no BL, though)
- **pro-b^{h}u(h_2)*- 'outstanding': Ved. *prabhú*- ≈ Lat. *probus* < **pro-b^{h}u̯-o*-?
  - In general, same problem as above — but this word could have been formed independently in Vedic ('hyper-zero grade' -*bhu*- rather than -*bhū*- as in *vi-bhū*- 'excellent', *abhi-bhū*- 'superior', and AV has *pra-bhū*-) based on the synchronic preverb *pra*
  - If old, weak stem **pro-b^{h}u̯*- < **pro-b^{h}u̯h_2-V* via the νεογνός-rule[12] would be a non-BL context

Conclusion: Probably the strongest exceptions to BL, but even so:

- No "fixed -*o*-" for *k^{u}ó-*ti* (less certain for **proti*)
- Sandhi variants

3.1.4 τομος-nouns: **nómo-* 'pasture', **dómo-* 'house', **róso-* 'juice'

See AiG II,2: 59ff., Hajnal 1994, Nussbaum To appear ... general problems:

- Analogical influence of *seṭ*-roots of the **CaRH* type on *aniṭ*-roots of the **CaR*-type (**CaC*-roots tend to show the expected BL outcomes more than **CaR*-roots do, Hajnal 1994)

[12] Thanks to Michael Weiss for pointing this out!

- Influence of compound forms on simplex forms (type *su-kára-* 'easy to do' vs. *su-pārá-* 'helping across easily', etc.).
- According to Hajnal, the variation of R($\bar{a}$)∼R(a) forms in compounds is at least partially metrically conditioned (*CaR/CaC* if the FMC ends in a heavy syllable, *CāR/CāC* if the FMC ends in a light syllable, e.g., *janaṃ-sahá-* 'conquering the people' vs. *abhimāti-ṣāhá-* 'conquering opponents' — but many exceptions...)

Some generalizations are possible:

(12) Barytone action nouns (τόμος)
   a. *seṭ*: *jána-* (secondary also n. *jā́na-*; Gk. γόνος, **ĝenh₁*), *grábha-* 'grasping, reaching' (*gráha-* 'cup, container', **greb*^{h}*h₂*), *jára-* 'wear, age' (**ĝerh₂*, besides *jā́ra-* 'aging')
   b. *aniṭ*: *vā́ja-* 'speed, race' (**u̯eĝ*), *-svā́pa-* 'sleep' (**su̯ep*), *śā́ka-* 'strength, might' (**k̂ek*^{u}); with secondary oxytonesis: *bhārá-* 'burden' (Gk. φορός, **b*^{h}*er*), *vāká-* 'song, speech' (**u̯ek*^{u}), *sādá-* 'sitting, riding' (Gk. ὁδός f., **sed*)

Exceptions: *aniṭ*-roots, (12-b) mostly have *a* (no BL): *dáma-* 'house' (Gk. δόμος, **dem*), *bhára-* 'takings, plunder' (**b*^{h}*er*), *tána-* n. 'descendants' (**ten*), *kṣáya-* 'dwelling' (**tk̂ei̯*), etc. → Action nouns generalized the *seṭ*-outcome to *aniṭ*-roots (Hajnal 1994)

(13) Oxytone agent/patient nouns (τομός)
   a. *seṭ*: *-staná-* 'resounding, noise' (**stenh₂*), *bhayá-* 'fear' (**b*^{h}*ei̯h₂*), *vadhá-* 'killing, killer' (**u̯ed*^{h}*h₁*)
   b. *aniṭ*: *vāhá-* 'draft animal' (Av. *vāza-*, **u̯eĝ*^{h}), *-kārá-* 'making, performing' (**k*^{u}*er*), *-sāhá-* 'conquering' (**seĝ*^{h}), *pārá-* 'crossing' (**per*)

Exceptions:

- variation in second members of compounds (SMC), especially for *aniṭ*-roots ("*su-kára*-type" has generalized *a* to *aniṭ*-roots, AiG II,2: 63)
- simplex *aniṭ*-roots generalize short *a* (*seṭ*-outcome): *ghaná-* 'slayer, destroyer' (**g*^{uh}*en*, Gk. φονός), *plavá-* 'boat' (**pleu̯*), *dravá-* 'running' (**dreu̯*)

Tucker 2012: the most direct reflexes of BL in thematic nouns are found in:

(14) (originally barytone) action nouns in compounds: *aniṭ*-roots show lengthening, *seṭ*-roots vary (Tucker: analogy from simplex action nouns, where *a* was generalized)
   a. BL lengthening: *aniṭ*: *vi-bhāgá-* 'distribution', *adhi-vāká-* 'advocacy', *saṃ-vādá-* 'conversation', *ā-hāvá-* 'bucket, container'
   b. No lengthening: *seṭ*: *ā-havá-* 'challenge', *pra-savá-* 'impulse' vs. *aniṭ*: *ud-ayá-* 'rising', *saṃ-gamá-* 'coming together', etc.

(15) Simplex agent nouns (often passive/itr.)
   a. BL lengthening: *aniṭ*: *kārá-* 'decisive act, battle', *bhārá-* 'burden', *sādá-* 'seat', etc.
   b. No lengthening: *javá-* 'speed', *savá-* 'impelling'

(15) = analyzed as **tómos*-type action nouns with secondary oxytonesis by, e.g., Hajnal 1994 → Hajnal & Tucker draw (relatively) similar conclusions concerning the synchronic distribution of $\bar{a}/a$ in the different types of thematic nouns.

3.1.5 Thematic nouns: Kiparsky 2009

According to K.'s rule, we expect "*CáCa*- in action/result nouns as opposed to retained *CaCá*- in agent nouns" (p. 13)

- More or less true for action nouns, less so for agent nouns (cp. (15)) → K. refers to Hajnal's metrical rule in compounds to explain the "unexpected" BL variants in agent nouns.

***nómo*- 'pasture', *dómo*- 'house', *róso*- 'juice':** Note that these are a problem for K.'s own rule (lengthening expected because the following vowel is not accented), so the explanation is that these were not "compositionally derived from their original root" (which seems odd for cases like *kṣáya*- 'abode', *bhága*- 'prosperity', *bhára*- 'booty, spoils of battle', *tána*- 'progeny', which are among his examples).

- **nómo*- 'pasture': Ved. *náma*- = Gk. νόμος < **nem* 'assign (to)', R(*e*) in Gk. νέμω, νέμομαι 'assign to, share', νέμος, -εος 'pasture', Goth. *niman* 'take', etc.
- **dómo*- 'house': Ved. *dáma*- ≈ Gk. δόμος; R(*e*) in the root noun **dóm-*/*dem*- (Ved. *dámpati-*/*páti- dán*, OAv. *də̄ŋg paiti-*, Gk. δεσπότ[ης], Gk. δέμω 'build'; zero grade in, e.g., Gk. δμώς 'slave' < **dm̥-ō̯u̯*-, etc.
  - Volkart 1994 suggests that Ved. *dáma*- might be derived from Vedic *dám*-
  - While Nikolaev 2010 gives strong arguments in favor of an original *aniṭ*-root **dem*, some forms seem to support the traditional reconstruction **demh₂* (LIV²: 114ff.)[13]
- **róso*- 'juice': Ved. *rása*-, YAv. *raŋhā*- name of a stream, Lat. *rōs* 'dew', Lith. *rasà*, OCS *rosa*, probably a *Schwebeablaut* variant of **h₁ers* 'flow' (Hitt. *ārašzi*, *aršanzi*, Ved. *arṣati*). No evidence for nominal R(*e*).

3.1.6 *h₃óp-os*- 'work'

If Ved. *ápaḥ*, gen. *ápasaḥ* (also *apáḥ*, gen. *apásaḥ* 'working') = Lat. *opus*, gen. *operis*, this would be counterexample to traditional BL. However:

- **h₁ep* 'seize, take': Hitt. *ēpzi*, *appanzi*, OLat. *apiō* 'bind together', Ved. *ā́pa* 'has reached', desid. *apsanta* 'they wish to reach' (LIV²: 237)
- **h₃ep* 'produce': Osc. *upsed* 'produced' < **o̯p-s-e-t* (?) and possibly also 2. **h₃ep* 'wish, choose' in OLat. *opet* 'chooses', later *optāre* 'choose' (LIV²: 298-9)
- (maybe also relevant: **h₂ep* 'fit', OHitt. *ḫ̯apparu*, LIV²: 269)

So up to four **Hep*-roots may be at play here, given the somewhat flexible semantic reconstruction (thanks, Indo-Iranian vowel merger ..!).

- Balles 1997 proposes **h₁ep-es*-, R(*o*) in Latin analogical (to *ops* 'power, wealth'...?)
- Stüber 2002: **h₃ep-es*- (if BL only before liquids, nasals, glides, cp. discussion in Mayrhofer 1986, but not universally accepted) vs. **h₂op-s* Lat. *ops* 'power, wealth', cp. Hitt. *ḫ̯appinant*- 'rich' (probably not the same root as the **h₂ep* reconstructed by LIV...)
- Weiss 2010: no **h₃ep* 'choose' in Italic; *opus* = **h₁ep*

[13] If this root *is* ultimately *anit*, one could also posit a secondary derivative **dóm-h₂-o*- based on an (albeit unattested) *-*eh₂*, a possibility pointed out to me by Michael Weiss.

3.1.7 **tómos-* 'darkness'

Ved. *támas-*, YAv. *təmah-* 'darkness' < **temH-os-* (Stüber 2002, Höfler 2012; R(o) in **s*-stems morphologically unexpected anyway):

- Ved. *tam*$^{\text{i}}$ 'become weak, pass out' (RV only *tamat* (subj.) 'becomes exhausted')
- Ved. *támisrā-* 'night' < **temH-s-ro/eh₂-*, OHG *demar* n. 'dusk' < **temH-s-ó-* Lat. adv. *temere* 'unintentionally, coincidentally' < **temH-es-i* (Stüber 2002)
- Lith. *témti* (*témsta*) = denominal to **s*-stem (and shows *seṭ*-character!)
  - I have no idea what to do with *tamsà* 'darkness', and Lithuanian has other odd forms that may or may not belong to this root and are diachronically unexpected (e.g., *timsras* '(some kind of) red', *tumsà* 'darnkess', see Fraenkel 1962: 1055, 1080), and I see no reason to prefer the apparent R(o) of the Lithuanian form to the much better attested R(e)

Conclusion: Mostly denominal formations to the **s*-stem in IE daughter branches, *seṭ*-root, no reason to assume R(o)

3.1.8 **somó-* 'same'

Ved. *samá-* 'same', OAv. *hama-*, Gk. ὁμός, Goth. *sama(-)* < **somH-ó-*? Evidence for root-final laryngeal:

- Lack of BL in IIr. (EWA II: 703, following Darms 1978: 167)—circular.
- Gk. ἅμα adv. 'at the same time', as if < **sm̥h₂*; Gk. ὁμαλός 'equal, level' < **somh₂-lo-*
- maybe Ved. *simá-* 'self' < **sm̥h₂-o-* ...? (EWA II: 730: "Laryngal-Umlaut")

Conclusion: at least some independent evidence for a *seṭ*-root.

3.1.9 **k$^{\text{u}}$ók$^{\text{u}}$r̥-* 'excrement'

Ved. nom.acc.sg. *śákṛt* < **k̂ók$^{\text{u}}$r̥-* (?), but weak stem *śakn-* ´ (instr.sg. *śaknā́*, gen.sg. *śaknáḥ*) not a BL context.

- R(o) because of Gk. κόπρος f. 'dung'?
- OIr. *cechor*, *cechar* f. 'dirt' seems to reflect R(e)
- ≈ Hitt. *šakkar, šaknaš*, Gk. σκῶρ, σκατός ?
- → Not very confident about R(o) here, and it's a potential taboo word, so whatever.

3.1.10 **h₃ég$^{\text{uh}}$i-* 'snake'

Original root ablaut is difficult to determine (Ved. *áhi-* 'snake', only closed infl., & YAv. *ažiš* = ambiguous):

- R($\bar{e}$): Cl.Arm. *iž* 'snake' < **h₁ég$^{\text{uh}}$i-* (loc.sg.? or R($\bar{e}$/o)-ablaut? Nussbaum 1998: 150, fn. 179)
- R(o): Gk. ὄφις, -εος, -ιος 'snake'
- R(e): if Gk. ἔχις 'viper', ἐχῖνος 'hedgehog', Myc. *e-ki-no* belong to the same word, maybe from *h₁ég$^{\text{uh}}$i-* (weak stem + delabialization before **-i-*, Neri 2003: 27, fn. 56)?
- Also Lat. *anguis* m./f. 'snake' < **h₂eng$^{\text{u(h)}}$is* (**h₂n̥g$^{\text{uh}}$i-* > PIIr. **aǰʰi-*?)

Conclusion: **h₁ég$^{\text{uh}}$* rather than **h₃ég$^{\text{uh}}$*; no "fixed *o*"

3.1.11 *nagná-tā-* 'nakedness'

Ved. *nagná-* 'naked' < **nog^{u}nó-*; *nagnátā-* f. 'nakedness' clearly *einzelsprachlich*.

3.1.12 **h$_3$ónos-* > '(heavy) cart' < *'burden, heaviness'

- Ved. *ánas-* n. 'heavy cart' = Lat. *onus*, *-eris* n. 'burden'; LIV^2 has neither **h$_1$en* nor **h$_3$en*
- Stüber 2002 reconstructs **h$_1$enh$_3$* 'move sth. heavy' based on Gk. Ἐνοσί-χθων 'earth-shaker' (epithet of Poseidon) < **h$_1$enh$_3$ti-* and Hitt. *aniya-* 'work' < **h$_1$onh$_3$-e(-)i̯e-*
- → Ved. *ánas-*, Lat. *onus* < **enos* < **h$_1$enh$_3$-os-*; Lat. *o*-grade secondary (cp. *pondus*, *foedus*, etc.)

3.1.13 **stomn̥-* 'mouth'

- probably from **steh$_3$-mn̥-* because of Hitt. *ištāman-*, *ištamin-* c./n. 'ear' (once *plene*), Cluv. *tūmmant-* n. 'ear' (Lubotsky 1997, Kloekhorst 2008: 411f.); Gk. στόμα 'mouth' < **sth$_3$mn̥-*.
  - Germanic has evidence for R(*e*), cf. Goth. *stibna* 'voice', OHG *stimna* 'voice', which would exclude **h$_3$* in the root (cf. Kroonen 2013: 480). In that case, however, this form would not be an example of "fixed *o*"
- Av. *staman-* (m.) occurs twice (V.13.30, V.15.4) and seems to be secondary for expected **stāman-* (Lubotsky 1997). Don't put your faith in Avestan vowels.

3.1.14 Summary

- A few forms seem to have PIE "fixed *o*" (**pro(ti)-*, **póti-*, **sóm(H)o-*, **róso-*; maybe **nómo-*, **róso-* — these are the "good" counterexamples to traditional BL)
- Some controversial etymologies (**h$_{1/3}$eg^{uh}i-*, **h$_{2/3}$o̯uis-*, **k̂ok^{u}r̥-*...)
- Some forms require reconstruction with a root-final laryngeal (Ved. *ánas-*, Av. *staman-*, Ved. *támas-*)
- So for most of these there is neither a diachronic reason (= regular sound change) nor a synchronic reason (= morphological category) to expect BL lengthening

3.2 "No lengthening before accented morphemes"

Recall that this is the underlying accent, not the ictus.

3.2.1 *$g^{u}\acute{o}u$- 'cow, bull'

Usually reconstructed as R(o/e)-ablauting root noun (Schindler 1973), R(e) not directly attested.

(16) *$g^{u}\acute{o}u$-/*$g^{u}\acute{e}u$-

	sg.		dual		pl.	
nom.	*$g^{u}\acute{o}us$	[Ved. *gáuḥ*, OAv. *gāušˇ*], Gk. βοῦς, βῶς, Lat. *bōs*, OIr. *bó*, OE *cū*	*$g^{u}\acute{o}ueh_1$[14]	Ved. *gā́vā*, Gk. βόε	*$g^{u}\acute{o}ues$	Ved. *gā́vaḥ*, Gk. βόες
acc.	*$g^{u}\acute{o}m$ (< **$g^{u}\acute{o}um$)	Ved. *gā́m*, OAv. *gąm*, Hom. βῶν, Umbr. **bum**	*$g^{u}\acute{o}ueh_1$	Ved. *gā́vā*	*$g^{u}\acute{o}s$ (< **$g^{u}\acute{o}uns$)[15]	Ved. *gā́ḥ*, OAv. *gā̊* (vs. Gk. βόας)
instr.	*$g^{u}\acute{e}u(e)h_1$	Ved. *gávā*	(*$g^{u}\acute{e}ub^{h}iV$-?)		*$g^{u}\acute{e}ub^{h}i$-	Ved. *góbhiḥ*
dat.	*$g^{u}\acute{e}uei$	Ved. *gáve*, OAv. *gauuōi*, Lat. *b[o]vī*	(*$g^{u}\acute{e}ub^{h}iV$-?)		*$g^{u}\acute{e}ub^{h}(i)os$	Ved. *góbhyaḥ*
abl.	*$g^{u}\acute{e}us$	Ved. *góḥ*	(*$g^{u}\acute{e}ub^{h}iV$-?)		*$g^{u}\acute{e}ub^{h}(i)os$	Lat. *b[ū]bus*
gen.	*$g^{u}\acute{e}us$	Ved. *góḥ*, OAv. *gəušˇ*	(*$g^{u}\acute{e}uous$?)		*$g^{u}\acute{e}u\bar{o}m$	Ved. *gávām*, OAv. *gauuąm*
loc.	*$g^{u}\check{e}u(i)$	Ved. *gávi*	(*$g^{u}\acute{e}uous$?)		*$g^{u}\acute{e}usu$	Ved. *góṣu*, Gk. β[o]υσ[ι]

- Indo-Ir. gen.sg. *$gaus$ synchronically irregular and clearly older than Gk. βο(ϝ)ός, Lat. *bovis*, etc.
- So accent was presumably originally on the root throughout (as it is indeed in IIr.), even though we don't see the theoretically expected zero-grade version of instr.dat.sg. endings (*-h_1, *-i)[16]
- ... which means that K.'s dat.sg. *$g^{u}\acute{o}u$-$\acute{e}i$, even if it had generalized R(o), was presumably accented on the root originally (as it is in Vedic), at least in its surface form
  - underlying *$g^{u}\acute{o}u$-$\acute{e}i$ surfaces as *$g^{u}\acute{o}u$-ei by K.'s *Basic Accentuation Principle* (BAP): "erase all accents but the leftmost one, and put an accent on the leftmost syllable of an accented domain"
  - So in order for BL to *not* apply in this dat.sg., learners would have to somehow know that there was an underlying accent on the ending, even though they would never actually *hear* this accent
- Same for instr.sg. *gávā* vs. nom.acc.dual *gā́vā*
- Alternatives?

[14] Malzahn 2000.

[15] See Schindler 1973, but there's mixed evidence concerning the status of the acc.pl., see **pód*-, in which the acc.pl. seems to belong to the weak stem.

[16] An archaic zero grade version of the instr.sg. ending seems to be attested in some Avestan *u*-stems: *xruui.druuō*, *bāzuuō*, *rašnuuō*, with -*uuō* < *-*auH* < *-*euH* (Tremblay 1998, Kümmel 2014), so this type of instrumental was morphonologically lictit.

(17) PIIr. paradigm of **gáus* (post-BL)

	sg.	dual	pl.
nom.	**gáus*	**gắ̯uā*	**gắ̯uā*
acc.	**gắm*	**gắ̯uā*	**gắs*
instr.	**gávā* (**gắvā*)		**gáubhis*
dat.	**gávai̯* (**gắvai̯*)		**gáubhi̯as*
abl.	**gáus*		**gáubhi̯as*
gen.	**gáus*		**gáu̯ām* (**gắ̯u̯ām*)
loc.	**gáu̯i* (**gắvi*)		**gáušu*

- nom.sg. **gáus* → **gắus*; strong evidence that PIIr. inherited a paradigm with root ablaut
- Even if pre-PIIr. had generalized R(*o*) (in which case the expected gen.sg. ending would be *-aḫ* < **-e/os*, cp. Gk. -ος), this would result in a highly irregular paradigm and the expected BL forms in the instr., dat., and loc.sg. and gen.pl. would most likely have been renewed with synchronic full grade

3.2.2 **pód-* 'foot'

Also reconstructed with R(*o/e*)-ablaut, but in this case R(*e*) is well attested.

- However, unlike **g^{u}ou̯-*, this stem had accented endings in the weak stem fairly early on (in K.'s system, that's because **g^{u}ou̯-* had inherent root accent, but **pód-* did not)

(18) (late?) PIE **pód-*/**péd-* 'foot'

	sg.		dual		pl.	
nom.	**póds*	[Ved. *pā́t*, Lat. *pēs*], Gk. πούς	**pódeh$_1$*	Ved. *pā́dā*	**pódes*	Ved. *pā́daḥ*
acc.	**pódm̥*	Ved. *pā́da[m]*, YAv. *pādə[m]*, Gk. πόδα	**pódeh$_1$*	Ved. *pā́dā*	**pé/ód-n̥s*	Ved. *padás*, YAv. *paδō*, Gk. πόδας
instr.	**pedéh$_1$*	Ved. *padā́*	(**pedb^{h}i̯V-*?)		**pedb^{h}í-*	Myc. *p[o]-pi*, Ved. *padbhíḥ*
dat.	**pedéi̯*	(Ved. *padé*,) Lat. *pedī*	(**pedb^{h}i̯V-*?)		**pedb^{h}(i̯)os*	YAv. *paδəbiias-*
abl.	**pedé/ós*		(**pedb^{h}i̯V-*?)	Ved. *padbhyā́m*	**pedb^{h}(i̯)os*	
gen.	**pedé/ós*	(Ved. *padáḥ*), Gk. π[o]δός, Lat. *pedis*	(**pedóu̯s* ?)		**pedṓm*	
loc.	**pĕ́d(í)*	Ved. *padí*, Gk. π[o]δί, OIr. *ís* 'under'[17]	(**pedóu̯s* ?)	Ved. *padóḥ*	**pedsú*	Ved. *patsú*, Gk. π[o]σ(σ)[ί]

- Strong evidence for an old ablauting paradigm, so no BL context in the weak stem
- Evidence for R(*e*): Italic, Old Irish *ís* (indirect - lengthened grade), Albanian. Additional evidence in derived nominals in other branches, e.g., Gk. πεζός 'on foot', etc.

[17] < loc.pl. **pédsu*, which analogical R($\bar{e}$) from loc.sg.

- Unlike in the paradigm for 'cow', K.'s crucial forms (dat.sg. *padé*, acc.pl. *padás*) presumably already had accented endings in pre-Graeco-Aryan — but probably R(*e*)
- So the question is whether we want to reconstruct pre-PIIr. R(*o*) in the weak stem based on Greek and other IE languages in which R(*o*) has been generalized (e.g., Arm. *otk'* 'feet', Germ. **fōt-* in, e.g., Goth. *fotu-*, ON *fót*, etc., and maybe in Tocharian) and the fact that BL did *not* apply in the instr.dat.abl.gen.sg. & acc.pl.

3.2.3 **h₂eḱ-mon-* 'stone'

- Originally amphikinetic **h₂eḱ-mon-/*h₂(e)ḱ-mn-́*, as shown by the archaic gen.sg. Ved. *áśnaḥ* (Av. *ašnō*), instr.sg. *áśnā*, so no BL context in the weak stem
  - PIE *-*Cmn-* > *-Cn-*, cp. Nussbaum 2010
- So no inherited gen.abl.sg. **h₂eḱ-mon-ós*; Ved. gen.sg. *áśmanaḥ* is secondary and there's no diachronic or synchronic reason to expect a BL form

3.2.4 **dṵoi̯ós*

- Ved. *dvayáḥ* 'twofold' = Gk. δϝοιός< **dṵoi̯ós*? Note that *-i̯- should have been lost in Greek.
- ... or synchronically from *dvi-* 'twice', e.g., a (PIIr.) *vṛddhi*-form **dṵai̯a-*[18]?
- **dṵei̯-* apparently in Lith. *dvejì* 'two each' (but OCS *dъvojь*)

3.2.5 Summary

Scant evidence for "no lengthening before accented morphemes": weak stem of **pod-* if we don't reconstruct root ablaut (which we probably should, and problem of accent/ablaut of acc.pl.), and maybe Ved. *dvayáḥ* if from **dṵoi̯ós*

3.3 "Variably fleeting *-o-* lengthens variably"

= BL in these forms depends on whether or not the vowel in question is "fleeting" or not

3.3.1 **h₂us-os-* 'dawn'

Usually reconstructed as originally amphikinetic, but Vedic has generalized R(Ø), and there is some variation in whether or not the suffix shows the expected BL outcome in the strong stem:

(19)
a. acc.sg. *uṣā́sam* vs. *uṣásam*
b. nom.acc.dual *uṣā́sā* vs. *uṣásā*
c. nom.pl. *uṣā́saḥ* vs. *uṣásaḥ*

- Nom.sg. *uṣā́ḥ* + comparative evidence (e.g., Ion. Gk. ἠώς, Att. ἕως, Lat. *aurōra*, etc.) + archaic Ved. gen.sg. *uṣáḥ* < **h₂us-s-és*, acc.pl. *uṣáḥ* < **h₂us-s-ń̥s* = amphikinetic (Schindler 1972, Stüber 2002)
- K.'s argument here seems to be that the "fixed" gen.sg. variant *uṣáḥ* triggers the "fixed" strong stem variant *uṣás-* in, e.g., the nom.acc.dual
- But the comparative evidence suggests that the gen.sg. *uṣáḥ* (synchronically isolated & clearly the archaic variant) actually goes with the BL forms in the strong stem (cp. Av. *ušā̊ŋhəm*, Ion. Gk. ἠῶ̃ < **ἠόα*)

[18] Thanks again to Michael Weiss for pointing this out.

- The non-BL forms in (19) are then a fairly straightforward innovation (from compounds or influence of old hysterokinetic stems, cp. acc.sg. *uḱsáṇam* below), as is the synchronically regular gen.sg. *uṣásaḥ* (the same happened in Avestan)
- But none of this requires language learners to know whether the suffix vowel was (diachronically...?) "fleeting" or not, it just requires them to understand how to form a synchronically regular gen.sg. to an *s*-stem

3.3.2 **h₂uks-én-* 'bull'

Reconstruction varies between hysterokinetic **h₂uks-én-*/**h₂uks-n-́* and amphikinetic **h₂e̯uks-én-*/**h₂uks-n-́* (cp. NIL, Höfler 2015, who argues for an originally amphikinetic stem), but the weak stem is generally agreed to be identical for both, so the gen.sg. *ukṣṇáḥ* (= YAv. *uxšnō̄*) is not decisive

- K.'s (brief) discussion seems to suggest that the "fixed" form *ukṣáṇam* goes with the acc.pl. *ukṣáṇaḥ*, while the "fleeting" form *ukṣáṇam* goes with gen.sg. (= acc.pl.) *ukṣṇáḥ*
- Again, what's missing is a diachronic discussion. If this paradigm did originally have S(*o*) in the strong stem, *ukṣáṇam*, *ukṣṇáḥ* are the expected outcomes and *ukṣáṇam*, *ukṣáṇaḥ* are younger (and probably analogical to originally hysterokinetic stems)
- If this was an originally hystero paradigm, *ukṣáṇam* was presumably analogical to the acc. of inherited amphi nouns (e.g., *rā́jānam*), as suggested by K. himself
- Again, learners needed to know which noun class this word belonged to (and apparently weren't sure, hence the variants), rather than whether or not the suffix vowel was "fixed"

3.4 Summary

- K.'s three crucial contexts for "regular exceptions", (9b-d), run into trouble because they rely on reconstruction of **o*-grades, accent position or etymologies that are not independently justified → comparative reconstruction matters!
- ... and because the role of analogy in these paradigms is not sufficiently addressed
- "Traditional BL" can account for most of these forms (assuming that traditional BL was a Neogrammarian sound change, which seems warranted given that all the forms in (9) have PIE etymologies and are reconstructed with **o* rather than PIIr. **a*) once the comparative evidence is taken into account
- However, traditional BL crucially relies on intra- and inter-paradigmatic analogy, and that's a powerful tool—we need some way of constraining it.

4 Analogy

4.1 Types of analogical processes

Traditional types of analogical change (e.g., Campbell 2004)

(20) a. Rule extension (e.g., OE *cū*, pl. *cȳ* → *cow*, pl. *cows*)
b. Four-part proportional analogy: *sing* : *sang* = *bring* : x, x = *brang*; *strive* : *strove* = *dive* : x, x = *dove*, etc.
c. Paradigm leveling (*reach* : *raught* → *reach reached*, *melt : molt : molten* → *melt : melted : melted*, etc.)

These processes are usually considered to belong to the domain of language change somehow (rather than being synchronic grammatical rules), but it's not always clear what changes. Morphology? Lexicon? Generative rule system?

- Recent ("realizational") approaches to morphological theory have discarded the idea that there is a unified module/domain "Morphology" (e.g., Distributed Morphology: Halle and Marantz 1993, Marantz 1997, Harley and Noyer 1999, Embick and Noyer 2007, Embick 2015, etc.), so analogy ≠ "morphological change" in that domain-specific sense
- Has the "rule system"/grammar changed in any of the examples in (20)? No (productive plural & past tense rules still intact).
- So the changes happened in the lexicon—how?

4.2 Analogy as lexical change

Reiss 2003, 2006: analogy = "misacquisition" of properties of lexical items during language acquisition (in a frame work where change = a relationship between grammars/knowledge states at different points in time, cp. Hale 2007):

> "... analogies reflect the process of lexicon building during language acquisition. Retaining the notion that language change refers to a relationship between various grammars, we can ascribe the analogies to a difference in the lexicons at two stages of a 'language,' that is, two grammars, the output of one serving as the PLD for the construction of the other. The example referred to as paradigm leveling is particularly easy to account for under these assumptions. The change from stage 1 *reach/raught* to stage 2 *reach/reached* merely reflects a failure by the stage 2 speaker to internalize the form *raught*. In the absence of a stored past tense form for this verb, the speaker applies the productive, default past tense formation rules, learned on the basis of numerous other data points, and generates the regular form *reached*. If *raught* had been acquired, it would block the formation of *reached*." (Reiss 2006: 277)

However, cases of proportional analogy (in which an *unproductive pattern* is extended) are more difficult to account for.

- Reiss refers to "accidental priming" by morphonologically similar forms
- this priming depends on recency rather than frequency
- NB Language acquisition studies have not established a direct link between frequency and "successful" acquisition (= grammar transmission), Legate and Yang 2002, Yang 2015
- Children are not purely inductive learners (**Poverty of the Stimulus**: children's generative capacities surpass the input data)

How much data is enough?

> "So how much data is sufficient? It would surely be nice to give some absolute figures, e.g., "250 of these examples will set this parameter right", but we are far from that level of understanding in language acquisition." (Legate and Yang 2002: 155)

- For morphological patterns, this is different, since irregular patterns must be stored → children need to hear plural forms like *mice* and *feet* at some point in order to be able to store them in their mental lexicon — but they don't need to ever hear *cows* to produce the plural of *cow*

- Marcus et al. 1992: some correlation between frequency of irregular past tense forms in parental speech and children's ability to produce these forms (frequency effect for irregular verbs also found by Clahsen et al. 2002)
- But: overgeneralization not correlated to frequency of regular vs. irregular forms ("The distribution of regular and irregular (stem/root) types does not show any particular increase, when children start to overregularize or shortly before that point, suggesting that the development of overregularizations is not directly linked to the frequency distribution in the child's vocabulary", Clahsen et al. 2002: 618)
- In other words, children don't overgeneralize because regular forms are more frequent, but because they failed to store/retrieve the irregular form

> "... development of the ability to mark regular verbs reliably for tense appears to be the immediate harbinger of overregularization, and reliable marking of irregular verbs for tense accompanies it. Aside from frequency, verbs' proneness to overregularization depends to small extent on the strength of the verb's phonological neighborhood: clusters of similar irregular verbs protect one another from overregularization. In contrast, clusters of similar regular verbs do not appear to pull an irregular toward overregularization. These facts can be accounted for by a simple theory. The child stores irregular past tense forms in a rote memory system, in which the strength of a memory trace is monotonically related to the frequency with which it is encountered. In addition, this memory system has some of the properties of an associative network: stem-past pairs displaying similar relations reinforce each other. (This same property occasionally leads to irregular generalizations such as *brang* and *wope*.) Regular past tense forms, in contrast, are generated by a mental concatenation operation that attaches a suffix to stem. Because this rule can always be applied on line, regularly inflected forms need not, in general, be stored ..." (Marcus et al. 1992: 129)

4.3 Analogy = domain regularity

For the BL case, two different contexts of analogy are relevant:

1. Extension of an unproductive pattern to stems/roots with "similar relations" (the "irregular generalization" examples like Engl. *brang*)
    - → Extension of "synchronic BL" to CaR, CaT roots, even if they were historically *seṭ* (e.g., *ájani* vs. *ájāni*)
    - This in turn leads to a quasi-regular morphonological pattern in certain categories (passive aorist, causative, etc.)
    - Similar to K.'s "synchronic BL" rule, but crucially sensitive to morphological category/stem type/root (= ones where BL is historically justified)
    - Cp. Garrett and Blevins 2009: several cases in which "regular morphophonological patterns arose via analogical extension of fortuitous morphological patterns" and led to (phonologically) "crazy rules", such as Ancient Greek T → s/_ m (e.g., πέπεισμαι, πεπεισμένος, πεῖσμα from πείθω 'persuade')
2. Extension of a productive pattern that happened to erase BL variants

The latter case is relevant for the "exceptions" to BL discussed above.

4.4 The hunt for *o*-grades continues...

Considering the BL counterexamples in (9b), two groups stand out:

- n. *s*-stems (*ápas-* 'work', *támas-* 'darkness', *ánas-* 'cart'): no diachronic justification for BL, hence not a category where BL variants (for example, ones that arise through a sequence $*h_3e$) are expected to survive
- *i*-stems: *páti-* m. 'master, lord', *ávi-* m.f. 'sheep', *áhi-* m. 'snake'
  - Did *i*-stems generalize the strong stem?

(21) Root ablaut grade in *i*-stems (not exhaustive, cp. Grestenberger 2014)

a. R($\bar{a}$)	b. R(a)	c. R(Ø)
dhrā́ji- f. 'gust of wind'	*jálpi-* f. 'whispering'	*iṣí-* (inf.) 'send out, release'
grā́hi- f. 'grabber' (?)	*rándhi-* f. 'submission'	*tují-* f. 'progeny'
ājí- m. 'race'	*rábhi-* f. 'chariot-piece; support'	*kṛṣí-* f. 'ploughing; field'
ghāsí- m. 'food'	*(sam-)taní-* f. 'resounding'	*nṛtí-* f. 'dance'
khā́dí- m. 'clasp'	*dhvaní-* m. 'thunder'	*dhúni-* a. 'thundering'
drāpí- m. 'coat'	*añjí-* a./m. 'anointing, ointment'	*bhují-* f. 'enjoyment'
dhāsí- m. 'nourishment'	*arcí-* m. 'flame'	*kṛtí-* (m. or f.) 'knife'
dhāsí- f. 'dwelling'	*granthí-* m. 'knot'	*krīḍí-* a. 'playing'
rā́ji- f. 'line' (MS+)	*ráji-* f. 'line'	*girí-* m. 'mountain'
	svarí- a. 'sounding'	*śúci-* a. 'bright'
	draví- m. 'cutter'	
	saní- m. 'reward'	
	rámhi- f. 'speed'	
	hárṣi- (f.?) 'joy'	
	-sváni- 'resounding'	
	-táni- 'stretching out'	
	hári- 'yellowish'	

- (21-b) mostly *CaRC*-roots, so R(e/o) are equally possible
  - But note *-sváni-* < $*s\hat{u}enh_2$, *-taní-* < $*(s)tenh_2$ vs. *-táni-* < $*ten$, *ráji-* < $*h_3re\hat{g}$
  - So it looks like synchronic R(a) in *i*-stems not dependent on *seṭ*/*aniṭ* character
- (21-a): possibly old *o*-grades: *ghāsí-* ($*g^{(u)h}es$), *dhrā́ji-* (?), *ājí-* ($*h_2e\hat{g}$), *khādí-* (?), *drāpí-* ($*drep$), *dhāsí-* (?)
  - *rā́ji-* is from a root with Narten behavior, *grā́hi-* is from a *seṭ*-root

So what are speakers to do with *páti-*, *ávi-*, *áhi-*?

- All forms in (21) have closed inflection, *páti-* and *ávi-* are the only ones with open inflection
- The *dā́ru*, *dróṇ* pattern was apparently not an option for *i*-stems (... because no neuters?)
- So PIIr. forms like dat.sg. $*p\acute{a}t\hat{i}a\hat{i}$ or gen.sg. $*a\hat{u}\hat{i}as$ would lead to a strong stem *páti-*, $*\acute{a}\hat{u}i$- (2., "extension of a productive pattern", cp. (21-b)) — tentative explanation, more work needed

5 Conclusion

The preceding discussion hardly settles everything, but:

- K.'s revision of BL does not cover the facts any better than traditional BL once evidence from comparative reconstruction is systematically taken into account
- ... but it makes great testable predictions!
- Synchrony - diachrony problem: revised version of BL works for neither (well)
- Traditional version of BL captures the core cases in which inherited *o*-grades became "morphologized" as a property of a particular morphological category (causatives, passive aorist, etc.)
  - ... at least descriptively, but a synchronic morphonological rule for this is indeed a desideratum, as pointed out by K.
- But for individual cases (*páti-*, etc.) more subtle methods are needed
- "rule extension/extension of a productive pattern" tends to erase BL forms, while "extension of an unproductive pattern" creates (diachronically unexpected) BL forms (more work needed)

References

AiG II,2 = Debrunner, Albert. 1954. *Altindische Grammatik*, volume II,2: *Die Nominalsuffixe*. Göttingen: Vandenhoeck & Ruprecht.

Albright, Adam. 2005. The morphological basis of paradigm leveling. In *Paradigms in phonological theory*, ed. L. Downing, T. A. Hall, and R. Raffelsiefen, 17–43. Oxford University Press.

Albright, Adam. 2008. Explaining universal tendencies and language particulars in analogical change. In *Linguistic universals and language change*, ed. J. Good. Oxford University Press.

Balles, Irene. 1997. Griechisch ἄφ(ε)νος "Reichtum". *HS* 110:215–32.

Benveniste, Émile. 1966. *Problèmes de linguistique générale*. Paris: Gallimard.

Brugman, Karl. 1879. Zur geschichte der nominalsuffixe *-as*, *-jas* und *-vas*. *KZ* 24/1:1–99.

Campbell, Lyle. 2004. *Historical Linguistics: An Introduction*. Edinburgh University Press, 2nd edition.

Clahsen, Harald, Fraibet Aveledo, and Iggy Roca. 2002. The development of regular and irregular verb inflection in Spanish child language. *Journal of Child Language* 29/3:591–622.

Darms, Georges. 1978. *Schäher und Schwager, Hahn und Huhn. Die V̥rddhi-Ableitung im Germanischen*. München: Kitzinger.

Embick, David. 2015. *The morpheme*. De Gruyter Mouton.

Embick, David, and Rolf Noyer. 2007. Distributed morphology and the syntax/morphology interface. In *The Oxford Handbook of Linguistic Interfaces*, ed. G. Ramchand and Ch. Reiss, 289–324. Oxford University Press.

EWA II = Mayrhofer, Manfred. 1996. *Etymologisches Wörterbuch des Altindoarischen, II. Band*. Heidelberg: Winter.

Fraenkel, Ernst. 1962. *Lithauisches etymologisches Wörterbuch*, volume I. Heidelberg: Winter.

Garrett, Andrew, and Juliette Blevins. 2009. Analogical morphonology. In *The nature of the word: essays in honor of Paul Kiparsky*, ed. K. Hanson and S. Inkelas, chapter 22, 527–45. Cambridge, Mass.: MIT Press.

Grestenberger, Laura. 2009. The Vedic *i*-stems and internal derivation. Master's thesis, University of Vienna.

Grestenberger, Laura. 2014. Zur Funktion des Nominalsuffixes **-i-* im Vedischen und Urindogermanischen. In *Das Nomen im Indogermanischen. Morphologie, Substantiv versus Adjektiv, Kollek-*

tivum. Akten der Abeitstagung der Indogermanischen Gesellschaft vom 14. bis 16. September 2011 in Erlangen, 88–102. Wiesbaden: Reichert.
Hajnal, Ivo. 1994. Das Brugmansche Gesetz in diachroner Sicht und seine Gültigkeit innerhalb der arischen *a*-Stämme. *Historische Sprachforschung* 107/2:194–221.
Hale, Mark. 1999. *ha*: so-called 'metrical lengthening in the Rigveda. In *Compositiones Indogermanicae: In Memoriam Jochem Schindler*, ed. H. Eichner and H. C. Luschützky, 143–51. Prague: Enigma.
Hale, Mark. 2007. *Historical Linguistics. Theory and Method*. Blackwell.
Halle, Morris, and Alec Marantz. 1993. Distributed Morphology and the pieces of inflection. In *The View from Building 20: Essays in Linguistics in Honor of Sylvain Bromberger*, ed. K. Hale and S.J. Keyser, 111–176. Cambridge, Mass.: MIT Press.
Harley, Heidi, and Rolf Noyer. 1999. State-of-the-article: Distributed Morphology. *GLOT International* 4:3–9.
Höfler, Stefan. 2012. Untersuchungen zum Ablaut der neutralen **s*-Stämme des Indogermanischen. Master's thesis, University of Vienna.
Höfler, Stefan. 2015. Denominale Sekundärderivation im Indogermanischen: eine Ochsentour. *MSS* 69/2:219–44.
Jamison, Stephanie. 1983. *Function and Form in the -áya-formations of the Rig Veda and the Atharva Veda*. Göttingen: Vandenhoeck & Ruprecht.
Jamison, Stephanie W., and Joel P. Brereton. 2014. *The Rigveda: The Earliest Religious Poetry of India, vol. I-III*. OUP.
Jasanoff, Jay. 1997. Where does Skt *bhávati* come from? In *Studies in Honor of Jaan Puhvel. Part One: Ancient Languages and Philology (= JIES Monograph 20)*, ed. D. Disterheft et al., 173–86. Washington: Institute for the Study of Man.
Jasanoff, Jay. 2003. *Hittite and the Indo-European Verb*. Oxford University Press.
Kiparsky, Paul. 1995. Phonological basis of sound change. In *Handbook of Phonological Theory*, ed. J. Goldsmith, 640–70. Oxford: Blackwell.
Kiparsky, Paul. 2009. Compositional vs. paradigmatic approaches to accent and ablaut. URL `https://web.stanford.edu/~kiparsky/Papers/ucla_IE_09.submitted.new.pdf`, Ms., Stanford University.
Kiparsky, Paul. 2010. Compositional vs. paradigmatic approaches to accent and ablaut. In *Proceedings of the 21st Annual UCLA Indo-European conference*, ed. S. W. Jamison, H. C. Melchert, and B. Vine, 137–81. Bremen: Hempen.
Kloekhorst, Alwin. 2006. Initial laryngeals in Anatolian. *HS* 119:77–108.
Kloekhorst, Alwin. 2008. *Etymological Dictionary of the Hittite Inherited Lexicon*. Leiden: Brill.
Kroonen, Guus. 2013. *Etymological dictionary of Proto-Germanic*. Leiden: Brill.
Kümmel, Martin. 1996. *Stativ und Passivaorist im Indoiranischen*. Göttingen: Vandenhoeck & Ruprecht.
Kümmel, Martin. 2000. *Das Perfekt im Indoiranischen. Eine Untersuchung der Form und Funktion einer ererbten Kategorie des Verbums und ihrer Weiterentwicklung in den altindoiranischen Sprachen*. Wiesbaden: Reichert.
Kümmel, Martin. 2014. Zum "proterokinetischen" Ablaut. In *Das Nomen im Indogermanischen. Morphologie, Substantiv versus Adjektiv, Kollektivum. Akten der Arbeitstagung der Indogermanischen Gesellschaft vom 14. bis 16. September 2011 in Erlangen*, ed. N. Oettinger and T. Steer, 164–79. Wiesbaden: Reichert.
Kuryłowicz, Jerzy. 1927. Les effets du ə en indo-iranien. *Prace filologiczne* 11:201–43.
Legate, Julie Anne, and Charles Yang. 2002. Empirical re-assessment of stimulus poverty arguments. *The Linguistic Review* 19:151–62.

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

Lubotsky, Alexander. 1990. La loi de Brugmann et *H_3e. *La reconstruction des laryngales (Bibliothèque de la Faculté de Philosophie et Lettres de l'Université de Liège, fascicule CCLIII)* 129–36.

Lubotsky, Alexander. 1997. Review of Volkart (1994), Zu Brugmanns Gesetz im Altindischen. *Kratylos* 42:55–9.

Malzahn, Melanie. 2000. Die nominalen Flexionsendungen des idg. Duals. *HS* 112:204–26.

Marantz, Alec. 1997. No escape from syntax: Don't try morphological analysis in the privacy of your own lexicon. In *Proceedings of the 21st Annual Penn Linguistics Colloquium*, ed. A. Dimitriadis, L. Siegel, C. Surek-Clark, and A. Williams, University of Pennsylvania Working Papers in Linguistics 4/2, 201–25. Philadelphia: University of Pennsylvania.

Marcus, Gary F., Steven Pinker, Michael Ullman, Michelle Hollander, T. John Rosen, Fei Xu, and Harald Clahsen. 1992. *Overgeneralization in language acquisition*, volume 57/4 of *Monographs of the Society for Research in Child Development*. Wiley.

Mayrhofer, Manfred. 1986. *Indogermanische Grammatik I, 2. Halbband: Lautlehre [Segmentale Phonologie des Indogermanischen]*. Heidelberg: Winter.

Mayrhofer, Manfred. 2004. *Die Hauptprobleme der indogermanischen Lautlehre seit Bechtel*. Wien: Verlag der Österreichischen Akademie der Wissenschaften.

Melchert, H. Craig. 1994. *Anatolian Historical Phonology*. Amsterdam: Rodopi.

Neri, Sergio. 2003. *I Sostantivi in u- del Gotico*. Innsbruck: Institut für Sprachwissenschaft der Universität Innsbruck [IBS 108].

Neri, Sergio. 2005. Riflessioni sull' apofonia radicale di proto-germanico *$namō^n$ 'nome'. *Historische Sprachforschung* 118:201–50.

Nikolaev, Alexander. 2010. Indo-European *dem(h_2)- 'to build' and its derivatives. *HS* 123:56–96.

NIL = Wodtko, Dagmar S. et al. 2008. *Nomina im Indogermanischen Lexikon*. Heidelberg: Universitätsverlag Winter.

Nussbaum, Alan J. 1998. *Two Studies in Greek and Homeric Linguistics*. Göttingen: Vandenhoeck & Ruprecht.

Nussbaum, Alan J. 2010. PIE *-Cmn-* and Greek τρᾱνής 'clear'. In *Ex Anatolia Lux. Anatolian and Indo-European Studies in Honor of H. Craig Melchert on the Occasion of his Sixty-Fifth Birthday*, ed. R. Kim, N. Oettinger, E. Rieken, and M. Weiss, 269–77. Beech Stave Press.

Nussbaum, Alan J. To appear. Agentive and other derivatives of "τόμος-type" nouns. In *Proceedings of the Arbeitstagung der Indogermanischen Gesellschaft, Paris 2014: Adjectifs verbaux et participes dans les langues indo-européennes*, ed. C. Le Feuvre, D. Petit, and G.-J. Pinault. Bremen: Hempen.

Oldenberg, Hermann. 1912. *R̥gveda. Textkritische und exegetische Noten, siebentes bis zehntes Buch*. Berlin.

Pinault, Georges-Jean. 1997. Terminologie du petit bétail en Tokharien. *Studia Etymologica Cracoviensia* 2:175–218.

Pinault, Georges-Jean. 2017. Tracing the expression of mastery and power in IE languages. In *Etymology and the European Lexicon. Proceedings of the 14th Fachtagung der Indogermanischen Gesellschaft, 17–22 September 2012, Copenhagen*, ed. B. Simmelkjaer Sandgaard Hansen, B. Nielsen Whitehead, T. Olander, and B. A. Olsen, 337–51. Wiesbaden: Reichert.

Reiss, Charles. 2003. Language change without constraint reranking. In *Optimality Theory and Language Change*, 143–68. Dordrecht: Kluwer.

Reiss, Charles. 2006. Morphological change, paradigm leveling and analogy. In *Encyclopedia of Language & Linguistics*, ed. K. Brown, 277–8. Amsterdam: Elsevier, 2nd edition.

Schindler, Jochem. 1972. *Das Wurzelnomen im Arischen und Griechischen*. Unpublished disserta-

tion, Würzburg.
Schindler, Jochem. 1973. Bemerkungen zur Herkunft idg. Diphthongstämme und zu den Eigentümlichkeiten ihrer Kasusformen. *Die Sprache* 19:148–157.
Schindler, Jochem. 1975. Zum Ablaut der neutralen *s-S*tämme des Indogermanischen. In *Flexion und Wortbildung, Akten der V. Fachtagung der Indogermanischen Gesellschaft, Regensburg 9. - 14. September 1973*, ed. H. Rix, 259–67. Wiesbaden: Reichert.
Schindler, Jochem. 1994. Alte und neue Fragen zum indogermanischen Nomen. In *In Honorem Holger Pedersen (Kolloquium der Indogermanischen Gesellschaft, Kopenhagen 1993)*, ed. J.E. Rasmussen, 397–400. Wiesbaden: Reichert.
Schmidt, Johannes. 1885. Der locativus singularis und die griechische i-deklination. *KZ* 27:287–309.
Schmidt, Johannes. 1889. *Die Pluralbildungen der indogermanischen Neutra*. Weimar.
Stüber, Karin. 2002. *Die primären s-Stämme des Indogermanischen*. Wiesbaden: Reichert.
Tremblay, Xavier. 1998. *Études sur les noms suffixaux athematiques de l'Avesta*. Unpublished dissertation, École pratique des haute études.
Tremblay, Xavier. 2003. Interne Derivation: "Illusion de la reconstruction" oder verbreitetes morphologisches Mittel? In *Indogermanisches Nomen. Derivation, Flexion und Ablaut*, ed. E. Tichy, D. Wodtko, and B. Irslinger, 231–59. Bremen: Hempen.
Tremblay, Xavier. 2004. Die Ablautstufe des Lokativs der akrostatischen Nomina. In *Per Aspera ad Asteriscos: Studia Indogermanica in Honorem Jens Elmegård Rasmussen sexagenarii Idibus Martiis anno MMIV*, ed. A. Hyllested, A.R. Jørgensen, J.H. Larsson, and T. Olander, 573–90. Innsbruck: Institut für Sprachwissenschaft der Universität Innsbruck [IBS 112].
Tucker, Elizabeth. 2012. Brugmann's Law: the problem of Indo-Iranian thematic nouns and adjectives. In *Laws and rules in Indo-European*, ed. P. Probert and A. Willi, 229–59. Oxford: Clarendon Press.
Volkart, Marianne. 1994. *Zu Brugmanns Gesetz im Altindischen*, volume 33 of *Arbeitspapiere des Instrituts für Sprachwissenschaft der Universität Bern*. Bern: Institut für Sprachwissenschaft, Universität Bern.
Weiss, Michael. 2010. *Language and ritual in Sabellic Italy*. Leiden: Brill.
Yang, Charles D. 2015. For and against frequencies. *Journal of Child Language* 42:287–93.
Yoshida, Kazuhiko. 2013. Lycian *χawa-* 'sheep'. In *Multi nominis grammaticus: studies in classical and Indo-European linguistics in honor of Alan J. Nussbaum on the occasion of his sixty-fifth birthday*, ed. A. I. Cooper, J. Rau, and M. Weiss, 357–62. Ann Arbor/New York: Beech Stave.