



Stress and cyclicity in Hittite and its diachronic development

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Roadmap

- ▶ Introduction
- ▶ Stress & vowel length in Hittite deradical formations
- ▶ Vowel length, stress, and cyclicity in Hittite
- ▶ The diachrony of Hittite stress cyclicity



Stress and vowel length in Hittite

(1) a. *pātuš* [pát-os] ‘feet’

b. *patān* [pat-án] ‘of the feet’

(2) a. *dātti* [tá-ti] ‘you take’

b. *dattēni* [ta-téni] ‘y’all take’

- Many Hittite words exhibit exactly one long vowel, the locus of primary stress — e.g., (1–2).



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- (3) a. *kātapūmeneš* [ka:tap-o:men-es] ‘men of Katapa’
 b. *iwārwāer* [iwa:rw-a:rj-er] ‘bestowed a dowry’

- Many Hittite words exhibit exactly one long vowel, the locus of primary stress — e.g., (1–2).
- When stress shifts within inflectional paradigms, these alternate with short vowels.
- But — Hittite words like (3) exhibit multiple long vowels, only one of which can be the site of primary stress.



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- Main **questions** addressed today:
 - How do stress and vowel length interact in Hittite words like (1–2)?



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- Main **questions** addressed today:
 - How do stress and vowel length interact in Hittite words like (1–2)?
 - How should words like (3) with multiple long vowels be accounted for?
 - How does this analysis of (3) inform the reconstruction of Proto-Indo-European word stress?



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- Core proposals:

- (i) Regular shortening of unstressed long vowels in (1–2).



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- (3) a. *kātapūmeneš* [kà:tap-ó:men-es] 'men of Katapa' ⇐ ^{URU}*kātapā* [ká:tapā] 'Katapa'
 b. *iwārwāer* [iwà:rw-á:j-er] 'bestowed a dowry' ⇐ *iwāru* [iwá:ru] 'dowry'

- Core proposals:

- (i) Regular shortening of unstressed long vowels in (1–2).
- (ii) Denominal (and deverbal) derivatives like (3) cyclically preserve the primary stress of their base as secondary stress, which blocks shortening.



Stress and vowel length in Hittite

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- (3) a. *kātapūmeneš* [kà:tap-ó:men-es] 'men of Katapa' $\Leftarrow$ ^{URU}*kātapa* [ká:tap] 'Katapa'
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- Core proposals:

- (i) Regular shortening of unstressed long vowels in (1–2).
- (ii) Denominal (and deverbal) derivatives like (3) cyclically preserve the primary stress of their base as secondary stress, which blocks shortening.
- (iii) Hittite supports reconstruction of cyclic secondary stress for Proto-Indo-European.



Roadmap

- ▶ Introduction
- ▶ Stress & vowel length in Hittite deradical formations
 - Plene spelling, vowel length, and stress in Hittite
 - Analyzing Hittite stress & vowel length
- ▶ Vowel length, stress, and cyclicity in Hittite
- ▶ The diachrony of Hittite stress cyclicity



Stress, vowel length, and plene spelling

(4) *Variable plene spelling of long vowels:*

a. [té:kan]	tēkan	~	tekan
‘earth’	⟨ <u>te</u> -e-kán⟩		⟨te-kán⟩
b. [tá:χ:on]	dāḫḫun	~	daḫḫun
‘I took’	⟨ <u>da</u> -a-aḫ-ḫu-un⟩		⟨da-aḫ-ḫu-un⟩
c. [ár:χ:on]	ārḫun	~	arḫun
‘I arrived’	⟨ <u>a</u> -ar-ḫu-un⟩		⟨ar-ḫu-un⟩

- Stress is not directly encoded in Hittite’s cuneiform script, but can be inferred from its effects on vowel quantity and quality.
- Principal diagnostic of stress is **vowel length**, which is variably marked.
 - Long vowels may exhibit PLENE SPELLING, i.e., a repeated independent vowel sign.
 - Short vowels are not spelled plene.



Stress, vowel length, and plene spelling

- (1) a. *pātuš* [pát-os] ‘feet’
b. *patān* [pat-án] ‘of the feet’
- (5) a. *tēkan* [té:kan] ‘earth’
b. *takn-āš* [takn-ás] ‘of the earth’
- (2) a. *dātti* [tá:-t:i] ‘you take’
b. *dattēni* [ta-t:é:ni] ‘y’all take’
- (6) a. *ārḥun* [ár-χ:on] ‘I arrived’
b. *artēni* [ar-t:é:ni] ‘y’all arrive’
c. *aranzi* [ar-ánfsi] ‘they arrive’
- Deradical derivatives exhibit **maximally one** (plene-spelled) **long vowel**, the position of which may vary within inflectional paradigms — e.g., in (1–2), (5–6).



Stress, vowel length, and plene spelling

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|-----|----|----------------|-----------|----------------|-----|----|----------------|-------------|----------------|
| (1) | a. | <i>pātuš</i> | [pát-os] | ‘feet’ | (2) | a. | <i>dātti</i> | [tá-ti] | ‘you take’ |
| | b. | <i>patān</i> | [pat-án] | ‘of the feet’ | | b. | <i>dattēni</i> | [ta-t:é:ni] | ‘y’all take’ |
| (5) | a. | <i>tēkan</i> | [té:kan] | ‘earth’ | (6) | a. | <i>ārḫun</i> | [ár-χ:on] | ‘I arrived’ |
| | b. | <i>takn-āš</i> | [takn-ás] | ‘of the earth’ | | b. | <i>artēni</i> | [ar-t:é:ni] | ‘y’all arrive’ |
| | | | | | | c. | <i>aranzi</i> | [ar-ánfsi] | ‘they arrive’ |

- Deradical derivatives exhibit **maximally one** (plene-spelled) **long vowel**, the position of which may vary within inflectional paradigms — e.g., in (1–2), (5–6).
- Intramorphemic vowel length alternations supported by robust negative evidence.
 - Root vowel is **short** in (2b) and (6c), non-plene across many attestations (19x, > 100x).



Stress, vowel length, and plene spelling

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| (5) | a. | <i>tēkan</i> | [té:kan] | ‘earth’ | (6) | a. | <i>ārḫun</i> | [ár-ḫon] | ‘I arrived’ |
| | b. | <i>takn-āš</i> | [takn-ás] | ‘of the earth’ | | b. | <i>artēni</i> | [ar-t:é:ni] | ‘y’all arrive’ |
| (7) | | <i>ḫāran-aš</i> | [ḫá:ran-as] | ‘of the eagle’ | | c. | <i>aranzi</i> | [ar-ánfsi] | ‘they arrive’ |

- Deradical derivatives exhibit **maximally one** (plene-spelled) **long vowel**, the position of which may vary within inflectional paradigms — e.g., in (1–2), (5–6).
- Intramorphemic vowel length alternations supported by robust negative evidence.
 - Root vowel is **short** in (2b) and (6c), non-plene across many attestations (19x, > 100x).
 - Likewise, ending vowel is **short** in (7) and similar lexemes.



Stress, vowel length, and plene spelling

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| (5) | a. | <i>tēkan</i> | [té:kan] | ‘earth’ | (6) | a. | <i>ārḫun</i> | [ár-χ:on] | ‘I arrived’ |
| | b. | <i>takn-āš</i> | [takn-ás] | ‘of the earth’ | | b. | <i>artēni</i> | [ar-té:ni] | ‘y’all arrive’ |

- Deradical derivatives exhibit **maximally one** (plene-spelled) **long vowel**, the position of which may vary within inflectional paradigms — e.g., in (1–2), (5–6).
- Convergent evidence that this distribution reflects shifts in **primary stress**.



Stress, vowel length, and plene spelling

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| | b. | <i>takn-āš</i> | [takn-ás] | ‘of the earth’ | | b. | <i>artēni</i> | [ar-té:ni] | ‘y’all arrive’ |
| | c. | <i>takn-ī</i> | [takn-ī] | ‘on the earth’ | | | | | |

- Deradical derivatives exhibit **maximally one** (plene-spelled) **long vowel**, the position of which may vary within inflectional paradigms — e.g., in (1–2), (5–6).
- Convergent evidence that this distribution reflects shifts in **primary stress**:
 - (i) Lexemes like (5) show **deletion** and/or **reduction** of pretonic vowels.



Stress, vowel length, and plene spelling

- (1) a. *pātuš* [pát-os] ‘feet’
b. *patān* [pat-án] ‘of the feet’
- (8) a. Ved. *pád-am* ‘foot’
b. Ved. *pad-ás* ‘of the foot’
- (9) a. AGk. *pód-as* ‘feet’
b. AGk. *pod-ós* ‘of the foot’
c. AGk. *pod-ôn* ‘of the feet’

- Deradical derivatives exhibit **maximally one** (plene-spelled) **long vowel**, the position of which may vary within inflectional paradigms — e.g., in (1–2), (5–6).
- Convergent evidence that this distribution reflects shifts in **primary stress**:
 - (ii) Cognate lexemes exhibit same stress shifts in other ancient IE languages — compare (1) Hittite with (8) Vedic Sanskrit and (9) Ancient Greek.



Stress, vowel length, and plene spelling

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| (1) | a. | <i>pātuš</i> | [pát-os] | ‘feet’ | (2) | a. | <i>dātti</i> | [tá-ti] | ‘you take’ |
| | b. | <i>patān</i> | [pat-án] | ‘of the feet’ | | b. | <i>dattēni</i> | [ta-té:ni] | ‘y’all take’ |
| (5) | a. | <i>tēkan</i> | [té:kan] | ‘earth’ | (6) | a. | <i>ārḫun</i> | [ár-χ:on] | ‘I arrived’ |
| | b. | <i>takn-āš</i> | [takn-ás] | ‘of the earth’ | | b. | <i>artēni</i> | [ar-té:ni] | ‘y’all arrive’ |

- Deradical derivatives exhibit **maximally one** (plene-spelled) **long vowel**, the position of which may vary within inflectional paradigms — e.g., in (1–2), (5–6).
- Convergent evidence that this distribution reflects shifts in **primary stress**:
 - (iii) Restriction to **one long vowel** explained naturally via interaction of culminativity and stress-dependent vowel quantity.



Stress, vowel length, and plene spelling

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|-----|----|----------------|------------|----------------|-----|----|----------------|-------------|----------------|
| (1) | a. | <i>pātuš</i> | [pát-os] | ‘feet’ | (2) | a. | <i>dātti</i> | [tá:-t:i] | ‘you take’ |
| | b. | <i>patān</i> | [pat-á:n] | ‘of the feet’ | | b. | <i>dattēni</i> | [ta-t:é:ni] | ‘y’all take’ |
| (5) | a. | <i>tēkan</i> | [té:kan] | ‘earth’ | (6) | a. | <i>ārḫun</i> | [ár-χ:on] | ‘I arrived’ |
| | b. | <i>takn-āš</i> | [takn-á:s] | ‘of the earth’ | | b. | <i>artēni</i> | [ar-t:é:ni] | ‘y’all arrive’ |

- How should Hittite stress-dependent length alternations of the type in (1), (2), and (6) be analyzed?



Analyzing Hittite stress & vowel length

- (2) a. *dātti* [tá:-t:i] 'you take'
b. *dattēni* [ta-t:é:ni] 'y'all take'
- (6) a. *ārḫun* [á:r-χ:on] 'I arrived'
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- Length alternations like (2) and (6a–b) are compatible with either:
 - (i) Stressed vowel lengthening (/V/ → [Ṽ:])
 - (ii) Unstressed vowel shortening (/V:/ → [V]).



Analyzing Hittite stress & vowel length

- | | |
|---|---|
| <p>(2) a. <i>dātti</i> [tá:-t:i] 'you take'</p> <p>b. <i>dattēni</i> [ta-t:é:ni] 'y'all take'</p> | <p>(10) a. <i>kišhat</i> [kís-χ:at] 'I became'</p> <p>b. <i>kištat</i> [kís-t:at] 'you became'</p> |
| <p>(6) a. <i>ārḫun</i> [ár-χ:on] 'I arrived'</p> <p>b. <i>artēni</i> [ar-t:é:ni] 'y'all arrive'</p> <p>c. <i>aranzi</i> [ar-ánf:si] 'they arrive'</p> | <p>c. <i>walḫzi</i> [wálχ:-f:si] '(s)he strikes'</p> <p>d. <i>parna</i> [párn-a] 'to the house'</p> <p>e. <i>tuk</i> [túk] '(to/for) you'</p> |

- Length alternations like (2) and (6a–b) are compatible with either:
 - (i) Stressed vowel lengthening (/V/ → [V̄:])
 - (ii) Unstressed vowel shortening (/V:/ → [V]).
- But — short stressed vowels in closed syllables like (10) and (6c) are problematic for (i) across-the-board lengthening under stress.



Analyzing Hittite stress & vowel length

- (2) a. *dātti* [tá:t-i] ← /ta:t-i/
b. *dattēni* [ta:t-é:ni] ← /ta:t-é:ni/
(6) a. *ārḫun* [á:r-χ:on] ← /a:r-χ:on/
b. *artēni* [ar-t:é:ni] ← /a:r-t:é:ni/
c. *aranzi* [ar-ánf̥si] ← /a:r-ánf̥si/

★ Proposal: long vowels were regularly shortened in unstressed syllables, e.g., in (2) and (6).



Analyzing Hittite stress & vowel length

- (2) a. *dātti* [tá:-t:i] ← /ta:-t:i/
 b. *dattēni* [ta-t:é:ni] ← /ta:-t:é:ni/
 (6) a. *ārḫun* [á:r-χ:on] ← /a:r-χ:on/
 b. *artēni* [ar-t:é:ni] ← /a:r-t:é:ni/
 c. *aranzi* [ar-ánf̥si] ← /a:r-ánf̥si/

- (11) a. *kišhat* [kís-χ:at] 'I became'
 b. *kištat* [kís-t:at] 'you became'
 c. *kīšari* [kí:s-ari] '(s)he becomes'
 d. *kīšat* [kí:s-at] '(s)he became'

★ **Proposal:** long vowels were regularly shortened in unstressed syllables, e.g., in (2) and (6).

+ Short vowels were lengthened in stressed open syllables — e.g., in (11) — where stressed vowels are predictably long.



Analyzing Hittite stress & vowel length

- (2) a. *dātti* [tá:t̪i] ← /ta:t̪i/
 b. *dattēni* [ta:t̪é:ni] ← /ta:t̪é:ni/
 (6) a. *ārḫun* [á:r̪χ:ɔn] ← /a:r̪χ:ɔn/
 b. *artēni* [ar:t̪é:ni] ← /a:r̪t̪é:ni/
 c. *aranzi* [ar-ánf̪si] ← /a:r̪-ánf̪si/
 (11) a. *kišhat* [kís-χ:at] ← /kís-χ:at/
 b. *kištat* [kís-t̪at] ← /kís-t̪at/
 c. *kīšari* [kí:s-ari] ← /kís-ári/
 d. *kīšat* [kí:s-at] ← /kís-át/

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Analyzing Hittite stress & vowel length

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 b. *dattēni* [ta:t̪é:ni] ← /ta:t̪é:ni/
 (6) a. *ārḫun* [á:r̪χ:ɔn] ← /ar̪χ:ɔn/
 b. *artēni* [ar̪:t̪é:ni] ← /ar̪:t̪é:ni/
 c. *aranzi* [ar̪-án̪tsi] ← /ar̪-án̪tsi/

- (11) a. *kišhat* [kís:χat] ← /kís:χat/
 b. *kištat* [kís:t̪at] ← /kís:t̪at/
 c. *kīšari* [kís:ari] ← /kís-ári/
 d. *kīšat* [kís:at] ← /kís-át/

- How can Hittite words with multiple long vowels be reconciled with the regular shortening of unstressed vowels?



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- ▶ Vowel length, stress, and cyclicity in Hittite
 - Hittite word formation and word prosody
 - Multiple long vowels in denominal derivatives
 - Stress cyclicity in Hittite
 - Hittite stress cyclicity in cross-linguistic perspective
- ▶ The diachrony of Hittite stress cyclicity



Word formation & word prosody in Hittite

(12) *Alleged multiple plene spelling (/long vowels) in deradical formations:*

- a. $\langle ma-a-ri-i-e-eš \rangle$ [má:rij-es] ‘spears’
- b. $\langle te-e-pa-u-e-eš \rangle$ [té:paw-es] ‘few’

- Morphologically, all Hittite words treated in §2 are deradical — they consist (historically) of a root, exactly one (overt) derivational suffix, and an inflectional ending.
- There is no compelling evidence for multiple **long vowels** in deradical derivatives.
 - e.g., **supposed plene spellings** in (12) are rather artifacts of the writing system, with $\langle -i-e- \rangle$ and $\langle -u-e- \rangle$ as substitutes for non-existent signs “ $\langle ye \rangle$ ” and “ $\langle we \rangle$ ”.¹

¹See in detail Kloekhorst 2012: 247–50, 2014: 134–61 (cf. Yates 2017, forthcoming).



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↓ Denominal (and deverbal) derivatives behave **differently**.

¹See in detail Kloekhorst 2012: 247–50, 2014: 134–61 (cf. Yates 2017, forthcoming).



Multiple long vowels in denominal derivatives

- (13) a. *kātapūmeneš* [ka:tap-o:men-es] ‘men of Katapa’
b. *iwārwär* [iwa:rw-a:rj-er] ‘bestowed a dowry’
c. *mālāši* [ma:l-a:si] ‘you approve’
d. *kūšāta* [ku:s-a:t-a] ‘bride-price’
e. *šaruwāit* [sa:rw-a:i-t] ‘(s)he plundered’
šāruwauwanzi [sa:rw-a:-wanf̥si] ‘to plunder’

- Denominal formations frequently exhibit multiple long vowels.
 - Sometimes spelled plene within a single attestation, e.g., (13a–d).
 - Or spelled plene across attestations, e.g., (13e).



Multiple long vowels in denominal derivatives

- (13) a. *kātapūmeneš* [ka:tap-o:men-es] ‘men of Katapa’ $\Leftarrow$ ^{URU}*kātapa* [ka:tapa] ‘Katapa’
 b. *iwārwāer* [iwa:rw-a:ɹ-er] ‘bestowed a dowry’ $\Leftarrow$ *iwāru* [iwa:ru] ‘dowry’
 c. *mālāši* [ma:l-a:si] ‘you approve’ $\Leftarrow$ *māl* [ma:l] ‘approval’
 d. *kūšāta* [ku:s-a:t-a] ‘bride-price’ $\Leftarrow$ *kūšan* [kú:sa-n] ‘bride’
 e. *šaruwāit* [sa:rw-a:ɹ-i-t] ‘(s)he plundered’ $\Leftarrow$ *šāru* [ša:ru] ‘booty’
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- Denominal formations frequently exhibit multiple **long vowels**.
- These **regularly** include any long vowels present in their derivational base.



Multiple long vowels in denominal derivatives

- (13) a. *kātapūmeneš* [ka:tap-o:men-es] ‘men of Katapa’ $\Leftarrow$ ^{URU}*kātapa* [kā:ta:pa] ‘Katapa’
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- Denominal formations frequently exhibit multiple **long vowels**.
- These **regularly** include any long vowels present in their derivational base.
 - Previously suspected denominal formations have long vowels “analogical” to their base.¹
 - But robustness of the evidence suggests that “transfer” of base long vowels was **systematic**.²

¹See esp. Kimball 1999: 129 (cf. Melchert 1994: 177–8, Kloekhorst 2014: 245).

²See provisionally Yates 2017 and in more detail Yates forthcoming.



Multiple long vowels in denominal derivatives

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- Denominal formations frequently exhibit multiple **long vowels**.
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⇒ A cyclic effect



Multiple long vowels in denominal derivatives

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šāruwauwanzi [sa:rw-a:-wanʃi] ‘to plunder’

- Denominal formations frequently exhibit multiple **long vowels**.
- These **regularly** include any long vowels present in their derivational base.
- A **cyclic** effect — but how should it be **analyzed**?



Stress cyclicity & multiple long vowels

- (13) a. *kātapūmeneš* [kà:tap-ó:men-es] ‘men of Katapa’ $\Leftarrow$ ^{URU}*kātapa* [ká:ta:pa] ‘Katapa’
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šāruwauwanzi [sà:rw-á:-wanfši] ‘to plunder’

★ **Proposal:** stress assignment in Hittite was **cyclic**.

- Stress-preferring denominal suffixes attract primary stress, are realized as long.
- Primary stress of the base was preserved cyclically as secondary stress, blocking shortening of the base long vowel.



Stress cyclicity & multiple long vowels

- (13) a. *kātapūmeneš* [kà:tap-ó:men-es] ‘men of Katapa’ $\Leftarrow$ ^{URU}*kātapa* [kà:tap] ‘Katapa’
 b. *iwārwāer* [iwà:rw-á:j-er] ‘bestowed a dowry’ $\Leftarrow$ *iwāru* [iwá:ru] ‘dowry’
 c. *mālāši* [mà:l-á:si] ‘you approve’ $\Leftarrow$ *māl* [má:l] ‘approval’
 d. *kūšāta* [kù:s-á:t-a] ‘bride-price’ $\Leftarrow$ *kūšan* [kú:sa-n] ‘bride’
 e. *šaruwāit* [sà:rw-á:i-t] ‘(s)he plundered’ $\Leftarrow$ *šāru* [sá:ru] ‘booty’
šāruwauwanzi [sà:rw-á:wanʃi] ‘to plunder’

- Secondary stress is orthographically encoded in the same way as primary stress, thus plausibly associated with same phonetic correlates (esp. greater duration).



Hittite cyclicity in cross-linguistic perspective

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

- a. àbracadábra
- b. dèlicatéssen
- c. Mèditerráneau
- d. Kàlamazóo

- Hittite stress cyclicity has close parallel, e.g., in present-day American English.¹
 - When a word contains a sequence of three pretonic light syllables (/LLL^σ/), the first regularly receives secondary stress ([LLL^σ]) — e.g., in (14).

¹See Hayes 1982, Pater 2000, Bermúdez-Otero 2012, i.a.



Hittite cyclicity in cross-linguistic perspective

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

- | | | | |
|-----------------------|---|-----------------------|------------------------------------|
| a. <u>im</u> áginē | ⇒ | imàgináti <u>on</u> | ^x <u>im</u> aginátion |
| b. <u>or</u> íginal | ⇒ | orìginál <u>ity</u> | ^x <u>or</u> iginálity |
| c. <u>div</u> ísible | ⇒ | divìsibí <u>lity</u> | ^x <u>div</u> isibílity |
| d. <u>phen</u> óménon | ⇒ | phenòmén <u>ology</u> | ^x <u>phè</u> nomonólogy |

- Hittite stress cyclicity has close parallel, e.g., in present-day American English.¹
 - When a word contains a sequence of three pretonic light syllables (/LLLó/), the first regularly receives secondary stress ([̈́LLLó]) — e.g., in (14).
 - But derived nominals like (15) preserve primary stress of their base as secondary stress, blocking its regular assignment to the initial syllable and reduction of peninitial.

¹See Hayes 1982, Pater 2000, Bermúdez-Otero 2012, i.a..



Hittite cyclicity in cross-linguistic perspective

(16) *Cyclic stress in Hittite and American English:*

- a. Hitt. *iwāru* 'dowry' $\Rightarrow$ *iwārwāer* 'bestowed a dowry' ^x*iwarwāer*
[iwāru] [iwarw-áj-er] ^x[iwarw-áj-er]
- b. Eng. *imáginē* $\Rightarrow$ *imàginátiōn* ^x*imàginátiōn*

$\Rightarrow$ Stress cyclicity in Hittite and (American) English align closely.



Hittite cyclicity in cross-linguistic perspective

(16) *Cyclic stress in Hittite and American English:*

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 [iwāru] [iwarw-áj-er] ^x[iwarw-áj-er]
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$\Rightarrow$ Stress cyclicity in Hittite and (American) English align closely.

- Denominal and deverbal derivatives preserve primary stress of their base as secondary stress.



Hittite cyclicity in cross-linguistic perspective

(16) *Cyclic stress in Hittite and American English:*

a. Hitt. *iwāru* ‘dowry’ ⇒ *iwār^wāer* ‘bestowed a dowry’ x *iwar^wāer*
[iwá:ru] [iwà:r^w-á:j-er] x[iwar^w-á:j-er]

b. Eng. *im[æ]gine* ⇒ *im[ə]ginátion* x *im[ə]ginátion*

⇒ Stress cyclicity in Hittite and (American) English align closely.

- Denominal and deverbal derivatives preserve primary stress of their base as secondary stress.
- Secondary stress prevents **vowel reduction** — shortening in Hittite, weakening/centralization in English.



Roadmap

- ▶ Introduction
- ▶ Stress & vowel length in Hittite deradical formations
- ▶ Vowel length, stress, and cyclicity in Hittite
- ▶ The diachrony of Hittite stress cyclicity
 - Vowel deletion in Proto-Indo-European deradical formations
 - Cyclic vowel deletion in Proto-Indo-European
 - Stress cyclicity as a Proto-Indo-European phenomenon



Pretonic mid vowel deletion in PIE

- (17) a. $^*/g^{wh}en-ti/ \rightarrow ^*[g^{wh}én-ti] > \text{Ved. } hánti, \text{ Hitt. } kuēnzi \text{ 'kills'}$
 b. $^*/g^{wh}en-énti/ \rightarrow ^*[g^{wh}n-énti] > \text{Ved. } ghnánti, \text{ Hitt. } kunanzi \text{ 'kill'}$
- (18) a. $^*/ph_2tér-m/ \rightarrow ^*[pəh_2tér-m] > \text{Ved. } pitáram, \text{ AGk. } patéra \text{ 'father'}$
 b. $^*/ph_2tér-éi/ \rightarrow ^*[pəh_2tr-éi] >(>) \text{Ved. } pitré; \text{ AGk. } patrí \text{ 'to/for father'}$
- (19) a. $^*/kileu-'os-ø/ \rightarrow ^*[kiléw-os] > \text{Ved. } śrávas, \text{ AGk. } kléos \text{ 'fame'}$
 b. $^*/kileu-tó-s/ \rightarrow ^*[kilu-tó-s] > \text{Ved. } śrutás, \text{ AGk. } klutós \text{ 'heard'}$

- Proto-Indo-European (PIE) mid vowels ($^*/e, o/$) were subject to regular pretonic deletion in deradical formations.¹
 - Root $^*/e/$ surfaces when stressed, e.g., in (17–19a).
 - Root $^*/e/$ is deleted before stressed syllables, e.g., in (17–19b).

¹See Yates 2022, 2023 (= ESHP 6!), 2025.



Pretonic mid vowel deletion in PIE

- (17) a. $^{*}/g^{wh}en-ti/ \rightarrow ^{*}[g^{wh}\acute{e}n-ti] >$ Ved. *hánti*, Hitt. *kuēnzi* ‘kills’
 b. $^{*}/g^{wh}en-énti/ \rightarrow ^{*}[g^{wh}n-\acute{e}nti] >$ Ved. *ghnánti*, Hitt. *kunanzi* ‘kill’
- (20) a. $^{*}/pent-oh_2-m/ \rightarrow ^{*}[pént-o:-m] >(>)$ YAv. *paṇtqm*; Ved. *pánthām* ‘path’
 b. $^{*}/pent-oh_2-ós/ \rightarrow ^{*}[pnt-h_2-\acute{o}s] >$ OAv. *paθō*, Ved. *pathás* ‘of the path’

- Proto-Indo-European (PIE) mid vowels ($^{*}/e, o/$) were subject to regular pretonic deletion in deradical formations.
- Deletion applied **iteratively**, e.g., to both suffixal $^{*}/o/$ and root $^{*}/e/$ in (20b).



Cyclic vowel deletion in PIE

- (21) a. $*/wet-'os-\emptyset/ \rightarrow *[\text{wét-os}] > \text{AGk. } \acute{e}tos \text{ (Myc. } we-to \text{) 'year'}$
 b. $*/wet-'os-ó-s/ \rightarrow *[\text{wet-s-ó-s}] > \text{Ved. } vatsás \text{ 'calf' (< *'yearling')}$
- (22) a. $*/b^heid^h-'e-si/ \rightarrow *[\text{b}^heíd^h-e-si] > \text{AGk. } peítheis, \text{ Lat. } fīdis \text{ 'you persuade/believe'}$
 b. $*/b^heid^h-'e-ói-s/ \rightarrow *[\text{b}^heid^h-ói-s] > \text{AGk. } peithḗ \text{ 'persuasion'}$
- (23) a. $*/new-'o-m/ \rightarrow *[\text{néw-o-m}] > \text{Hitt. } nēwan, \text{ Ved. } nāvam, \text{ AGk. } néon \text{ 'new'}$
 b. $*/new-'o-éh_2-ei/ \rightarrow *[\text{new-áh}_2-ai] >(>) \text{ Hitt. } nēwahḫi; \text{ Lat. } renovat \text{ 'renews'}$
- In PIE denominal and deverbal formations pretonic deletion regularly **underapplied** to (root) vowels stressed in their base, e.g.:¹
 - In (21b) deletion fails to apply iteratively to root $*/e/$, stressed in its base in (21a).
 - When stem-final theme vowel is **truncated** in (22–23b), deletion fails to apply to root $*[e]$, stressed in their bases in (22–23a).

¹See Yates 2022, 2023 (= ESHP 6!), 2025.



Cyclic vowel deletion in PIE

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 b. */wet-'os-ó-s/ → *[wet-s-ó-s] > Ved. *vatsás* 'calf' (< *'yearling')
- (22) a. */b^heid^h-'e-si/ → *[b^héid^h-e-si] > AGk. *peítheis*, Lat. *fīdis* 'you persuade/believe'
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- (23) a. */new-'o-m/ → *[néw-o-m] > Hitt. *nēwan*, Ved. *návam*, AGk. *néon* 'new'
 b. */new-'o-éh₂-ei/ → *[new-áh₂-ai] >(>) Hitt. *nēwahḫi*; Lat. *renovat* 'renews'
- In PIE denominal and deverbal formations pretonic deletion regularly **underapplied** to (root) vowels stressed in their base.

◦ Why?



Cyclic vowel deletion & secondary stress in PIE

- (21) a. $*/wet-'os-\emptyset/ \rightarrow *[\underline{wét-os}] > \text{AGk. } \acute{e}tos \text{ (Myc. } we-to \text{) 'year'}$
 b. $*/wet-'os-ó-s/ \rightarrow *[\underline{wèt-s-ó-s}] > \text{Ved. } vatsás \text{ 'calf' (< *'yearling')}$
- (22) a. $*/b^heid^h-'e-si/ \rightarrow *[\underline{b^héid^h-e-si}] > \text{AGk. } peítheis, \text{ Lat. } fīdis \text{ 'you persuade/believe'}$
 b. $*/b^heid^h-'e-ói-s/ \rightarrow *[\underline{b^hèid^h-ói-s}] > \text{AGk. } peithṓ́ \text{ 'persuasion'}$
- (23) a. $*/new-'o-m/ \rightarrow *[\underline{néw-o-m}] > \text{Hitt. } nēwan, \text{ Ved. } nāvam, \text{ AGk. } néon \text{ 'new'}$
 b. $*/new-'o-éh_2-ei/ \rightarrow *[\underline{nèw-áh_2-ai}] >(>) \text{Hitt. } nēwahḫi; \text{ Lat. } renovat \text{ 'renews'}$

★ **Proposal:** stress assignment in PIE was **cyclic**, just as in Hittite.

- Stress-preferring denominal and deverbal suffixes attract primary stress.
- Primary stress of the base was preserved cyclically as secondary stress, blocking deletion of the base vowel.



Cyclic vowel deletion & secondary stress in PIE

- (21) a. */wet-'os-Ø/ → *[wét-os] > AGk. *étos* (Myc. *we-to*) 'year'
 b. */wet-'os-ó-s/ → *[wèt-s-ó-s] > Ved. *vatsás* 'calf' (< *'yearling')
- (22) a. */b^heid^h-'e-si/ → *[b^héid^h-e-si] > AGk. *peítheis*, Lat. *fīdis* 'you persuade/believe'
 b. */b^heid^h-'e-ói-s/ → *[b^hèid^h-ói:i] > AGk. *peithṓ́* 'persuasion'
- (23) a. */new-'o-m/ → *[négw-o-m] > Hitt. *nēwan*, Ved. *návam*, AGk. *néon* 'new'
 b. */new-'o-éh₂-ei/ → *[négw-áh₂-ai] >(>) Hitt. *nēwah₂hi*; Lat. *renovat* 'renews'
- PIE situation is best reflected in Hittite, where secondary stress has audible cues — e.g., increased duration in [négw-áχ:i] in (23b).



Cyclic vowel deletion & secondary stress in PIE

- (21) a. */wet-'os-Ø/ → *[wét-os] > AGk. *étos* (Myc. *we-to*) 'year'
 b. */wet-'os-ó-s/ → *[wèt-s-ó-s] > Ved. *vatsás* 'calf' (< *'yearling')
- (22) a. */b^heid^h-'e-si/ → *[b^héid^h-e-si] > AGk. *peítheis*, Lat. *fīdis* 'you persuade/believe'
 b. */b^heid^h-'e-ói-s/ → *[b^hèid^h-ói-s] > AGk. *peithṓ́* 'persuasion'
- (23) a. */new-'o-m/ → *[nēw-o-m] > Hitt. *nēwan*, Ved. *návam*, AGk. *néon* 'new'
 b. */new-'o-éh₂-ei/ → *[nèw-áh₂-ai] >(>) Hitt. *nēwah₂hi*; Lat. *renovat* 'renews'
- PIE situation is best reflected in Hittite, where secondary stress has audible cues — e.g., increased duration in [nè:w-áχ:i] in (23b).
 - Audible cues were lost in prehistory of Vedic Sanskrit and Ancient Greek.



Cyclic vowel deletion & secondary stress in PIE

- (21) a. */wet-'os-Ø/ → *[wét-os] > AGk. *étos* (Myc. *we-to*) 'year'
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 b. */b^heid^h-'e-ói-s/ → *[b^hèid^h-ói-s] > AGk. *peithṓ* 'persuasion'
- (23) a. */new-'o-m/ → *[néw-o-m] > Hitt. *nēwan*, Ved. *návam*, AGk. *néon* 'new'
 b. */new-'o-éh₂-ei/ → *[nèw-áh₂-ai] >(>) Hitt. *nēwah₂hi*; Lat. *renovat* 'renews'
- PIE situation is best reflected in Hittite, where secondary stress has audible cues — e.g., increased duration in [nè:w-áχ:i] in (23b).
 - Audible cues were lost in prehistory of Vedic Sanskrit and Ancient Greek.
 - Opacification of inherited deletion processes may help to explain their diachronic breakdown and ultimately loss in these languages (and elsewhere in IE).



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 - Indo-European & Modern Linguistic Theory research group
 - Princeton University Linguistics Coffee Hour
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 - Stephanie Jamison, Brent Vine, John Clayton, Ron Kim, and esp. Craig Melchert
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Roadmap

- ▶ Appendices
 - Secondary stress & “the missing base” problem
 - Toward an analysis of Hittite stress cyclicity



Stress & length in base-less denominals

(24) a. *mūgāmi* [mò:k-á:-mi] ‘I incite’

b. *šāktāizzi* [sà:kt:-á:i-ḫsi] ‘performs sick-maintenance’

c. *šāklāiš* [sà:kl-á:i-s] ‘custom’

- Some Hittite words with multiple **long vowels** are historically denominal, but lack attested bases — e.g., (24).
- Lexically-specified secondary stress accounts for vowel length, avoiding the “missing base” problem.



Analyzing Hittite stress cyclicity

(25)	CYCLE 1:	a. iwá:ru	b. iwá:ru	c. a:r	UR
		iwá:ru	iwá:ru	a:r	SA
	CYCLE 2:	–	iwá:rw-á:i	–	– <i>ǎ</i> (i)-AFFIXATION
		iwá:ru	iwà:rw-ái	a:r	SA
	POSTCYCLIC:	iwá:ru-ø	iwà:rw-á:i-er	a:r-ánf̥si	INFLECTION
		iwá:ru-ø	iwà:rw-á:i-er	a:r-ánf̥si	SA
		iwá:ru-ø	iwà:rw-á:i-er	ar-ánf̥si	UVS
		[iwá:ru]	[iwà:rw-á:i-er]	[ar-ánf̥si]	SR
		‘dowry’	‘bestowed a dowry’	‘arrive’	

- Possible rule-based analysis of Hittite stress and vowel length in (25).¹

¹SA = stress assignment (see Yates 2017, forthcoming for details); UVS = unstressed vowel shortening.



Analyzing Hittite stress cyclicity

(25)	CYCLE 1:	a. iwá:ru	b. iwá:ru	c. a:r	UR
		iwá:ru	iwá:ru	a:r	SA
	CYCLE 2:	–	iwá:rw-á:i	–	–ǎ(i)-AFFIXATION
		iwá:ru	iwà:rw-ái	a:r	SA
	POSTCYCLIC:	iwá:ru-ø	iwà:rw-á:i-er	a:r-ánf̥si	INFLECTION
		iwá:ru-ø	iwà:rw-á:i-er	a:r-ánf̥si	SA
		iwá:ru-ø	iwà:rw-á:i-er	ar-ánf̥si	UVS
		[iwá:ru]	[iwà:rw-á:i-er]	[ar-ánf̥si]	SR
		‘dowry’	‘bestowed a dowry’	‘arrive’	

- Possible rule-based analysis of Hittite stress and vowel length in (25).¹

○ How is Hittite stress cyclicity best captured formally (within an OT framework)?

¹SA = stress assignment (see Yates 2017, forthcoming for details); UVS = unstressed vowel shortening.