

Cyclicity as a Proto-Indo-European phenomenon

Anthony D. Yates
University of California, Los Angeles
adyates@ucla.edu

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Slides available at:
www.adyates.com/research/



Vowel deletion in ancient Indo-European

(1)	a.	‘father-ACC.SG’	‘father-DAT.SG’	b.	‘be-3SG	‘be-3PL’
	Ved.	<i>pitár-am</i>	<i>pit(∅)r-é</i>	Ved.	<i>ás-ti</i>	<i>(∅)s-ánti</i>
	AGk.	<i>patér-a</i>	<i>pat(∅)r-í</i>	Osc.	es-t	(∅)s-ent

- ▶ Oldest Indo-European (IE) languages exhibit synchronic alternations involving **deletion** of unstressed non-high vowels (* /e, o, a/).¹
 - ▶ Intraparadigmatically within stems — e.g., (1).

¹Stress is lexical — not discussed here, but feel free to ask (cf. Kiparsky 2010, Yates 2017 et seq.)

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(2)	‘fame’	‘heard (of)’
Ved.	<i>śráv-as</i>	<i>śr(∅)u-tá-s</i>
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- ▶ Oldest Indo-European (IE) languages exhibit synchronic alternations involving **deletion** of unstressed non-high vowels (* /e, o, a/).¹
 - ▶ Interparadigmatically within roots — e.g., (2).

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Vowel deletion in PIE

- (1) a. ‘father-ACC.SG’ ‘father-DAT.SG’ b. ‘be-3SG’ ‘be-3PL’
- | | | | | | |
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| Ved. | <i>pitár-am</i> | <i>pit(∅)r-é</i> | Ved. | <i>ás-ti</i> | <i>(∅)s-ánti</i> |
| AGk. | <i>patér-a</i> | <i>pat(∅)r-í</i> | Osc. | es-t | (∅)s-ent |
| PIE | *[pəh ₂ tér-m] | *[pəh ₂ t(∅)r-éi] | PIE | *[h ₁ és-ti] | *[h ₁ (∅)s-énti] |
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|------|------------------|--------------------|
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| PIE | *[kʲléw-os] | *[kʲl(∅)u-tó-s] |

- On basis of such agreement these **deletion** patterns (“quantitative ablaut”) are reconstructible for Proto-Indo-European (PIE).

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○ **How should PIE vowel deletion be analyzed?**

Reconstructing IE vowel deletion

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- ▶ Traditional approaches to reconstruction of IE morphophonology (e.g., Erlangen Model; Schindler 1967 et seq., Rix 1976/1992) founded on a shared assumption about vowel deletion patterns in (1–2)

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PRE-PIE UNSTRESSED VOWEL DELETION:

$$\left[\begin{array}{c} e \\ -\text{stress} \end{array} \right] \rightarrow \emptyset$$

“Unstressed /e/ is deleted.”

- ▶ Traditional approaches to reconstruction of IE morphophonology (e.g., Erlangen Model; Schindler 1967 et seq., Rix 1976/1992) founded on a shared assumption about vowel deletion patterns in (1–2):
 - ★ Ultimately reflect the operation of pre-PIE phonological process in (3) (see esp. Schindler 1975b:260–1).¹

¹Szemerényi (1996:111 n. 1) traces this view back to mid-19th century.

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- ▶ But **in PIE** — (3) was clearly not operative (cf. Schindler 1975b:260).¹

¹Even in pre-PIE (3) is typologically and empirically questionable.

(4) *Unstressed* *[e] in PIE:

- a. *[pəh₂tér-es] > Ved. *pitár-as*, AGk. *patér-es* ‘fathers’
- b. *[suh_xnéw-ei] > Ved. *sūnáv-e*, OCS *synov-i* ‘for the son’
- c. *[péŋk^we] > Ved. *páñca*, AGk. *pénte*, Lat. *quīnque* ‘five’
- d. *[wék^wes-^os] > Ved. *vácas-as*, AGk. *(w)épe-os* ‘of the word’

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 - ▶ Unstressed *[e] is securely reconstructible, especially in **post-tonic syllables** — e.g., (4a–d).

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 - ▶ Unstressed *[e] is securely reconstructible, especially in **post-tonic syllables** — e.g., (4a–d).
 - ▶ Unstressed *[e] also reconstructible in **pretonic syllables** — e.g., (4e–f).

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“[L]ong since extinct as a living phonological process.”

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- ▶ Such exceptions justify traditional assumption that deletion was “morphologized” already in PIE — e.g., per Jasanoff (2017:4 n. 13):
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- ▶ And motivate analyses — or descriptions? (cf. §4) — employing lexically-specified prosodic templates (“paradigmatic classes”).

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“Unstressed /e/ is deleted.”

- ▶ **Hypothesis:** a phonological account of PIE vowel deletion is **possible**

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 - ▶ PIE had synchronic vowel deletion processes conditioned by stress assignment, which applied in a narrower set of environments than (3).¹

¹cf. Kiparsky 2010, 2018; Yates 2019a, 2022.

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 - ▶ PIE had synchronic vowel deletion processes conditioned by stress assignment, which applied in a narrower set of environments than (3).¹
 - ▶ PIE vowel deletion was further constrained by morphophonological factors.

¹cf. Kiparsky 2010, 2018; Yates 2019a, 2022.

(5)

PRETONIC VOWEL DELETION (PVD):

[+syll, -high] → ∅ / ___ $\acute{\sigma}$ (iterative)

A non-high vowel (* /e, o, a/) is deleted preceding a stressed syllable.

► **Proposal** — in specific terms:

► PIE had the phonologically conditioned vowel deletion process in (5).

(6)

SCHINDLER'S GENERALIZATION:

Root vowel of a derived base is preserved in its derivatives.

- ▶ **Proposal** — in specific terms:
 - ▶ PIE had the phonologically conditioned vowel deletion process in (5).
 - ▶ (5) regularly underapplied to root vowels in denominal and deverbal derivatives, “blocked” by (6).¹

¹Inspired by an underappreciated observation of Schindler (1975b:260).

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SCHINDLER'S GENERALIZATION:

Root vowel of a derived base is preserved in its derivatives.

⇒ PIE (pretonic) vowel deletion was a CYCLIC process.¹

- ▶ CYCLICITY ≈ a phonological property is transferred from a base to its derivative, resulting in opaque under- or overapplication of an active phonological process in this derivative.

¹See Bermúdez-Otero 2011, Kiparsky 2015, i.a.

§1 Introduction

§2 Pretonic vowel deletion in PIE

- ▶ Pretonic vowel deletion in PIE deradical derivatives
- ▶ Pretonic vowel deletion in PIE denominal derivatives
- ▶ Deletion, Schindler's Generalization, and cyclicity

§3 Cyclicity as a PIE phenomenon

§4 Conclusions & discussion

Pretonic vowel deletion in PIE primary derivatives

- (7) a. */h₁es-ti/ → *[h₁és-ti] > Ved. *ásti*, Osc. **est** ‘is’
b. */h₁es-énti/ → *[h₁s-énti] > Ved. *sánti*, Osc. **sent** ‘are’
- (8) a. */g^{wf̥}en-ti/ → *[g^{wf̥}én-ti] > Ved. *hánti*, Hitt. *kuēnzi* ‘kills’
b. */g^{wf̥}en-énti/ → *[g^{wf̥}n-énti] > Ved. *ghnánti*, Hitt. *kunanzi* ‘kill’

- ▶ Robust IE evidence that PIE non-high vowels were regularly deleted in pretonic syllables of “primary” (i.e., deradical) derivatives.
 - ▶ Root */e/ within V-paradigms — stressed in (7–8a) vs. deleted in (b).

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- (9) a. */dyew-m/ → *[djé:-m] > Ved. *dyám* ‘sky’, AGk. *Zēn* ‘Zeus’
b. */dyew-és/ → *[diw-és] > Ved. *divás*, AGk. *Diós* ‘of ’’

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- ▶ Root */e/ within V-paradigms — stressed in (7–8a) vs. deleted in (b).
- ▶ Root */e/ within N-paradigms — stressed in (9a) vs. deleted in (b).

Pretonic vowel deletion in PIE primary derivatives

- (10) a. */k^jleu-ʹos-∅/ → *[k^jléw-os] > Ved. *śrávas*, AGk. *kléos* ‘fame’
b. */k^jleu-tó-s/ → *[k^jlu-tó-s] > Ved. *śrutás*, AGk. *klutós* ‘heard (of)’
- (11) a. */g^{j^h}eu-ʹmon-∅/ → *[g^{j^h}éu-mn̥] > Ved. *hóma*, AGk. *k^heũma* ‘pouring’
b. */g^{j^h}eu-tó-s/ → *[g^{j^h}u-tó-s] > Ved. *hūtás*, AGk. *k^hutós* ‘poured’

- ▶ Robust IE evidence that PIE non-high vowels were regularly deleted in pretonic syllables of primary derivatives.
 - ▶ Root */e/ across paradigms — stressed in (10–11a) vs. deleted in (b).

Pretonic vowel deletion in PIE primary derivatives

(12) a. */ph₂tér-m/ → *[pəh₂tér-m] > Ved. *pitáram*, AGk. *patéra* ‘father’

b. */ph₂tér-éi/ → *[pəh₂tr-éi] > Ved. *pitré*, AGk. *patri* ‘to father’

(13) a. */h₂uksén-es/ → *[h₂uksén-es] > Ved. *ukṣánas* ‘oxen’

b. */h₂uksén-és/ → *[h₂uksn-és] > Ved. *ukṣnás* ‘of the ox’

► Robust IE evidence that PIE non-high vowels were regularly deleted in pretonic syllables of primary derivatives.

► Stem-final */e/ in N-paradigms — stressed in (12–13a) vs. deleted in (b).

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b. */h₂uksén-és/ → *[h₂uksn-és] > Ved. *ukṣnás* ‘of the ox’

(14) a. */jeu-né-g-ti/ → *[ju-né-k-ti] > Ved. *yunákti* ‘yokes’

b. */jeu-né-g-énti/ → *[ju-n-g-énti] > Ved. *yuñjánti*, Lat. *iungunt* ‘yoke’

▶ Robust IE evidence that PIE non-high vowels were regularly deleted in pretonic syllables of primary derivatives.

▶ Stem-final */e/ in N-paradigms — stressed in (12–13a) vs. deleted in (b).

▶ Stem-final */e/ in V-paradigms — stressed in (14a) vs. deleted in (b).

Pretonic vowel deletion in PIE primary derivatives

- (15) a. */pentoh₂-es/ → *[péntoh₂-as] >> Ved. *pánthās* ‘paths’
(cf. YAv. *paṇṭam* ‘path’)
- b. */pentoh₂-é/s/ → *[pṇth₂-é/s] > Ved. *pañthás* ‘of the path’
OAv. *paθō* ‘id.’
- (16) a. */h₂wert-ói-s/ → *[h₂wr̥t-ói] > Hitt. *ḫurtāiš* ‘curse’
- b. */h₂wert-ói-é/s/ → *[h₂wr̥t-j-é/s] > Hitt. *ḫurtiyaš* ‘of the curse’

▶ Also evidence that pretonic vowel deletion applied iteratively in PIE primary derivatives.

- ▶ Stem-final */o/ — surfaces in (15–16a) vs. deleted in (b).

Pretonic vowel deletion in PIE primary derivatives

- (15) a. */pentoh₂-es/ → *[péntoh₂-as] >> Ved. *pánthās* ‘paths’
(cf. YAv. *paṇtām* ‘path’)
- b. */pentoh₂-é/s/ → *[pn̥th₂-é/s] > Ved. *pañthás* ‘of the path’
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- (16) a. */h₂wert-ói-s/ → *[h₂wr̥t-ói] > Hitt. *hur̥tāiš* ‘curse’
- b. */h₂wert-ói-é/s/ → *[h₂wr̥t-j-é/s] > Hitt. *hur̥tiyaš* ‘of the curse’

▶ Also evidence that pretonic vowel deletion applied iteratively in PIE primary derivatives.

- ▶ Stem-final */o/ — **surfaces** in (15–16a) vs. **deleted** in (b).
- ▶ Further stem-initial */e/ — **stressed** in (15a) vs. **deleted** in (15–16b).

Pretonic deletion in PIE non-primary derivatives

(17) PVD in PIE non-primary derivatives with adjectival suffix $^*/-ó-/$:

- a. $^*/b^{f_i}eud^{f_i}-mén-ó-s/$ → $^*[b^{f_i}ud^{f_i}-~~m~~-ó-s]$ > Ved. *budhnás* ‘ground’¹
> Lat. *fundus* ‘ground’
- b. $^*/wet-~~r~~°eS-ó-s/$ → $^*[wet-s-ó-s]$ > Ved. *vatsás* ‘calf’
- c. $^*/pek^j-~~r~~°eS-ó-s/$ → $^*[pek^j-s-ó-s]$ > Lat. *pexus* ‘wooly’

- ▶ PIE denominal and deverbial (i.e., non-primary) derivatives present a more complex picture.
 - ▶ Some appear to exhibit iterative pretonic vowel deletion — e.g., (17a).
 - ▶ But more frequently root non-high vowels are preserved pretonically after deletion of suffixal vowel(s) — e.g., (17b–c).²

¹ EWA II: 228–9, de Vaan 2008:250, Beekes 2010:1255, Weiss 2020:123, i.a.

² See Appendix II for additional PIE non-primary derivatives with $^*/-ó-/$ and lit.

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> Lat. *fundus* ‘ground’
 - b. $^*/wet-~~r~~°eS-ó-s/$ → $^*[wet-s-ó-s]$ > Ved. *vatsás* ‘calf’¹
 - c. $^*/pek^j-~~r~~°eS-ó-s/$ → $^*[pek^j-s-ó-s]$ > Lat. *pexus* ‘wooly’²

► **Proposal:** Contrast between (17a) and (17b–c) is due to (6):

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SCHINDLER'S GENERALIZATION:

Root vowel of a derived base is preserved in its derivatives.

¹Stüber 2002:31, 187–8, Schaffner 2004:292–3, Meissner 2005:153 n. 82, 165, i.a.

²Schmidt 1895:101–2, Ernout and Meillet 2001:491, Höfler 2017:307–8, Nussbaum 2010:270, i.a.

Pretonic deletion in PIE non-primary derivatives

(18) PIE non-primary derivatives with adjectival **-/ó-/* and their bases:

- a. PIE **[b^hud^h-mén-]* ‘bottom’ ⇒ **[b^hud^h-~~mn~~-ó-s]* ‘having a bottom’
> AGk. *put^hmén-a* ‘bottom’ Ved. *budhnás* ‘ground’
> Lat. *fundus* ‘ground’
- b. PIE **[wét-_s]* ‘year’ ⇒ **[wet-s-ó-s]* ‘having a year’
> AGk. *(w)étos* ‘year’ Ved. *vatsás* ‘calf’
- c. PIE **[pék^j-_s]* ‘wool’ ⇒ **[pek^j-s-ó-s]* ‘having wool’
> AGk. *pékos* ‘wool’ Lat. *pexus* ‘wooly’
> Lat. *pecus* ‘herd’

▶ Non-primary derivatives in (18) mirror root vocalism of their bases.

- ▶ In (18a) base contains **no non-high vowel in the root**, likewise in the **root** of its derivative.
- ▶ In (18b–c) base contains **a (stressed) non-high vowel in the root**, likewise in the **root** of its derivative.

Schindler's Generalization in PIE non-primary derivatives

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- a. PIE *|b^hud^h-mén-| 'bottom' ⇒ *|b^hud^h-m-ó-s| 'having a bottom'
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> Lat. *fundus* 'ground'
- b. PIE *|wét-_s-| 'year' ⇒ *|wet-s-ó-s| 'having a year'
> AGk. (*w*)*étos* 'year' Ved. *vatsás* 'calf'
- c. PIE *|pék^j-_s-| 'wool' ⇒ *|pek^j-s-ó-s| 'having wool'
> AGk. *pékos* 'wool' Lat. *pexus* 'wooly'
> Lat. *pecus* 'herd'

▶ SCHINDLER'S GENERALIZATION predicts the data in (18).

- ▶ In non-primary derivative in (18b–c) the root vowel is preserved pretonically **because** it is present in the base.
- ▶ In non-primary derivative in (18a) the root vowel is deleted **because** there is **no root vowel** present in its base to preserve.

Pseudo-cyclic analysis of Schindler's Generalization

(19) Pseudo-cyclic analysis of PVD in PIE adjectives with */-ó-/:

a. */b^heud^h-mén-m/ → *[[b^hud^h-mén|-m]] > AGk. *put^hména* 'bottom'

b. */b^heud^h-mén-ó-s/ → *[[b^hud^h-~~mén~~|-ó-s]] > Ved. *budhnás* 'ground'
> Lat. *fundus* 'ground'

c. */wet-^ʷeS-∅/ → *[[wét-os]] > AGk. (*w*)*ét-os* 'year'

d. */wet-^ʷeS-ó-s/ → *[[wét-s|-ó-s]] > Ved. *vatsás* 'calf'

▶ Pseudo-cyclic derivation of adjectives from (18) in (19).¹

▶ In (19a–c) PVD applies wherever its environment is met — thus iteratively to suffix and **root** in (19b), non-application in (19c).

▶ PVD underapplies in (19d) — it deletes the suffixal vowel, but cannot delete the root vowel **because** it is transferred from its base in (19c).

¹Amenable to analysis in terms of base-derivative correspondence (Benua 1997, Rolle 2018, i.a.); a truly cyclic analysis is sketched in Appendix XXX.

Interim summary: PVD and cyclicity in PIE

- ▶ Established thus far:
 - ▶ Lots of evidence for PVD in PIE across different morphological contexts.
 - ▶ In root and non-root syllables
 - ▶ In nouns and verbs.
 - ▶ Within and across paradigms
 - ▶ In primary and non-primary derivatives.
 - ▶ Reconstructible exceptions to PVD in non-primary derivatives, which could be attributed to cyclicity.

Interim summary: PVD and cyclicity in PIE

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 - ▶ Within and across paradigms
 - ▶ In primary and non-primary derivatives.
 - ▶ Reconstructible exceptions to PVD in non-primary derivatives, which could be attributed to cyclicity.
- ▶ **Now** — strengthen case for reconstructing cyclic vowel deletion in PIE, typologically and empirically.

§1 Introduction

§2 Pretonic vowel deletion in PIE

§3 Establishing cyclicity as a PIE phenomenon

- ▶ PIE cyclicity in cross-linguistic perspective
- ▶ Cyclicity in PIE **-oi*-stems
- ▶ Cyclicity in PIE **-mon*-stems

§4 Conclusions & discussion

(20) *Non-cyclic stress in American English (monomorphemic nominals):*

àbracadábra

dèlicatéssen

Mèditerráanean

Kàlamazóo

- ▶ Cyclic effects are cross-linguistically common — e.g., in present-day American English (Hayes 1982, Pater 2000, Bermúdez-Otero 2012, *i.a.*).
 - ▶ When a word contains a sequence of three pretonic light syllables (/LLLσ/), the **first** regularly receives secondary stress ([̀LLLσ]).

PIE cyclicity in cross-linguistic perspective

(21) *Cyclic stress in American English (derived nominalizations):*

- a. *imáagine* ⇒ *imàginátion* ^x*imáginátion*
- b. *oríginal* ⇒ *orìgináality* ^x*òrigináality*
- c. *divísible* ⇒ *divìsibilità* ^x*dìvisibilità*
- d. *phenómenon* ⇒ *phenòmenólogy* ^x*phènomonólogy*

- ▶ Cyclic effects are cross-linguistically common — e.g., in present-day American English (Hayes 1982, Pater 2000, Bermúdez-Otero 2012, *i.a.*).
 - ▶ But derived nominals like (22) **preserve primary stress of their base** as secondary stress, blocking its regular assignment to **initial syllable**.

(22) Pretonic deletion in PIE (non-)primary derivatives:

- a. */ph₂tér-éi/ → *[pəh₂tr-éi] > Ved. *pitré* ‘to/for father’
>> AGk. *patri* ‘to/for father’
- b. */pentoh₂-é/s/ → *[p_nth₂-é/s] > Ved. *pathás* ‘of the path’
> OAv. *paθō* ‘of the path’
- c. */wet-’_es-ø/ → *|[wét-os]| > AGk. (*w*)*ét-os* ‘year’
- d. */wet-’_es-ó-s/ → *|[wét-s|-ó-s] > Ved. *vatsás* ‘calf’

▶ PIE pretonic vowel deletion works similarly.

- ▶ Primary derivatives lack independent bases, thus always show regular (iterative) **pretonic vowel deletion**.
- ▶ But in non-primary derivatives vowel deletion may underapply due to cyclic transfer of a (stressed) root vowel from their base.

(22) Pretonic deletion in PIE (non-)primary derivatives:

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- c. */wet-´₀s-∅/ → *|[w[̣]et-os|] > AGk. (*w*)*ét-os* 'year'
- d. */wet-´₀s-ó-s/ → *|[w[̣]et-s|-ó-s]? > Ved. *vatsás* 'calf'

- ▶ PIE pretonic vowel deletion works similarly.
- Was PVD blocked in PIE non-primary derivatives because **secondary stress was transferred**, as in English?

¹Direct evidence for secondary stress in ancient IE languages is lacking.

Mixed behavior of PIE **-oi-*stems

(23) PIE **-oi-*stem nouns and their IE reflexes:

- a. * $[\text{h}_2\text{wrt-}\underline{\text{ói:}}]$ > Hitt. *hurtāiš* ‘curse’
- b. * $[\text{b}^{\text{fi}}\text{eid}^{\text{fi}}\text{-}\underline{\text{ói:}}]$ > AGk. *peit^hō* ‘persuasion’
- c. * $[\text{leg}^{\text{fi}}\text{-}\underline{\text{ói:}}]$ > AGk. *lek^hō* ‘woman post-childbirth’

- ▶ IE evidence for mixed prosodic behavior in PIE animate **-oi-*stems:
 - ▶ Consistent suffixal stress in direct case-forms.¹
 - ▶ Absence of pretonic root **/e/*, e.g., in (23a).
 - ▶ But more commonly presence of pretonic root **/e/*, e.g., in (23b–c)

¹Securely reconstructible on convergent evidence from Hittite and Greek (Yates 2019b).

²Rix 1992:146–7, Weiss 2020:259, *i.a.*

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 - ▶ Absence of pretonic root **/e/*, e.g., in (23a).
 - ▶ But more commonly presence of pretonic root **/e/*, e.g., in (23b–c)
- ▶ Traditionally, root vocalism in (23) has been taken as evidence for prehistoric root-ending stress alternations (“amphikinetic”), against convergent Hittite and Greek evidence for suffixal stress.²

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- c. * $[leg^{fi}-ói:]$ > AGk. *lek^hō* ‘woman post-childbirth’

▶ **Proposal:** Mixed prosodic behavior reflects different morphological structure:

- ▶ Type in (23a) are derived from verbal roots, thus show regular PVD.
- ▶ Type in (23b–c) are derived from verbal stems, preserve the root **/e/* of their bases.

Covert non-primary *-oi-stems in PIE and Greek

(24) PIE deverbal *-oi-stems and their IE reflexes:

- a. PIE *|b^{fi}éid^{fi}-%-| ‘persuade’ ⇒ *|[b^{fi}éid^{fi}|-ói:] ‘persuasion’
> AGk. *peít^hō* ‘persuade’ AGk. *peít^hō* ‘persuasion’
> Lat. *fīdō* ‘trust’
- b. PIE *|lég^{fi}-%-| ‘lie (down)’ ⇒ *|[leg^{fi}|-ói:] ‘lying down’
> AGk. *lék^homai* ‘lie (down)’ AGk. *lek^hō* ‘woman post-childbirth’
> OIr. *laigid* ‘lie (down)’
- c. PIE *|b^{fi}éid^{fi}-%-| ‘split’ ⇒ *|[b^{fi}éid^{fi}|-ói:] ‘splitting’
> AGk. *p^heídomai* ‘spare’ AGk. *p^heidō* ‘sparing’
> Goth. *beitan* ‘bite’

- ▶ PIE *-oi-stems with non-deletion thus to be analyzed as covert non-primary derivatives of “simple” thematic verbs in (24) with cyclic preservation of root vocalism.¹

- ▶ Historical base-derivative pairs are attested side-by-side in Greek.

¹As proposed in Yates 2019b:214 n. 20.

Covert non-primary *-oi-stems in PIE and Greek

(24) PIE deverbal *-oi-stems and their IE reflexes:

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▶ PIE *-oi-stems with non-deletion thus to be analyzed as covert non-primary derivatives of “simple” thematic verbs in (24) with cyclic preservation of **root vocalism**.

▶ Covert because **stressed suffix *-oi-** truncates (“replaces”) thematic ***-e/o-** in base verb (like other *-i-ful suffixes).¹

¹See Schindler 1980:390, Grestenberger 2014:89, i.a.

Pseudo-cyclic analysis of PVD in PIE **-oi-*stems

(25) Pseudo-cyclic analysis of PIE **-oi-*stems:

- a. $*/h_2wert-ói-s/ \rightarrow *[\text{h}_2\text{wrt}-ó:i]$ > Hitt. *hurtāiš* ‘curse’
- b. $*/b^h éid^h-é%-o:/ \rightarrow *[[b^h éid^h]-o:]$ > AGk. *peít^hō* ‘I persuade’
Lat. *fīdō* ‘I trust’
- c. $*/b^h éid^h-é%-ói-s/ \Rightarrow *[[b^h éid^h]-ó:i]$ > AGk. *peit^hō* ‘persuasion’

- ▶ Pseudo-cyclic analysis of PIE **-oi-*stems from (24) in (25).
 - ▶ PVD applies regularly to root **/e/* in primary (25a).
 - ▶ No target for PVD in root-stressed “simple” thematic verb in (25b).
 - ▶ PVD underapplies in (25d) — after truncation of **-é-* it cannot delete the root **/e/* **because** it is transferred from its base in (25b).

Mixed behavior of PIE **-mon*-stems

(26) PIE **-mon*-stem nouns and their IE reflexes:

- a. * $[p_1t_2h_2]$ -mó:n] > AGk. *platamón* ‘broad space’
- b. * $[sh_2i]$ -món-es] > Hitt. *išhimāneš* ‘bonds’
(cf. Ved. *sīmānam* ‘hairline’, OE *sīma* ‘rope’)
- c. * $[b^{h_1}leg^{j_1}]$ -món-m] > Ved. *brahmānam* ‘priest’
- d. * $[d^{h_1}eh_1]$ -mó:n] > AGk. *t^hēmón* ‘heap’

- ▶ IE evidence for mixed prosodic behavior in PIE **-mon*-stem nominals:
 - ▶ Consistent suffixal stress in direct case-forms.¹
 - ▶ Absence of pretonic root **/e/*, e.g., in (26a–b).
 - ▶ But much more commonly presence of root **/e/*, e.g., in (26c–d).

¹Securely reconstructible on convergent evidence from Vedic, Baltic, and Anatolian (Yates 2020, 2022).

²Widmer (2004:69), Rau (2009:134), Fortson (2010:122–3), *i.a.*

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 - ▶ But much more commonly presence of root **/e/*, e.g., in (26c–d).
- ▶ Root vocalism in (26) has been taken as evidence for prehistoric root-ending stress alternations (“amphikinetic”), against weight of Vedic, Baltic, and Anatolian evidence for suffixal stress.²

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► **Proposal:** Mixed prosodic behavior reflects different morphological structure:

- Type in (27a–b) are derived from verbal roots, thus show regular PVD.
- Productive type in (27c–d) are derived from nominal stems, preserve the root **/e/* of their bases.

(28) *PIE neuter *-men- and *-mon-stem nominals and their IE reflexes:*

- | | | | | | |
|----|--|-----------------|---|---|----------------|
| a. | * b ^{fi} lég ^{ji} -m% _n - | ‘formulation’ | ⇒ | *[b ^{fi} leg ^{ji} -món -ṃ] | ‘formulating’ |
| > | Ved. <i>bráhma</i> | ‘formulation’ | | Ved. <i>brahmānam</i> | ‘priest’ |
| b. | * d ^{fi} éh ₁ -m% _n - | ‘establishment’ | ⇒ | *[d ^{fi} eh ₁ -mó:n] | ‘establishing’ |
| > | AGk. <i>t^hēma</i> | ‘tomb’ | | AGk. <i>t^hēmōn</i> | ‘heap’ |
| c. | * h ₂ éug-m% _n - | ‘growth’ | ⇒ | [* h ₂ aug-món -ṃ] | ‘growing’ |
| > | Lat. <i>augmen</i> | ‘increase’ | | Ved. <i>ojmānam</i> | ‘strength’ |
| | | | | (cf. Lith. <i>augmuō</i> | ‘sprout’) |

► Broad agreement that PIE had **-mon*-stem nominals formed by INTERNAL DERIVATION (ID) from neuter **-men*-stems as in (28).¹

► ID ≈ derivation marked by only by prosodic changes (stress, ablaut)

¹Schindler (1975a:63–4), Widmer (2004:69), Rau (2009:134), Fortson (2010:122–3), Nussbaum (2014:244, 248), Weiss (2020:281–2), i.a.

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- | | | | | | |
|----|--|-----------------|---|--|----------------|
| a. | * b ^h lég ^h -m% _n - | ‘formulation’ | ⇒ | * [b ^h leg ^h -món -m̄] | ‘formulating’ |
| > | Ved. <i>bráhma</i> | ‘formulation’ | | Ved. <i>brahmánam</i> | ‘priest’ |
| b. | * d ^h éh ₁ -m% _n - | ‘establishment’ | ⇒ | * [d ^h eh ₁ -mó:n] | ‘establishing’ |
| > | AGk. <i>t^hēma</i> | ‘tomb’ | | AGk. <i>t^hēmōn</i> | ‘heap’ |
| c. | * h ₂ éug-m% _n - | ‘growth’ | ⇒ | [* h ₂ aug-món -m̄] | ‘growing’ |
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▶ Broad agreement that PIE had **-mon*-stem nominals formed by INTERNAL DERIVATION (ID) from neuter **-men*-stems as in (28).¹

▶ ID ≈ derivation marked by only by prosodic changes (stress, ablaut)

⇒ PIE **-mon*-stems in (28) are covert non-primary derivatives, cyclically preserve root **/e/* of their bases when stress shifts to suffix.

¹Schindler (1975a:63–4), Widmer (2004:69), Rau (2009:134), Fortson (2010:122–3), Nussbaum (2014:244, 248), Weiss (2020:281–2), i.a.

Pseudo-cyclic analysis of PVD in PIE **-mon*-stems

(29) Pseudo-cyclic analysis of PIE **-mon*-stems:

- a. **/pleth₂-món-s/* → **[h₂w_rt-ó:i]* > Hitt. *hurtāiš* ‘curse’
- b. **/b^hleg^{jh}-‘m%_n-ø/* → **[|b^hlég^{jh}-m_n|]* > Ved. *bráhma* ‘formulation’
- c. **/b^hleg^{jh}-‘m%_n-ó-m/* → **[|b^hlég^{jh}-món|-m]* > Ved. *brahmānam* ‘priest’
-

▶ Pseudo-cyclic analysis of PIE **-mon*-stems from (28) in (29).

- ▶ PVD applies regularly to **root **/e/*** in primary (29a).
- ▶ No target for PVD in root-stressed neuter **-men*-stem in (29b).
- ▶ PVD underapplies in (29d) — after shift of stress to suffix it cannot delete the **root vowel** **because** it is transferred from its base in (29c).

Roadmap III

§1 Introduction

§2 Pretonic vowel deletion in PIE

§3 Establishing cyclicity as a PIE phenomenon

§4 **Conclusions & discussion**

(30)

PIE MORPHOPHONOLOGICAL PROCESSES:

- a. Non-high vowels were deleted in pretonic syllables.
- b. Root vowel of a derived base was transferred cyclically to its derivatives.

- ▶ Two synchronic processes in (30) are reconstructible for PIE.
 - ▶ (30a) **economically explains** robust IE evidence for pretonic deletion across diverse morphological contexts.
 - ▶ (30b) provides a **principled account** of exceptions to (30a).

(30)

PIE MORPHOPHONOLOGICAL PROCESSES:

- a. Non-high vowels were deleted in pretonic syllables.
- b. Root vowel of a derived base was transferred cyclically to its derivatives.

- ▶ Traditional templatic analyses of PIE vowel deletion lack the general explanatory power of (30).
 - ▶ To attain same empirical coverage would require extensive multiplication of templates.

(30)

PIE MORPHOPHONOLOGICAL PROCESSES:

- a. Non-high vowels were deleted in pretonic syllables.
- b. Root vowel of a derived base was transferred cyclically to its derivatives.

- ▶ Traditional templatic analyses of PIE vowel deletion lack the general explanatory power of (30).
 - ▶ To attain same empirical coverage would require extensive multiplication of templates.
 - ... at which point, analysis or description?

Conclusions & discussion

- ▶ Proposals advanced here offer a starting point for development of a general theory of PIE morphophonology.

Conclusions & discussion

- ▶ Proposals advanced here offer a starting point for development of a general theory of PIE morphophonology.
- ▶ Major question for future research in this domain:

- **What else belongs in a general theory of PIE morphophonology?**

Thank you!

- Special thanks to the members of the:
 - Indo-European & Modern Linguistic Theory research group
 - UCLA PIES Graduate Seminar
 - LMU Forschungskolloquium
- As well as to:
 - Craig Melchert, Brent Vine, Stephanie Jamison, Ron Kim, Sergio Neri, and Olav Hackstein.

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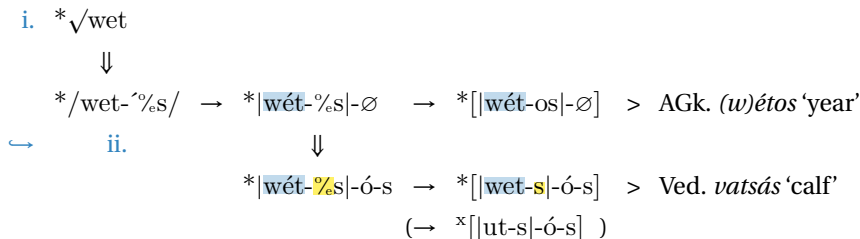
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Cyclic analysis of PIE adjectives in $^*/-ó-/$

(A1) Cyclic derivation of PIE * [wet-s-ó-s] ‘having a year’:



► Cyclic derivation of (18b) $^*|\text{wet-s}|\text{-}\acute{o}\text{-s}$ in (A1):

- (i) Derivation of primary noun $^*|\text{wét-}^{\circ}\text{s}$ ‘year’ — stressed on **root**, no environment for PVD.
- (ii) Derivation from (i) of non-primary adjective $^*|\text{wet-s}|\text{-}\acute{o}\text{-s}$ — PVD applies to **primary suffix**, but underapplies to root **because** it is cyclically bound.

Cyclic analysis of PIE adjectives in $^*/-ó-/$

(A2) Cyclic derivation of PIE $^*[b^{f_i}ud^{f_i}-n-ó-s]$ ‘having a bottom’:

i. $^*\sqrt{b^{f_i}eud^{f_i}}$

↓

$^*/b^{f_i}eud^{f_i}-mén/ \rightarrow ^*[b^{f_i}ud^{f_i}-mén|-m] \rightarrow ^*[b^{f_i}ud^{f_i}-mén|-m]$ > AGk. *put^hména*

↪

ii.

↓

$^*[b^{f_i}ud^{f_i}-mén|-ó-s] \rightarrow ^*[b^{f_i}ud^{f_i}-~~m~~-ó-s]$ > Ved. *budhnás* ‘ground’

Lat. *fundus* ‘ground’

► Cyclic derivation of (18a) $^*[b^{f_i}ud^{f_i}-n-ó-s]$ in (A2):

- (i) Formation of primary noun $^*[b^{f_i}ud^{f_i}-mén-|]$ ‘bottom’ — stressed on **suffix**, thus PVD applies in **root**.
- (ii) Derivation from (i) of non-primary adjective $^*[wet-s-ó-s]$ — PVD applies to its only target, the **primary suffix**.

Cyclic analysis of PIE adjectives in $^*/-ó-/$

(A2) Cyclic derivation of PIE $^*[b^h u d^h -n-ó-s]$ ‘having a bottom’:

i. $^*\sqrt{b^h e u d^h}$

↓

$^*/b^h e u d^h -mén/ \rightarrow ^*[b^h u d^h -mén|-m] \rightarrow ^*[b^h u d^h -mén|-m]$ > AGk. *put^h ména*

↪

ii.

↓

$^*[b^h u d^h -mén|-ó-s] \rightarrow ^*[b^h u d^h -mén|-ó-s]$ > Ved. *budhnás* ‘ground’

‘bottom’

Lat. *fundus* ‘ground’

▶ Cyclic derivation of (18a) $^*[b^h u d^h -n-ó-s]$ in (A2):

(i) Formation of primary noun $^*[b^h u d^h -mén-]$ ‘bottom’ — stressed on **suffix**, thus PVD applies in **root**.

(ii) Derivation from (i) of non-primary adjective $^*[w e t -s-ó-s]$ — PVD applies to its only target, the **primary suffix**.

⇒ Application of PVD on each cycle yields apparent iterative application.

Pretonic deletion in overt PIE non-primary derivatives

(A3) Cyclicality in other PIE overt non-primary derivatives:

- a. PIE *|léuks-men-| ‘light’ ⇒ *|leuks-~~mn~~-ó-| ‘having light’
> Lat. *lūmen* ‘light’ YAv. *raoxšna-* ‘bright’
- b. PIE *|h₁rot-eh₂-| ‘wheel’ ⇒ *|h₁rot-h₂-ó-| ‘wheeled’
> Lat. *rota* ‘wheel’ Ved. *rátha-*, YAv. *raθa-* ‘chariot’
- c. PIE *|sok^W-h₂-ói-| ‘comrade’ ⇒ *|sok^W-~~h₂~~-y-ó-| ‘having comrades’
> Ved. *sákhā(y)-* ‘friend’ Lat. *socius*, ON *seggr* ‘ally’, ‘warrior’
- d. PIE *|sok^W-eh₂-| ‘accompaniment’ ⇒ *|sok^W-h₂-ói-| ‘comrade’
> — (⇒ AGk. ὀπάων ‘comrade’) Ved. *sákhā(y)-* ‘friend’

- In (A3) are given more examples of PIE overt non-primary derivatives with cyclic PVD (viz., comparable to (18) above).

Pretonic deletion in overt PIE non-primary derivatives

(A3) Cyclicality in other PIE overt non-primary derivatives:

- a. PIE *|léuks-men-| ‘light’ ⇒ *|leuks-~~mn~~-ó-| ‘having light’
> Lat. *lūmen* ‘light’ YAv. *raoxšna-* ‘bright’
- b. PIE *|h₁rot-eh₂-| ‘wheel’ ⇒ *|h₁rot-h₂-ó-| ‘wheeled’
> Lat. *rota* ‘wheel’ Ved. *rátha-*, YAv. *raθa-* ‘chariot’
- c. PIE *|sok^W-h₂-ói-| ‘comrade’ ⇒ *|sok^W-~~h₂~~-y-ó-| ‘having comrades’
> Ved. *sákhā(y)-* ‘friend’ Lat. *socius*, ON *seggr* ‘ally’, ‘warrior’
- d. PIE *|sok^W-eh₂-| ‘accompaniment’ ⇒ *|sok^W-h₂-ói-| ‘comrade’
> — (⇒ AGk. ὀπάων ‘comrade’) Ved. *sákhā(y)-* ‘friend’

► Overt non-primary derivatives in (A3) are standardly reconstructed.

- (a) Schmidt 1895:101–2, Nussbaum 2010:270
(b) EWA II: 429–30, de Vaan 2008:527, *NIL*: 575–8, Weiss 2020:126, 320, Meier-Brügger and Fritz 2021:126, i.a.
(c) Schindler 1969:164, EWA II: 684–5, Beekes (2010:112–3, 1089), Byrd 2015:210–1, Ringe 2017:131–2, Yates 2019b:203–4, i.a.
(d) Schindler 1969:164 n. 65, Beekes 2010:112–3, 1089, Yates 2019b:203–4, i.a.

PIE *i-ful suffixes truncate the thematic vowel

(A4) Vedic non-primary derivatives formed with the suffixes /-ín-/ , /-ī̄-/ :

THEMATIC BASE	⇒	NON-PRIMARY DERIVATIVE
a. <i>ukthá-</i> ‘praise-hymn’		<i>ukth-ín-</i> ‘accompanied by praise-hymns’
b. <i>śṛṅga-</i> ‘horn’		<i>śṛṅg-ín-</i> ‘having horns’
c. <i>vájra-</i> ‘mace’		<i>vajr-ín-</i> ‘having a mace’
d. <i>sóma-</i> ‘soma’		<i>som-ín-</i> ‘having/bringing soma’
e. <i>ásva-</i> ‘horse’		<i>aśv-ín-</i> ‘having horses; Aśvin’
f. <i>hásta-</i> ‘hand’		<i>hast-ín-</i> ‘having hands’
g. <i>vṛka-</i> ‘wolf’		<i>vṛk-ī̄-</i> ‘female wolf’
h. <i>rátha-</i> ‘chariot’		<i>rath-ī̄-</i> ‘having a chariot; charioteer (M/F)’

- Vedic continues the PIE pattern whereby *i-ful suffixes truncate (“replace”) the thematic vowel *-e/o- — e.g., in (A4).¹

¹On the derivational pattern see Brugmann (1906:285), Schindler (1980) (“ersetzt wird”), and Grestenberger (2014:89, 2021) with references.

Non-cyclic PVD in PIE non-primary derivatives?

(A5) Possible PIE non-primary derivatives with “double zero-grade:”

- | | | | |
|--|------------------|--|---------------------|
| a. PIE * wéd- ^h s- | ‘water’ | ⇒ * ud-s-ó- | ‘having water’ |
| > AGk. <i>húdos</i> , Arm. <i>get</i> | ‘water’, ‘river’ | Ved. <i>útsa-</i> | ‘wellspring’ |
| b. PIE * h ₁ reud ^h -os- | ‘redness’ | ⇒ * h ₁ rud ^h -s-ó- | ‘red’ |
| > AGk. <i>éreat^hos</i> | ‘redness’ | Lat. <i>russus</i> | ‘red(-haired)’ |
| c. PIE * léuk- ^h s- | ‘light’ | ⇒ * luk-s-ó- | ‘having light’ |
| > Ved. <i>rókas-</i> , OAv. <i>raocah-</i> | ‘light’ | Ved. <i>rukṣá-</i> , Pers. <i>ruxš</i> | ‘shining’ |
| d. PIE * térh ₂ -men- | ‘boundary’ | ⇒ * tṛh ₂ -m̄n-ó- | ‘having a boundary’ |
| > AGk. <i>térma</i> , Lat. <i>termen</i> | ‘boundary’ | AGk. <i>trānós</i> (⇒ <i>trānēs</i>) | ‘clear’ (‘id.’) |
| e. PIE * nek ^h -(e)w- | ‘death’ | * n̄k ^h -w-ó- | ‘having death’ |
| > — (⇒ AGk. <i>nékūs</i> , Av. <i>nasau-</i> ‘corpse’) | | — (⇒ TA <i>onk</i> , TB <i>enikwe</i> ‘man’) | |

- Some possible traces of “double zero-grade” — i.e., non-cyclic, iterative application of PVD — in (A5).¹

¹For arguments in favor see Widmer (2004:72–3), Nussbaum (2010:272–6), and Höfler (2015,2017): 