'kill', 'cut', and the restructuring of root ablaut in Anatolian radical *–mi-verbs

Anthony D. Yates
Ludwig-Maximilians-Universität München
anthony.yates@lrz.uni-muenchen.de

April 21, 2021
Cornell University

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

'kill' and 'cut' in Hittite and Proto-Indo-European

▶ Two famous Proto-Indo-European (PIE) word equations, proposed by
Hrozný (1919:73) and now universally accepted:

(1) a. Hitt. *kuēnzi* = Ved. *hánti*
        'kills'   'kills'

   b. Hitt. *kunanzi* = Ved. *ghnánti*
        'they kill'   'they kill'

'kill' and 'cut' in Hittite and Proto-Indo-European

▶ Two famous Proto-Indo-European (PIE) word equations, proposed by Hrozný (1919:73) and now universally accepted:

(1) a. Hitt. *kuēnzi* = Ved. *hánti* < PIE *g^{wh}én-ti*
        'kills'   'kills'   'kills'

   b. Hitt. *kunanzi* = Ved. *ghnánti*
         'they kill'   'they kill'

'kill' and 'cut' in Hittite and Proto-Indo-European

▶ Two famous Proto-Indo-European (PIE) word equations, proposed by Hrozný (1919:73) and now universally accepted:

(1)   a.   Hitt.   *kuēnzi*   =   Ved.   *hánti*   <   PIE   *$^{*}g^{wh}$én-ti*
                 'kills'   'kills'   'kills'

        b.   Hitt.   *kunanzi*   =   Ved.   *ghnánti*   <   PIE   *$^{*}g^{wh}$n-énti*
                 'they kill'   'they kill'   'they kill'

'kill' and 'cut' in Hittite and Proto-Indo-European

▶ Two famous Proto-Indo-European (PIE) word equations, proposed by Hrozný (1919:73) and now universally accepted:

(1) a. Hitt. *kuēnzi* = Ved. *hánti* < PIE *g^{wh}én-ti*
       'kills'   'kills'   'kills'

    b. Hitt. *kunanzi* = Ved. *ghnánti* < PIE *g^{wh}n-énti*
       'they kill'   'they kill'   'they kill'

▶ Two less famous equations showing the same type of root ablaut alternation (cf. *LIV*[2]: 391–2):

(2) a. Hitt. *kuērta* = Ved. *kár* < PIE *k^{w}ér-t*
       'cut'   'made'   'cut'

    b. Hitt. *kurante*[š] = Ved. *krántas* < PIE *k^{w}r-ónt-es*
       'cut (by)'   'making'   'cutting'

Vowel deletion in Proto-Indo-European

▶ Such ablaut alternations are standardly attributed to a PIE
stress-conditioned vowel deletion process:

  ▶ Underlying root full-grade ($*$/e/) surfaces when stressed:

(3) a. PIE $*$/g^{wh}en-ti/ → $*$[g^{wh}én-ti] > Hitt. *kuēnzi,* Ved. *hán-ti*

   b. PIE $*$/k^{w}er-t/ → $*$[k^{w}ér-t] > Hitt. *kūerta,* Ved. *kár*

Vowel deletion in Proto-Indo-European

▶ Such ablaut alternations are standardly attributed to a PIE stress-conditioned vowel deletion process:

    ▶ Underlying root full-grade ($*/e/$) surfaces when stressed:

(3)   a.   PIE $*/g^{wh}en\text{-}ti/$ $\rightarrow$ $*[g^{wh}\acute{e}n\text{-}ti]$ >   Hitt. *kuēnzi,* Ved. *hán-ti*

     b.   PIE $*/k^w er\text{-}t/$ $\rightarrow$ $*[k^w \acute{e}r\text{-}t]$ >   Hitt. *kūerta,* Ved. *kár*

    ▶ Root vowel ($*/e/$) is <u>deleted</u> when following suffix attracts stress:

(4) a. PIE $*/g^{wh}en\text{-}\acute{e}nti/$ $\rightarrow *[\underline{g^{wh}n}\text{-}\acute{e}nti]$ > Hitt. *kunanzi,* Ved. *ghn-ánti*

   b. PIE $*/k^w er\text{-}\acute{o}nt\text{-}es/$ $\rightarrow *[\underline{k^w r}\text{-}\acute{o}nt\text{-}es]$ > Hitt. *kurante*[*š*], Ved. *kr-ánt-as*

▶ Focus of today's talk — the root vocalism of 'kill' and 'cut' in Hittite:

(5) a. Hitt. *kuēnzi* ~ *kunanzi*
                'kills'   'they kill'

    b. Hitt. *kuērta* ~ *kurante*[*š*]
                'cut'   'cut (by)'

Vowel deletion in Hittite?

▶ Focus of today's talk — the root vocalism of 'kill' and 'cut' in Hittite:

(5) a. Hitt. *kuēnzi*   ~   *kunanzi*
              'kills'   'they kill'

     b. Hitt. *kuērta*   ~   *kurante*[*š*]
              'cut'   'cut (by)'

▶ Two specific questions addressed:

   (i) **How should the vocalism of Hittite weak root allomorphs in (5) be interpreted phonologically?**

   (ii) **How should root ablaut alternations of the type in (5) be analyzed?**

Vowel deletion in Hittite?

▶ Focus of today's talk — the root vocalism of 'kill' and 'cut' in Hittite:

(5) a. Hitt. *kuēnzi* ~ *kunanzi* cf. Ved. *g͡hn-ánti*
              'kills'   'they kill'

    b. Hitt. *kuērta* ~ *kurante*[*š*]   Ved. *kr-ánt-as*
              'cut'   'cut (by)'

▶ Two specific questions addressed — traditional views:

   (i) **How should the vocalism of Hittite weak root allomorphs in (5) be interpreted phonologically?**

      ▶ As historically expected clusters [k͡ʷn-], [k͡ʷr-] (Kimball 1999:266–7, Kloekhorst 2014:667–8, *i.a.*)

   (ii) **How should root ablaut alternations of the type in (5) be analyzed?**

      ▶ As the reflex of historically expected deletion.

Vowel deletion in Hittite?

▶ Focus of today's talk — the root vocalism of 'kill' and 'cut' in Hittite:

(5) a. Hitt. *kuēnzi* ~ *kunanzi* cf. Ved. *g̥hn-ánti*
       'kills' 'they kill'

  b. Hitt. *kuērta* ~ *kurante*[*š*] Ved. *k̥r-ánt-as*
       'cut' 'cut (by)'

▶ Two specific questions addressed — new proposals:

 (i) **How should the vocalism of Hittite weak root allomorphs in (5) be interpreted phonologically?**

 (ii) **How should root ablaut alternations of the type in (5) be analyzed?**

Vowel deletion in Hittite?

▶ Focus of today's talk — the root vocalism of 'kill' and 'cut' in Hittite:

(5) a. Hitt. *kuēnzi*   ~   *kunanzi*   cf. Ved. *g̑hn-ánti*
                'kills'   'they kill'

     b. Hitt. *kuērta*   ~   *kurante*[*š*]   Ved. *kr̥-ánt-as*
                'cut'   'cut (by)'

▶ Two specific questions addressed — new proposals:

   (i) **How should the vocalism of Hittite weak root allomorphs in (5) be interpreted phonologically?**

        ✓ [kʷon-], [kʷor-] in place of historically expected ˣ[k̑ʷn̥-], ˣ[k̑ʷr̥-]

   (ii) **How should root ablaut alternations of the type in (5) be analyzed?**

Vowel deletion in Hittite?

▶ Focus of today's talk — the root vocalism of 'kill' and 'cut' in Hittite:

(5) a. Hitt. *kuēnzi* ~ *kunanzi* cf. Ved. *ghn-ánti*
            'kills'   'they kill'
     b. Hitt. *kuērta* ~ *kurante*[*š*]   Ved. *kr-ánt-as*
            'cut'   'cut (by)'

▶ Two specific questions addressed — new proposals:

   (i) **How should the vocalism of Hittite weak root allomorphs in (5) be interpreted phonologically?**

      ✓ [k^{w}on-], [k^{w}or-] in place of historically expected ^{x}[k^{w}n̥-], ^{x}[k^{w}r̥-]

   (ii) **How should root ablaut alternations of the type in (5) be analyzed?**

      ✓ As the reflex of an innovative vowel reduction process.

Vowel deletion in Hittite?

► Focus of today's talk — the root vocalism of 'kill' and 'cut' in Hittite:

(5) a. Hitt. *kuēnzi* ~ *kunanzi* cf. Ved. *ghn-ánti*
              'kills'   'they kill'

     b. Hitt. *kuērta* ~ *kurante*[*š*]   Ved. *kr-ánt-as*
              'cut'   'cut (by)'

► If these claims are correct, a broader question arises:

  (iii) **When and how did these phonological changes occur?**

Roadmap

Distribution of *kueR–* and *kuR–* in Hittite

▶ Root allomorphs of 'kill' and 'cut' are in complementary distribution:

    ▶ *kuĕn–* and *kuĕr–* when synchronically stressed.

(6)   a.   ⟨*ku-e-en-zi*⟩   'kills'

           [kʷéːn-t͡si]   cf. Ved. *hánti*

           (kill-3SG.NPST.ACT)   (e.g., KBo 6.2 i 3; OH/OS)

   b.   ⟨*ku-e-en-ta*⟩   'killed'

           [kʷéːn-ta]   cf. Ved. *hán*

           (kill-3SG.PST.ACT)   (e.g., KUB 36.100 obv. 14; OH/OS)

   c.   ⟨*ku-e-er-ta*⟩   'cut'

           [kʷéːr-ta]   cf. Ved. *kár*

           (cut-3SG.PST.ACT)   (KUB 44.4 + KBo 13.241 rev. 28; NS)

▶ Plene spelling marks long vowel, which indicates word stress (matching historical stress).

Distribution of *kueR–* and *kuR–* in Hittite

▶ Root allomorphs of 'kill' and 'cut' are in complementary distribution:

    ▶ *kuě̆n–* and *kuě̆r–* when synchronically stressed.

    ▶ *kun–* and *kur–* before synchronically stressed vowel-initial suffixes.

(7)   a. ⟨*ku-na-a-tar*⟩   'killing'   (KUB 19.4 obv. 7; NH/NS)
             kun-[áːtar]
             (kill-NML:N.NOM/ACC.SG)

       b. ⟨*ku-na-a-an-na*⟩   'to kill'   (KBo 10.7 ii 17; OH/NS)
             kun-[áːnːa]
             (kill-INF)

       c. ⟨^{TÚG}*ku-re-e-eš-šar*⟩   'piece of cloth'   (KUB 12.63 rev. 25; OH/MS)
             kur-[éːsːar]
             (cut-NML:N.NOM/ACC.SG)

       d. ⟨*ku-ra-a-an*⟩   'cut (by)'   (e.g., KBo 35.207 obv. 6; MH/MS)
             kur-[áːn]   cf. Ved. *kr-ánt–*
             (cut-PTCP:N.NOM/ACC.SG)

Distribution of *kueR–* and *kuR–* in Hittite

- ▶ Root allomorphs of 'kill' and 'cut' are in complementary distribution:
    - ▶ *kuĕn–* and *kuĕr–* when stressed.
    - ▶ *kun–* and *kur–* before stressed vowel-initial suffixes.
    - ▶ (Neither root is securely attested before stressed consonant-initial suffixes with a single exception discussed below.)

Distribution of *kueR–* and *kuR–* in Hittite

▶ Root allomorphs of 'kill' and 'cut' are in complementary distribution:

 ▶ *ku̯ĕn–* and *ku̯ĕr–* when stressed.
 ▶ *kun–* and *kur–* before stressed vowel-initial suffixes.
 ▶ (Neither root is securely attested before stressed consonant-initial suffixes with a single exception discussed below.)

▶ This distribution is compatible with null hypothesis — i.e., that Hittite continues the PIE phonological grammar unchanged.

 ⇒ *kun–* ([kʷn-]) and *kur–* ([kʷr-]) result from <u>pretonic deletion</u>:

(8) a. Hitt. /kʷen-énti/ → [k̫ʷn-ántsi]   cf. Ved. *ghn-ánti*
                              ⟨*ku-na-an-zi*⟩

    b. Hitt. /kʷer-ónt-∅/ → [k̫ʷr-áːn]   cf. Ved. *kr-ánt–*
                              ⟨*ku-ra-a-an*⟩

Distribution of *kueR–* and *kuR–* in Hittite

- ▶ Root allomorphs of 'kill' and 'cut' are in complementary distribution:
    - ▶ *ku̯én–* and *ku̯ér–* when stressed.
    - ▶ *kun–* and *kur–* before stressed vowel-initial suffixes.
    - ▶ (Neither root is securely attested before stressed consonant-initial suffixes with a single exception discussed below.)

- ▶ This distribution is compatible with null hypothesis — i.e., that Hittite continues the PIE phonological grammar unchanged.

    - ○ **But do *kun–* and *kur–* really represent** [kʷn-] **and** [kʷr-]**?**

(8)   a.   Hitt.   /kʷen-énti/   →   [k̲ʷ̲n̲-ánts͡i]   cf. Ved. *ghn-ánti*
                                      ⟨*ku-na-an-zi*⟩

       b.   Hitt.   /kʷer-ónt-∅/   →   [k̲ʷ̲r̲-áːn]   cf. Ved. *kr-ánt–*
                                        ⟨*ku-ra-a-an*⟩

Interpreting ambiguous spellings

▶ Weak allomorphs of 'kill' and 'cut' are consistently spelled ⟨*ku-nV-*⟩ and ⟨*ku-rV-*⟩:

(9)   a.   ⟨*ku-na-an-zi*⟩   'they kill'
             ⟨*ku-na-an-za*⟩   'killed (by)'
             ⟨*ku-na-an-du*⟩   'let them kill'
             ⟨*ku-na-a-an-na*⟩   'to kill'

      b.   ⟨*ku-ra-an-zi*⟩   'they cut'
             ⟨*ku-ra-a-an*⟩   'cut (by)'
             ⟨*ku-ra-an-du*⟩   'let them cut'
             ⟨*ku-ra-a-an-na*⟩   'to cut'

▶ These spellings are synchronically ambiguous — KU can represent:

(10)   a. $[k^w]$ b. $[ku]$ c. $[ko]$ d. $[k^wu]$ e. $[k^wo]$

Interpreting ambiguous spellings

- ▶ Weak allomorphs of 'kill' and 'cut' thus interpretable as:

(11)		[kʷ]	[k]	
a.	⟨*ku-na-an-zi*⟩	[kʷn-ánt͡si]	—	CLUSTER
		[kʷon-ánt͡si]	[kon-ánt͡si]	ROOT [o]
		[kʷun-ánt͡si]	[kun-ánt͡si]	ROOT [u]
b.	⟨*ku-ra-an-zi*⟩	[kʷr-ánt͡si]	—	CLUSTER
		[kʷor-ánt͡si]	[kor-ánt͡si]	ROOT [o]
		[kʷur-ánt͡si]	[kur-ánt͡si]	ROOT [u]

Interpreting ambiguous spellings

► Weak allomorphs of 'kill' and 'cut' thus interpretable as:

(11)		[kʷ]	[k]	
a.	⟨*ku-na-an-zi*⟩	[kʷn-ánt͡si]	—	CLUSTER
		[kʷon-ánt͡si]	[kon-ánt͡si]	ROOT [o]
		[kʷun-ánt͡si]	[kun-ánt͡si]	ROOT [u]
b.	⟨*ku-ra-an-zi*⟩	[kʷr-ánt͡si]	—	CLUSTER
		[kʷor-ánt͡si]	[kor-ánt͡si]	ROOT [o]
		[kʷur-ánt͡si]	[kur-ánt͡si]	ROOT [u]

○ **Which of these interpretations are correct?**

Interpreting ambiguous spellings

▶ Weak allomorphs of 'kill' and 'cut' thus interpretable as:

(11)		[kʷ]	[k]	
a.	⟨*ku-na-an-zi*⟩	[kʷn-ántsi]	—	CLUSTER
		[kʷon-ántsi]	[kon-ántsi]	ROOT [o]
		[kʷun-ántsi]	[kun-ántsi]	ROOT [u]
b.	⟨*ku-ra-an-zi*⟩	[kʷr-ántsi]	—	CLUSTER
		[kʷor-ántsi]	[kor-ántsi]	ROOT [o]
		[kʷur-ántsi]	[kur-ántsi]	ROOT [u]

○ **Which of these interpretations are correct?**

▶ Root [u]-vowel in 'cut' ruled out by systematic use of U signs (= [o(ː)]) before /r(ː)/ in Hittite (never Ú = [u(ː)]).

Interpreting ambiguous spellings

▶ Weak allomorphs of 'kill' and 'cut' thus interpretable as:

(11)		[kʷ]	[k]	
a.	⟨*ku-na-an-zi*⟩	[kʷn-ántsi]	—	CLUSTER
		[kʷon-ántsi]	[kon-ántsi]	ROOT [o]
		[kʷun-ántsi]	[kun-ántsi]	ROOT [u]
b.	⟨*ku-ra-an-zi*⟩	[kʷr-ántsi]	—	CLUSTER
		[kʷor-ántsi]	[kor-ántsi]	ROOT [o]
		[kʷur-ántsi]	[kur-ántsi]	ROOT [u]

○ **Which of these interpretations is correct?**

▶ **Claim:** There is evidence for an ahistorical root vowel in 'kill' and 'cut'.

Interpreting ambiguous spellings

▶ Weak allomorphs of 'kill' and 'cut' thus interpretable as:

(11)		[kʷ]	[k]	
a.	⟨*ku-na-an-zi*⟩	[kʷn-ántsi]	—	CLUSTER
		[kʷon-ántsi]	[kon-ántsi]	ROOT [o]
		[kʷun-ántsi]	[kun-ántsi]	ROOT [u]
b.	⟨*ku-ra-an-zi*⟩	[kʷr-ántsi]	—	CLUSTER
		[kʷor-ántsi]	[kor-ántsi]	ROOT [o]
		[kʷur-ántsi]	[kur-ántsi]	ROOT [u]

○ **Which of these interpretations is correct?**

  ▶ **Claim:** There is evidence for an ahistorical root vowel in 'kill' and 'cut'.
  ▶ No probative evidence distinguishing between others — I argue for [kʷon-ántsi] and [kʷor-ántsi].

Imperfectives of 'kill' and 'cut' in Hittite

- Highly productive in Hittite are imperfectives formed with the inherited suffix *–ške–* (< PIE *–sḱe–*).

Imperfectives of 'kill' and 'cut' in Hittite

▶ Highly productive in Hittite are imperfectives formed with the inherited suffix –*ške*– (< PIE *–*sk̂e*–).

▶ PIE verbal stems formed with the suffix *–*sk̂e*– regularly had suffixal stress and zero-grade of the root (cf. *LIV*[2]: 209–10, 490–1):

(12)   a.   PIE */prék̂-sk̂é-ti/   →   *[pr̥k̂-sk̂é-ti] > Ved. *pr̥cháti* 'asks'
                                                           Lat. *poscit* 'demands'

       b.   PIE */gʷem-sk̂é-∅/   →   *[gʷm̥-sk̂é] > Ved. *gácha* 'go!'
                                                          Gk. βάσκε 'come!'

Imperfectives of 'kill' and 'cut' in Hittite

- ▶ Highly productive in Hittite are imperfectives formed with the inherited suffix –*ške*– (< PIE *–*sk̂e*–).
- ▶ PIE verbal stems formed with the suffix *–*sk̂e*– regularly had suffixal stress and zero-grade of the root (cf. *LIV*²: 209–10, 490–1).
- ▶ Oldest imperfectives of 'kill' and 'cut' in Hittite reflect same pattern:

(13) a. PIE */g^{wh}en-sk̂é-ti/ → *[g^{wh}n̥-sk̂é-ti] > Hitt. [k^{w}a-skːéː-t͡si] 'kills'

⟨*ku-wa-as-ke-ez-zi*⟩

(KUB 33.66 iii 2; OH/MS)

b. */k^{w}er-sk̂é-ti/ → *[k^{w}r̥-sk̂é-ti] > Hitt. [k^{w}ar-skːéː-t͡si] 'cuts'

⟨*ku-wa-ar-aš-ke-ez-zi*⟩

(KBo 24.3 i 7; MS)

- ▶ For *k^wR̥ > Hitt. [k^{w}aR-] / ___CC see Kloekhorst 2007 (§5; cf. Melchert 2020).

Imperfective of 'cut' — a morphophonological change

▶ But — renewed imperfective forms of 'cut' attested in contemporaneous and later texts show instead root shape *kur–*:

(14)   a.   ⟨*ku-ra-aš-kán-zi*⟩   'they cut'

           (cut-IPFV-3SG.NPST.ACT)   (Bo 3640 iii 9–10; NS)

    b.   ⟨*kur-as-ke-mi*⟩   'I cut'

           (kill-IPFV-3SG.NPST.ACT)   (KBo 24.3 i 14; MS)

    c.   ⟨*kur-aš-ke-ez-zi*⟩   'cuts'

           (cut-IPFV-3SG.NPST.ACT)   (KUB 53.11 ii 4; MS)

▶ Cluster $[k^w r\text{-}]$ in (14) is phonotactically impossible ($^x[k^w rsk\text{:}\acute{V}\text{-}]$).

Imperfective of 'cut' — a morphophonological change

▶ But — renewed imperfective forms of 'cut' attested in contemporaneous and later texts show instead root shape *kur–*:

(14) a. ⟨*ku-ra-aš-kán-zi*⟩   'they cut'
          [kʷor-skː-ántsi]
          (cut-IPFV-3SG.NPST.ACT)   (Bo 3640 iii 9–10; NS)

      b. ⟨*kur-as-ke-mi*⟩   'I cut'
          [kʷor-skːéː-mi]
          (kill-IPFV-3SG.NPST.ACT)   (KBo 24.3 i 14; MS)

      c. ⟨*kur-aš-ke-ez-zi*⟩   'cuts'
          [kʷor-skːéː-tsi]
          (cut-IPFV-3SG.NPST.ACT)   (KUB 53.11 ii 4; MS)

▶ Cluster [kʷr-] in (14) is phonotactically impossible (ˣ[kʷrskːV́-]).

⇒ Root in (14) must contain a real vowel ([kʷor-skːV́-]).

Reduplicated imperfectives of 'cut'

- ▶ Further support for phonological interpretation of *kur*– as [kʷor-] comes from reduplication.

- ▶ Both (15a) older and (15b) renewed imperfectives of 'cut' attest reduplicated stems, which show differing reduplicant shapes based on the different vocalism of base:

(15)

	IPFV	⇒	RED IPFV
a.	⟨*ku-wa-ar-aš-ke-ez-zi*⟩		⟨*ku-wa-ku-wa-ar<-aš>-ke-mi*⟩
	[kʷar-skːé-t͡si]		[kʷá-kʷːar-skːe-mi]
	(cut-IPFV-3SG.NPST.ACT)		(RED-cut-IPFV-1SG.NPST.ACT)
b.	⟨*ku-ra-aš-kán-zi*⟩		⟨*ku-uk-ku-ra-aš-kán-zi*⟩
	[kʷor-skːé-t͡si]		[kʷó-kʷːor-skː-ant͡si]
	(cut-IPFV-3PL.NPST.ACT)		(RED-cut-IPFV-3PL.NPST.ACT)

- ▶ <u>Reduplicant</u> in (15b) must contain a vowel, which is copied from root.

kur– 'cut' is [kʷor-]

- ○ Where does *kur*– [kʷor-] in *kur(a)ške*– come from?
    - ✓ Kloekhorst (2007:455 n. 1): "[T]he imperfectiv[e] *kuraške*–" is a "younger formatio[n] **built on the synchronic weak ste[m] *kur*–**."

kur– 'cut' is [kʷor-]

- Where does *kur*– [kʷor-] in *kur(a)ške*– come from?

  ✓ Kloekhorst (2007:455 n. 1): "[T]he imperfectiv[e] *kuraške*–" is a "younger formatio[n] **built on the synchronic weak ste[m] *kur*–**."

⇒ Weak stem forms of 'cut' spelled *kur*– were pronounced [kʷor-] in Hittite, thus 3SG.NPST.ACT *kuranzi* [kʷor-ántsi].

kun– 'kill' is [kʷon-] — the evidence

▶ Hittite noun *kunkunuzzi*– '(type of) rock' occurs primarily in Song of Ullikummi (CTH 345; Güterbock 1952) as epithet of eponymous stone monster — e.g., (16) (cf. Hoffner 1998:62):

(16) [*ku-e*] *n-ta=wa-r=a-an=kán ku-w*[*a-at-qa*]
[^(NA₄)*ku*]*-un-ku-n*[*u-zi-iš am-me-el* LÚ-*an* ᵈU-*an na-ak-k*]*i-in* LUGAL-*un*

'(Hebat said:) "Perhaps the *kunkunuzzi* has killed him,
[my husband the Storm-god, the migh]ty king."'

(KUB 17.7 + KUB 33.93+ i 31–32; MH/NS)

kun– 'kill' is $[k^w on-]$ — the evidence

▶ Hittite noun *kunkunuzzi*– '(type of) rock' occurs primarily in Song of Ullikummi (CTH 345; Güterbock 1952) as epithet of eponymous stone monster — e.g., (16) (cf. Hoffner 1998:62):

(16) [*ku-e*] *n-ta=wa-r=a-an=kán ku-w*[*a-at-qa*]
[^{NA_4}*ku*]-*un-ku-n*[*u-zi-iš am-me-el* LÚ-*an* ^{d}U-*an na-ak-k*]*i-in* LUGAL-*un*

'(Hebat said:) "Perhaps the *kunkunuzzi* has killed him,
[my husband the Storm-god, the migh]ty king."'

(KUB 17.7 + KUB 33.93+ i 31–32; MH/NS)

▶ Connection between *kunkunuzzi*– and PIE *$g^{wh}en$*– 'kill' accepted since Carruthers 1933(cf. Puhvel 1997:251–4, Kloekhorst 2008:494).

kun– 'kill' is $[k^won-]$ — the evidence

▶ Hittite noun *kunkunuzzi*– '(type of) rock' occurs primarily in Song of Ullikummi (CTH 345; Güterbock 1952) as epithet of eponymous stone monster — e.g., (16) (cf. Hoffner 1998:62):

(16) [*ku-e*]*n-ta*=*wa-r-a-an*=*kán ku-w*[*a-at-qa*]
[^NA4^*ku*]*-un-ku-n*[*u-zi-iš am-me-el* LÚ-*an* ^d^U-*an na-ak-k*]*i-in* LUGAL-*un*

'(Hebat said:) "Perhaps the *kunkunuzzi* has killed him,
[my husband the Storm-god, the migh]ty king."'

(KUB 17.7 + KUB 33.93+ i 31–32; MH/NS)

▶ Connection between *kunkunuzzi*– and PIE *$*g^{wh}en$*– 'kill' accepted since Carruthers 1933(cf. Puhvel 1997:251–4, Kloekhorst 2008:494).

⇒ (16) contains a *figura etymologica*.

kun– 'kill' is [kʷon-] — the evidence

- ▶ Standard morphological analysis of Hitt. *kunkunuzzi–*:

kun– 'kill' is [kʷon-] — the evidence

- ▶ Standard morphological analysis of Hitt. *kunkunuzzi–*:
    - ▶ "tool"-suffix –*uzzi* (Hoffner and Melchert 2008:61) — cf. (17):

(17) a. *kuruzzi*– 'cutting-tool'   ⇐ *kuer*– 'cut'
      b. *išpanduzzi*– 'libation vessel' ⇐ *išpand*– 'libate'

kun– 'kill' is [kʷon-] — the evidence

▶ Standard morphological analysis of Hitt. *kunkunuzzi*–:

  ▶ "tool"-suffix –*uzzi* (Hoffner and Melchert 2008:61) — cf. (17):

(17) a. *kuruzzi*– 'cutting-tool'   ⇐ *kuer*– 'cut'
     b. *išpanduzzi*– 'libation vessel' ⇐ *išpand*– 'libate'

  ▶ An otherwise unattested verbal stem *kunkun–**, derived from Hitt.
    kuen– 'kill' (< PIE **gʷʰen*–) by full root reduplication (on the pattern see
    Dempsey 2015:314–7)

kun– 'kill' is $[\text{k}^\text{w}\text{on-}]$ — the evidence

► Standard morphological analysis of Hitt. *kunkunuzzi*–:

  ► "tool"-suffix –*uzzi* (Hoffner and Melchert 2008:61) — cf. (17):

(17) a. *kuruzzi*– 'cutting-tool'   ⇐ *kuer*– 'cut'
      b. *išpanduzzi*– 'libation vessel' ⇐ *išpand*– 'libate'

  ► An otherwise unattested verbal stem *kunkun*–*, derived from Hitt. *kuen*– 'kill' (< PIE *$g^{wh}en$*–) by full root reduplication (on the pattern see Dempsey 2015:314–7)

► Reduplicant of *kunkun*–* must contain a vowel ($[\text{k}^\text{w}\text{on-}]$), which is copied from synchronic weak root allomorph *kun*– ($[\text{k}^\text{w}\text{on-}]$) — i.e.:

(18) RED *kunkun*–*   ⇐ *kun*– 'kill'
          $[\text{k}^\text{w}\text{on-k}^\text{w}\text{on-}]$ $[\text{k}^\text{w}\text{on-}]$

kun– 'kill' is [kʷon-] — the evidence

▶ Interpreting orthographically ambiguous *kunkunuzzi* as [kʷon-kʷon-]
  with synchronic labiovelars yields an alliterative echo in passage from
  (16) above — i.e., (19).

(19) [*ku-e*]*n-ta=wa-r=a-an=kán ku-w*[*a-at-qa*] / [^{NA_4} *ku*]*-un-ku-n*[*u-zi-iš*]

  [kʷ . . .   kʷ . . .   kʷ . . .   kʷ . . .   ]

  'The *kunkunuzzi* could've killed him'

▶ See Francia 2018 for alliteration as a structuring device in Hittite poetry
  (Watkins 1995 for the IE background).

► Thus between PIE and Hittite 'kill' and 'cut' developed a root-internal vowel in prevocalic zero-grade contexts:

(25) a. PIE *gʷʰn-énti >(>) Hitt. [kʷon-ánt͡si] 'they kill'
⟨ku-na-an-zi⟩ cf. Ved. ghnánti

b. PIE *kʷr-ónt-es >(>) Hitt. [kʷor-áːnt-es] 'cut (by)'
⟨ku-ra-an-te-e[š]⟩ cf. Ved. kr-ánt-as

Chronology of prevocalic *[kʷR-] > [kʷVR-] in Anatolian

▶ Thus between PIE and Hittite 'kill' and 'cut' developed a root-internal vowel in prevocalic zero-grade contexts:

(25)   a.   PIE   *$g^{wh}n$-énti   >(>)   Hitt.   [kʷon-ánts͡i]   'they kill'
                                            ⟨*ku-na-an-zi*⟩   cf. Ved. *ghnánti*
     b.   PIE   *$k^{w}r$-ónt-es*   >(>)   Hitt.   [kʷor-áːnt-es]   'cut (by)'
                                            ⟨*ku-ra-an-te-e*[š]⟩   cf. Ved. *kr-ánt-as*

- **When exactly did this change occur?**

► Thus between PIE and Hittite 'kill' and 'cut' developed a root-internal vowel in prevocalic zero-grade contexts:

(25) a. PIE *g^{wh}n-énti >(>) Hitt. [kʷon-ánt͡si] 'they kill'
⟨*ku-na-an-zi*⟩ cf. Ved. *ghnánti*

b. PIE *k^wr-ónt-es >(>) Hitt. [kʷor-áːnt-es] 'cut (by)'
⟨*ku-ra-an-te-e*[š]⟩ cf. Ved. *kr-ánt-as*

○ **When exactly did this change occur?**

► There is evidence for the same change in Luwian, thus likely Proto-Anatolian (PA).

Luwian 'cut' and chronology of *[kʷR-] > [kʷVR-]

▶ Anatolian radical *mi*-verb 'cut' is securely continued in Luwian:

(26)   a.   1SG   I-ALuw.   ⟨*kwa/i+ra/i-ha*⟩   'I cut'   (MARAŞ 4 §13)
                    [kʷáːɾ-χːa]

      b.   3SG   KLuw.   ⟨*ku-wa-ar-ti*⟩   'cuts'   (KUB 35.48 iii 19)
                        ⟨*ku-wa-al-ti*⟩   (KUB 35.48 iii 18)
                    [kʷáːɾ-ti]

      c.   INF   KLuw.   ⟨*ku-ú-ru-na*⟩   'to cut'   (KUB 25.38: 11)
                    [kʷuːɾuna]

Luwian 'cut' and chronology of *[kʷR-] > [kʷVR-]

▶ Anatolian radical *mi*-verb 'cut' is securely continued in Luwian:

(26) a. 1SG I-ALuw. ⟨*kwa/i+ra/i-ha*⟩   'I cut'   (MARAŞ 4 §13)
                        [kʷáːɾ-χːa]

      b. 3SG KLuw.   ⟨*ku-wa-ar-ti*⟩   'cuts'   (KUB 35.48 iii 19)
                        ⟨*ku-wa-al-ti*⟩   (KUB 35.48 iii 18)
                        [kʷáːɾ-ti]

      c. INF KLuw.   ⟨*ku-ú-ru-na*⟩   'to cut'   (KUB 25.38: 11)
                        [kʷuːɾuna]

▶ Plene spelling of INF points to a real (and stressed/lengthened) vowel, i.e., [kʷúːɾ-].

Luwian 'cut' and chronology of *[kʷR-] > [kʷVR-]

▶ Anatolian radical *mi*-verb 'cut' is securely continued in Luwian:

(26) a. 1SG I-ALuw. ⟨*kwa/i+ra/i-ha*⟩ 'I cut' (MARAŞ 4 §13)
                     [kʷáːɾ-χːa]

    b. 3SG KLuw. ⟨*ku-wa-ar-ti*⟩ 'cuts' (KUB 35.48 iii 19)
                    ⟨*ku-wa-al-ti*⟩   (KUB 35.48 iii 18)
                    [kʷáːɾ-ti]

    c. INF KLuw. ⟨*ku-ú-ru-na*⟩ 'to cut' (KUB 25.38: 11)
                    [kʷuːɾuna]

▶ Plene spelling of INF points to a real (and stressed/lengthened) vowel, i.e., [kʷúːɾ-].

▶ Plene is unlikely to be a scribal error, since it recurs in deverbal noun *kuramman*– 'cutting':

        DAT/LOC.SG KLuw. ⟨*ku-ú-ra-am-mi*⟩ (KUB 35.55: 6)

Development of 'to cut' in Luwian

- Morphologically, INF KLuw. *kūruna* [kᵂuːɾuna] must be derived from:
    - Weak stem *kur–* of radical *mi*-verb 'cut'
    - INF suffix *–una*, which continues **–un-eh₂* (cf. Pal. *–una*, Lyc. *–na*; see Melchert 2017).

Development of 'to cut' in Luwian

▶ Morphologically, INF KLuw. *kūruna* [kʷuːɾuna] must be derived from:

   ▶ Weak stem *kur–* of radical *mi*-verb 'cut'
   ▶ INF suffix *–una*, which continues *–un-eh₂* (cf. Pal. *–una*, Lyc. *–na*; see Melchert 2017).

▶ Luwian thus shows *kur–* [kʷuɾ-] even in prevocalic contexts.

Development of 'to cut' in Luwian

- ▶ Morphologically, INF KLuw. *kūruna* [kʷuːɾuna] must be derived from:
    - ▶ Weak stem *kur–* of radical *mi*-verb 'cut'
    - ▶ INF suffix *–una*, which continues *–un-eh₂* (cf. Pal. *–una*, Lyc. *–na*; see Melchert 2017).

- ▶ Luwian thus shows *kur–* [kʷuɾ-] even in prevocalic contexts.

- ▶ In view of agreement with prevocalic Hitt. *kur–* [kʷor-], simplest to assume development of a root-internal vowel occurred already in PA.

Explaining PIE *[kʷR-] > PA [kʷVR-]

▶ Thus between PIE and PA 'cut' and (probably) 'kill' developed a
  root-internal vowel in prevocalic zero-grade contexts:

(27) a. PIE *gʷʰn-énti >(>) PA *[kʷVn-énti] > Hitt. [kʷon-án͡tsi]

  ⟨ku-na-an-zi⟩

  b. PIE *kʷr-ónt-es >(>) PA *[kʷVr-ónt-es] > Hitt. [kʷor-áːnt-es]

  ⟨ku-ra-an-te-e[š]⟩

  cf. KLuw. [kʷúːɾuna]

  ⟨ku-ú-ru-na⟩

Explaining PIE *[kʷR-] > PA [kʷVR-]

▶ Thus between PIE and PA 'cut' and (probably) 'kill' developed a root-internal vowel in prevocalic zero-grade contexts:

(27) a. PIE *gʷʰn-énti >(>) PA *[kʷVn-énti] > Hitt. [kʷon-ántsi]
⟨ku-na-an-zi⟩

b. PIE *kʷr-ónt-es >(>) PA *[kʷVr-ónt-es] > Hitt. [kʷor-áːnt-es]
⟨ku-ra-an-te-e[š]⟩

cf. KLuw. [kʷúːɾuna]
⟨ku-ú-ru-na⟩

∘ **How did this change occur?**

*[kʷR-] to Anatolian [kʷVR-] via epenthesis?

- ▶ One possible explanation is epenthesis (cf. Patri 2019:163).

*[kʷR-] to Anatolian [kʷVR-] via epenthesis?

- ▶ One possible explanation is epenthesis (cf. Patri 2019:163).
- ▶ Epenthesis generally produces front vowels in Hittite ([i] or [e]), but there is also evidence for epenthetic *u*-vowels ([u] or [o]) adjacent to labial obstruents (Kavitskaya 2001; cf. Yates 2015, 2016b):

(28)

	PRE-PA		HITTITE	
a.	*h_1g^{wh}-skʲé-weni*	>	[akʷːuskːéː-wani]	'we drink'
			⟨*ak-ku-uš-ke-e-wa-ni*⟩	
			(KUB 36.110 ref. 7; OH/OS)	
b.	*pnéuh$_x$s-m̥*	>	[póːnusː-on]	'I interrogated'
			⟨*pu-u-nu-uš-šu-un*⟩	
			(KUB 14.15 ii 12; NH/NS)	

*[kʷR-] to Anatolian [kʷVR-] via epenthesis?

▶ But word-initial onsets most similar to 'cut' and 'kill' show
no evidence for epenthesis in Hittite:

(29)   PIE ROOT   HITTITE

a.   *gʰrebʰ–   >   [kréːper]   'they devoured'
                      ⟨ka-re-e-pé-er⟩
                      (KUB 14.1 obv. 11; MH/MS)

b.   *ĝrei–   >   [kráːit͡s]   'flood'
                      ⟨ka-ra-i-iz⟩
                      (KUB 34.10: 10; OH/NS)

c.   *ĝneh₃–   >   [knéːsː-er]   'they recognized'
                      ⟨ga-né-eš-še-er⟩
                      (KBo 22.2 obv. 18; OH/OS)

*[kʷR-] to Anatolian [kʷVR-] via epenthesis?

► And *#$\overset{\frown}{\widehat{k}}$*rV–* is preserved into Luwian, where *$\widehat{k}$* is then deleted in word-initial cluster (cf. Melchert 1994:256, Oettinger 2017):

(30)

	I-A LUWIAN			HITTITE	
a.	[runtiyas]	'Stag-god'	cf.	[kráːwar]	'horn'
	⟨(DEUS)*ru-ti-ya-sá*⟩			⟨*ka-ra-a-wa-ar*⟩	
	(MARAŞ 1 §6)			(e.g., KUB 31.4 + KBo 3.41 obv. 15; OH/NS)	
b.	[ruwan]	'formerly'	cf.	[krúː]	'id.'
	⟨*rú-wa/i-na*⟩			⟨*ka-ru-ú*⟩	
	(KARATEPE 1 §33 (Hu.))			(e.g., KBo 17.74 ii 29; OH/OS)	

*[kʷR-] to Anatolian [kʷVR-] via epenthesis?

- And *#$\overset{(\sim)}{\hat{k}}rV$– is preserved into Luwian, where *$\hat{k}$ is then deleted in word-initial cluster (cf. Melchert 1994:256, Oettinger 2017):

(30)

	I-A LUWIAN			HITTITE	
a.	[runtiyas]	'Stag-god'	cf.	[kráːwar]	'horn'
	⟨(DEUS)*ru-ti-ya-sá*⟩			⟨*ka-ra-a-wa-ar*⟩	
	(MARAŞ 1 §6)			(e.g., KUB 31.4 + KBo 3.41 obv. 15; OH/NS)	
b.	[ruwan]	'formerly'	cf.	[krúː]	'id.'
	⟨*rú-wa/i-na*⟩			⟨*ka-ru-û*⟩	
	(KARATEPE 1 §33 (Hu.))			(e.g., KBo 17.74 ii 29; OH/OS)	

⇒ Epenthesis in PA is unmotivated, cannot explain PIE *[kʷR-] > [kʷVR-] in Anatolian languages.

*[kʷR-] to Anatolian [kʷVR-] via leveling?

► Another possible explanation is paradigm leveling.

► Weak stem forms *kun*– [kʷon-] and *kur*– [kʷor-] are historically expected in 1/2PL.NPST.ACT before stressed consonant-initial suffixes:

(31)	PRE-PA		HITTITE		
1PL	*kʷr̥-wéni*	>	⟨ku-ur-ú-e-ni⟩*	[kʷor-wéːni]*	'we cut'
2PL	*gʷʰn̥-téni*	>	⟨ku-un-te(-e)-ni⟩*	[kʷon-tːéːni]*	'y'all kill'

► For *kʷR̥* > Hitt. [k⁽ʷ⁾oR-] / ___CV see Melchert 2020 (§5; cf. Kloekhorst 2007).

*[kʷR-] to Anatolian [kʷVR-] via leveling?

- Another possible explanation is paradigm leveling.
- Weak stem forms *kun*– [kʷon-] and *kur*– [kʷor-] are historically expected in 1/2PL.NPST.ACT before stressed consonant-initial suffixes:

(31)	PRE-PA		HITTITE		
1PL	*kʷr̥-wéni*	>	⟨ku-ur-ú-e-ni⟩*	[kʷor-wéːni]*	'we cut'
2PL	*gʷʰn̥-téni*	>	⟨ku-un-te(-e)-ni⟩*	[kʷor-tːéːni]*	'y'all kill'

- [kʷon-] and [kʷor-] could thus be analogically generalized from 1/2PL.NPST.ACT.

*[kʷR-] to Anatolian [kʷVR-] via leveling?

- ▶ Another possible explanation is paradigm leveling.
- ▶ Weak stem forms *kun*– [kʷon-] and *kur*– [kʷor-] are historically expected in 1/2PL.NPST.ACT before stressed consonant-initial suffixes:

(31)	PRE-PA		HITTITE		
1PL	*kʷr̥-wéni*	>	⟨*ku-ur-ú-e-ni*⟩*	[kʷor-wéːni]*	'we cut'
2PL	*gʷʰn̥-téni*	>	⟨*ku-un-te(-e)-ni*⟩*	[kʷon-tːéːni]*	'y'all kill'

- ▶ But neither 'kill' nor 'cut' attests a 1/2PL.NPST.ACT form with the expected weak root allomorph.

*[kʷR-] to Anatolian [kʷVR-] via leveling?

- ► Another possible explanation is paradigm leveling.
- ► Weak stem forms *kun*– [kʷon-] and *kur*– [kʷor-] are historically expected in 1/2PL.NPST.ACT before stressed consonant-initial suffixes:

(31)	PRE-PA		HITTITE		
1PL	*k^wr̥-wéni*	>	⟨*ku-ur-ú-e-ni*⟩*	[kʷor-wéːni]*	'we cut'
2PL	*g^{wh}n̥-téni*	>	⟨*ku-un-te(-e)-ni*⟩*	[kʷon-tːéːni]*	'y'all kill'

- ► But neither 'kill' nor 'cut' attests a 1/2PL.NPST.ACT form with the expected weak root allomorph.

    ⇒ Only attested finite forms with weak *kun*– and *kur*– are 3PL:

(32)	NPST.ACT	*kunanzi*	'they kill	*kuranzi*	'they cut'
	IMP.ACT	*kunandu*	'let them kill	*kurandu*	'let them cut'

*[kʷR-] to Anatolian [kʷVR-] via leveling?

⇒ Paradigm leveling from 1/2PL.NPST.ACT does not plausibly account for weak stems *kun–* ([kʷon-]) and *kur–* ([kʷor-]) attested in 3PL.NPST.ACT and other prevocalic contexts.

*[kʷR-] to Anatolian [kʷVR-] via leveling?

⇒ Paradigm leveling from 1/2PL.NPST.ACT does not plausibly account for weak stems *kun*– ([kʷon-]) and *kur*– ([kʷor-]) attested in 3PL.NPST.ACT and other prevocalic contexts.

  ▶ Paradigm leveling from 1/2PL (as distinct from 3PL) is unknown in Hittite and runs counter to cross-linguistic preference for 3rd as base.

*[kʷR-] to Anatolian [kʷVR-] via leveling?

⇒ Paradigm leveling from 1/2PL.NPST.ACT does not plausibly account for weak stems *kun–* ([kʷon-]) and *kur–* ([kʷor-]) attested in 3PL.NPST.ACT and other prevocalic contexts.

▶ Paradigm leveling from 1/2PL (as distinct from 3PL) is unknown in Hittite and runs counter to cross-linguistic preference for 3rd as base.

▶ Exceptional leveling from 1/2PL.NPST.ACT due to frequency (or "salience") is especially unlikely in view of absence of attested forms.

A new account of *[kʷR-] to [kʷVR-] in Anatolian

▶ A general hypothesis, with two components:

(i) Between PIE and PA root vowel deletion in ablauting radical *mi*-verbs was restructured, replaced by a vowel reduction process.

(ii) PA reduced vowels were rounded by preceding labialized dorsals, whence Hitt. *kun–* ([kʷon-]) and Hitt./Luw. *kur–* ([kʷor-]/[kʷuɾ-]).

A new account of *[kʷR-] to [kʷVR-] in Anatolian

▶ A general hypothesis, with two components:

  (i) Between PIE and PA root vowel deletion in ablauting radical *mi*-verbs was restructured, replaced by a vowel reduction process.

  (ii) PA reduced vowels were rounded by preceding labialized dorsals, whence Hitt. *kun–* ([kʷon-]) and Hitt./Luw. *kur–* ([kʷor-]/[kʷuɾ-]).

▶ Evidence for spread of PA vowel reduction at expense of deletion comes from changes observed in the root ablaut of other Anatolian radical *mi*-verbs.

Root ablaut in Anatolian radical *mi*-verbs

▶ Hittite 'kill' and 'cut' belong to the Anatolian class of ablauting radical *mi*-verbs, which align historically with PIE **m*-conjugation root presents and aorists (in sense of Jasanoff 2018).

▶ A prominent set of Hittite verbs in this class clearly show stress-conditioned alternations between [éː] and pretonic [a]:

(33)	STRONG/STRESSED		WEAK/PRETONIC	
a.	⟨*e-eš-zi*⟩	'is'	⟨*a-ša-an-zi*⟩	'they are'
	[éːs-t͡si]		[as-ánt͡si]	
b.	⟨*e-ed-mi*⟩	'I eat'	⟨*a-da-an-zi*⟩	'they eat'
	[éːt-mi]		[at-ánt͡si]	
c.	⟨*e-ep-ši*⟩	'you take'	⟨*ap-pa-an-zi*⟩	'they take'
	[éːp-si]		[apː-ánt͡si]	
d.	⟨*e-ku-zi*⟩	'drinks'	⟨*a-ku-an-zi*⟩	'they drink'
	[éːkʷ-t͡si]		[akʷ-ánt͡si]	

Root ablaut in Anatolian radical *mi*-verbs

▶ Weak root [a]-vocalism in these Hittite verbs is matched by other Anatolian languages:

(34)	a.	Hitt. *ašanzi*	'they are'	= I-ALuw. ⟨*a-sa-ti*⟩	'id.'
	b.	Hitt. *ašandu*	'let them be'	= KLuw. *ašandu*	'id.'
				= Pal. *ašandu*	'id.'
	c.	Hitt. *adanzi*	'they eat'	= Pal. *atānti*	'they eat'
	d.	Hitt. *adandu*	'let them eat'	= I-ALuw. ⟨*a+ra/i-tu*⟩	'let them eat'
	e.	Hitt. *appanzi*	'they take'	≈ Lyc. *apptte*	'took'

⇒ Root vowel in (34) is reconstructible for PA (cf. Melchert 1994:67).

Weak [a]-vocalism in Anatolian radical *mi*-verbs

▶ In at least some of these ablauting verbs, Anatolian root [a]-vowel occurs where deletion is historically expected — most clearly, in 'be':

(35) a. PIE $*/h_1$es-ti/ → $*[h_1$és-ti] > Ved. *ásti*, Osc. **est**, Goth. *ist* 'is'
     cf. Hitt. *ēšzi* ([éːs-t͡si])

b. PIE $*/h_1$es-énti/ → $*[h_1$s-énti] > Ved. *sánti*, Osc. **sent**, Goth. *sind* 'are'
     cf. Hitt. *ašanzi* ([as-ánt͡si])

Weak [a]-vocalism in Anatolian radical *mi*-verbs

▶ In at least some of these ablauting verbs, Anatolian root [a]-vowel occurs where deletion is historically expected — most clearly, in 'be':

(35) a. PIE */h₁es-ti/ → *[h₁és-ti] > Ved. *ásti*, Osc. **est**, Goth. *ist* 'is'
cf. Hitt. *ēšzi* ([éːs-t͡si])

b. PIE */h₁es-énti/ → *[h₁s-énti] > Ved. *sánti*, Osc. **sent**, Goth. *sind* 'are'
cf. Hitt. *ašanzi* ([as-ánt͡si])

▶ Unlikely that Hitt. [a] is direct reflex of *h₁* (Kimball 1999:390–1, Kloekhorst 2014:382), since outside of ablauting *mi*-verbs *h₁* was lost in word-initial preconsonantal position (cf. Melchert 1994:66–7):

(36) a. PIE *h₁s-yé-ti* > Hitt. *šiyezzi* 'shoots' cf. Ved. *ásyati* 'id.'
b. PIE *h₁lenǵʰ-ti* > Hitt. *linkzi* 'swears' cf. Gk. ἐλέγχω 'question, shame'

Weak [a]-vocalism in Anatolian radical *mi*-verbs

▶ In at least some of these ablauting verbs, Anatolian root [a]-vowel occurs where deletion is historically expected — most clearly, in 'be':

(35) a. PIE $*/h_1$es-ti$/$ → $*[h_1$és-ti] > Ved. *ásti*, Osc. **est**, Goth. *ist* 'is'
> Hitt. *ēšzi* ([éːs-t͡si])

b. PIE $*/h_1$es-énti$/$ → $*[h_1$s-énti] > Ved. *sánti*, Osc. **sent**, Goth. *sind* 'are'
⊁ Hitt. *ašanzi* ([as-ánt͡si])

▶ Unlikely that Hitt. [a] is direct reflex of *h_1* (Kimball 1999:390–1, Kloekhorst 2014:382), since outside of ablauting *mi*-verbs *h_1* was lost in word-initial preconsonantal position (cf. Melchert 1994:66–7).

⇒ Hitt. [a] is not due to regular sound change.

Weak [a]-vocalism in Anatolian radical *mi*-verbs

(37)

	PIE		PA	HITTITE		VEDIC
a.	$*[h_1s\text{-}énti]$	>>	$*[h_1əs\text{-}énti]$	> ***ašanzi***	'they are'	cf. *s-ánti*
b.	$*[h_1s\text{-}éntu]$	>>	$*[h_1əs\text{-}éntu]$	> ***ašandu***	'let them be'	cf. *s-ántu*
c.	$*[h_1s\text{-}ónt\text{-}]$	>>	$*[h_1əs\text{-}ónt\text{-}]$	> ***ašant–***	'being'	cf. *s-ánt–*
d.	$*[h_1d\text{-}énti]$	>>	$*[h_1əd\text{-}énti]$	> ***adanzi***	'they eat'	
e.	$*[h_1d\text{-}énti]$	>>	$*[h_1əd\text{-}énti]$	> ***adandu***	'let them eat'	
f.	$*[h_1p\text{-}énti]$	>>	$*[h_1əp\text{-}énti]$	> ***appanzi***	'they take'	

▶ Building on Melchert (1994:66–7), Yates (2014) proposes that weak root [a] in (37) reflects PA $*[ə]$, a reduced allophone of $*/e/$.

  ▶ Independent evidence for $*[ə] > [a]$ in Anatolian (see Appendix IV).

Weak [a]-vocalism in Anatolian radical *mi*-verbs

(37)	PIE	PA	HITTITE		VEDIC
a.	*[h₁s-énti]	>> *[h₁əs-énti]	> *ašanzi*	'they are'	cf. *s-ánti*
b.	*[h₁s-éntu]	>> *[h₁əs-éntu]	> *ašandu*	'let them be'	cf. *s-ántu*
c.	*[h₁s-ónt-]	>> *[h₁əs-ónt-]	> *ašant–*	'being'	cf. *s-ánt–*
d.	*[h₁d-énti]	>> *[h₁əd-énti]	> *adanzi*	'they eat'	
e.	*[h₁d-énti]	>> *[h₁əd-énti]	> *adandu*	'let them eat'	
f.	*[h₁p-énti]	>> *[h₁əp-énti]	> *appanzi*	'they take'	

▶ Building on Melchert (1994:66–7), Yates (2014) proposes that weak root [a] in (37) reflects PA *[ə], a reduced allophone of *$/e/$.

    ▶ Independent evidence for *[ə] > [a] in Anatolian (see Appendix IV).

○ **But how did PA *[ə] emerge in these roots?**

Weak [a]-vocalism in Anatolian radical *mi*-verbs

(37)

	PIE		PA	HITTITE		VEDIC
a.	*[h₁s-énti]	>>	*[h₁əs-énti]	> *ašanzi*	'they are'	cf. *s-ánti*
b.	*[h₁s-éntu]	>>	*[h₁əs-éntu]	> *ašandu*	'let them be'	cf. *s-ántu*
c.	*[h₁s-ónt-]	>>	*[h₁əs-ónt-]	> *ašant–*	'being'	cf. *s-ánt–*
d.	*[h₁d-énti]	>>	*[h₁əd-énti]	> *adanzi*	'they eat'	
e.	*[h₁d-énti]	>>	*[h₁əd-énti]	> *adandu*	'let them eat'	
f.	*[h₁p-énti]	>>	*[h₁əp-énti]	> *appanzi*	'they take'	
g.	*[səs-énti]	>>	*[səs-énti]	> *šašanzi*	'they sleep'	cf. *sas-ántu*

▶ Per Melchert (1994:66) weak vocalism in (37a–f) is analogical to 'sleep'
  in (37g) "and other *TeT* roots," which had a reduced vowel already in
  PIE ("already PIE *T_eT*").

Weak [a]-vocalism in Anatolian radical *mi*-verbs

(37)

	PIE		PA	HITTITE		VEDIC
a.	*[h₁s-énti]	>>	*[h₁əs-énti]	> *ašanzi*	'they are'	cf. *s-ánti*
b.	*[h₁s-éntu]	>>	*[h₁əs-éntu]	> *ašandu*	'let them be'	cf. *s-ántu*
c.	*[h₁s-ónt-]	>>	*[h₁əs-ónt-]	> *ašant–*	'being'	cf. *s-ánt–*
d.	*[h₁d-énti]	>>	*[h₁əd-énti]	> *adanzi*	'they eat'	
e.	*[h₁d-énti]	>>	*[h₁əd-énti]	> *adandu*	'let them eat'	
f.	*[h₁p-énti]	>>	*[h₁əp-énti]	> *appanzi*	'they take'	
g.	*[səs-énti]	>>	*[səs-énti]	> *šašanzi*	'they sleep'	cf. *sas-ántu*

- ▶ Per Melchert (1994:66) weak vocalism in (37a–f) is analogical to 'sleep' in (37g) "and other *TeT* roots," which had a reduced vowel already in PIE ("already PIE *T_eT*").

- ▶ But 'sleep' is the only root of this shape attested among Anatolian radical *mi*-verbs (cf. Kloekhorst 2008:121 n. 244).

Analyzing Anatolian quantitative ablaut

▶ **Proposal:** PA *[ə] results from extension of existing vowel reduction rule (e.g., Garrett 2008), which was inherited from PIE (cf. Yates 2014).

▶ PIE/PA had two (ordered) rules targeting mid vowels in pretonic syllables:

(38) a. PRETONIC MID-VOWEL DELETION (PVD)

   PIE *$/$e, o$/ \to \varnothing$ / ___$\acute{\sigma}$ (iterative)

   b. PRETONIC MID-VOWEL REDUCTION (PVR)

   PIE *$/$e, o$/ \to$ *[ə] / ___$\acute{\sigma}$

⇒ Pretonic *$/$e, o$/$ was deleted whenever (phonotactically) possible; remaining pretonic *$/$e, o$/$ were reduced to *[ə].

Analyzing Anatolian quantitative ablaut

▶ Derivations in (39) illustrate application of these rules to PIE congenitors of Anatolian radical *mi*-verbs:

(39)

	a. PIE 'be'		b. PIE 'sleep'		
	*/h₁és-ti/	/h₁es-énti/	*/sés-ti/	*/ses-énti/	UR
	–	h₁ǿsénti	–	sesénti	PVD
	–	–	–	səsénti	PVR
	*[h₁és-ti]	*[h₁s-énti]	*[sés-ti]	*[səs-énti]	SR
>	Ved. *ásti*	*sánti*	*sásti*	*sas-ánti**	
>	Hitt. *ēšzi*	ˣ*šanzi*	*šēšzi*	*šašanzi*	

▶ Vowel deletion (PVD) applies regularly in PIE weak stem of 'be'.

Analyzing Anatolian quantitative ablaut

▶ Derivations in (39) illustrate application of these rules to PIE congenitors of Anatolian radical *mi*-verbs:

(39)

	a. PIE 'be'		b. PIE 'sleep'		
	*/h₁és-ti/	/h₁es-énti/	*/sés-ti/	*/ses-énti/	UR
	–	h₁ǿsénti	–	se<u>s</u>énti	PVD
	–	–	–	səsénti	PVR
	*[h₁és-ti]	*[h₁s-énti]	*[sés-ti]	*[səs-énti]	SR
>	Ved. *ásti*	*sánti*	*sásti*	*sas-ánti**	
>	Hitt. *ēšzi*	ˣ*šanzi*	*šēšzi*	*šašanzi*	

▶ Vowel deletion (PVD) applies regularly in PIE weak stem of 'be'.

▶ But deletion (PVD) is phonotactically blocked (ˣ[ss]) in weak forms of 'sleep', thus allowing vowel reduction (PVR) to apply.

Analyzing Anatolian quantitative ablaut

▶ Reduction seen in 'sleep' is a general phonological process in PIE/PA.

    ▶ Inherited word for 'earth' provides independent Anatolian evidence:

(40)   PIE 'earth'

*/dʰéĝʰom-s/	/dʰeĝʰom-ós/	UR
–	dʰeĝʰǿm-ós	PVD
–	dʰe̲ĝʰm-ós	PVD
–	dʰəĝʰm-ós	PVR
*[dʰéĝʰoːm]	*[dʰəĝʰm-ós]	SR
> Hitt. *tēkan*	*taknāš*	
'earth'	'of the earth'	

▶ Phonotactic <u>blocking</u> of deletion (PVD) in weak stem of 'earth'
(ˣ[#dʰĝʰm-]) allows vowel reduction (PVR) to apply, just like in 'sleep'.

Analyzing Anatolian quantitative ablaut

▶ Reduction seen in 'sleep' is a general phonological process in PIE/PA.

   ▶ Inherited word for 'earth' provides independent Anatolian evidence:

(40)   PIE 'earth'

$*/d^{h}é\hat{g}^{h}om\text{-}s/$	$/d^{h}e\hat{g}^{h}om\text{-}ós/$	UR
–	$d^{h}e\hat{g}^{h}\emptyset m\text{-}ós$	PVD
–	$d^{h}\underline{e}\hat{g}^{h}m\text{-}ós$	PVD
–	$d^{h}ə\hat{g}^{h}m\text{-}ós$	PVR
$*[d^{h}é\hat{g}^{h}oːm]$	$*[d^{h}ə\hat{g}^{h}m\text{-}ós]$	SR

     >   Hitt. *tēkan*   *taknāš*

             'earth'   'of the earth'

▶ PA radical *ḫi*-verbs provide further evidence for vowel reduction in phonotactic blocking contexts (see Appendix V).

Analyzing Anatolian quantitative ablaut

▶ Reduction seen in 'sleep' is a general phonological process in PIE/PA.

  ▶ Inherited word for 'earth' provides independent Anatolian evidence:

(40)   PIE 'earth'

*/dʰéĝʰom-s/	/dʰeĝʰom-ós/	UR
–	dʰeĝʰø̶m-ós	PVD
–	dʰe̲ĝʰm-ós	PVD
–	dʰəĝʰm-ós	PVR
*[dʰéĝʰoːm]	*[dʰəĝʰm-ós]	SR
> Hitt. *tēkan*	*taknāš*	
'earth'	'of the earth'	

⇒ Spread of vowel reduction in radical *mi*-verbs can be understood not just as lexical analogy, but as rule extension.

Extension of vowel reduction in PA

▶ **Proposal**: In PA vowel reduction (PVR) was extended into all contexts in which vowel deletion (PVD) used to create $[C_1eC_2] \sim [C_1C_2]$ root alternations in radical *mi*-verbs.

Extension of vowel reduction in PA

▶ **Proposal**: In PA vowel reduction (PVR) was extended into all contexts in which vowel deletion (PVD) used to create $[C_1eC_2] \sim [C_1C_2]$ root alternations in radical *mi*-verbs.

▶ Reduction thus extended into all PL.NPST.ACT forms of 'be' and other radical *mi*-verbs of same root shape (< PIE *h_1eT–).

(41)   PIE   *$/h_1$es-énti/   →   *$[h_1$s-énti]   'they are'   (via PVD)

>>   PA   *$/h_1$es-énti/   →   *$[h_1$əs-énti]   "   (via PVR)

Extension of vowel reduction in PA

- ▶ **Proposal**: In PA vowel reduction (PVR) was extended into all contexts in which vowel deletion (PVD) used to create $[C_1eC_2] \sim [C_1C_2]$ root alternations in radical *mi*-verbs.

- ▶ Reduction thus extended into all PL.NPST.ACT forms of 'be' and other radical *mi*-verbs of same root shape (< PIE *h_1eT–).

(41) PIE */$h_1$es-énti/ → *[h_1s-énti] 'they are' (via PVD)

>> PA */$h_1$es-énti/ → *[h_1əs-énti]   "   (via PVR)

- ◦ **Why did this morphophonological change occur?**
  - ▶ More on this in §6 below.

PIE *[kʷR-] >> PA [kʷəR-] via vowel reduction

▶ **Proposal**: In PA vowel reduction (PVR) was extended into all contexts in which vowel deletion (PVD) used to create $[C_1 e C_2] \sim [C_1 C_2]$ root alternations in radical *mi*-verbs.

▶ Extension of reduction to 3PL.NPST.ACT of 'kill' and 'cut' also predicted:

| (42) | PIE | */gʷʰen-énti/ | → | *[gʷʰn-énti] | 'they kill' | (via PVD) |
| | >> | PA | */gʷen-énti/ | → | *[gʷən-énti] | " | (via PVR) |

| (43) | PIE | */kʷer-énti/ | → | *[kʷr-énti] | 'they cut' | (via PVD) |
| | >> | PA | */kʷer-énti/ | → | *[kʷər-énti] | " | (via PVR) |

PIE *[kʷR-] >> PA [kʷəR-] via vowel reduction

▶ **Proposal**: In PA vowel reduction (PVR) was extended into all contexts in which vowel deletion (PVD) used to create $[C_1eC_2] \sim [C_1C_2]$ root alternations in radical *mi*-verbs.

▶ Extension of reduction to 3PL.NPST.ACT of 'kill' and 'cut' also predicted:

(42)	PIE	*/gʷʰen-énti/	→	*[gʷʰn-énti]	'they kill'	(via PVD)
>>	PA	*/gʷen-énti/	→	*[gʷən-énti]	"	(via PVR)
>	Hitt.	*kunanzi*	[kʷon-ántsi]	"		

(43)	PIE	*/kʷer-énti/	→	*[kʷr-énti]	'they cut'	(via PVD)
>>	PA	*/kʷer-énti/	→	*[kʷər-énti]	"	(via PVR)
>	Hitt.	*kuranzi*	[kʷor-ántsi]	"		

▶ Rounding of PA *[əR] to Hitt. [oR] (and Luw. [uR]) after labialized dorsals is supported by similar development of PA *R̥.

Development of PIE/PA *R̥ in Anatolian

▶ Some complications with syllabic nasals (Melchert 2020:265–6), but "the regular result of PA *R̥ in Hittite is *aR*" (Melchert 1994:125) — e.g.:

(44) a. PA *pl̥H-í-s > Hitt. ⟨pal-ḫi-š⟩ [palχːís] 'broad'
  b. PA *wód-r̥ > Hitt. ⟨wa-a-tar⟩ [wáːtar] 'water'
  c. PA *n̥sós > Hitt. ⟨an-za-a-aš⟩ [antsáːs] '(to/for) us'

▶ Likewise in Luwian (Melchert 1994:260):

(45) a. PA *pr̥n-éi > KLuw. ⟨pár-ni⟩ [parn-íː] 'in house'
  b. PA *=tr̥ > KLuw. ⟨=tar⟩ [tar] (PTC)

Development of PIE/PA *R̥ in Anatolian

▶ But after labialized dorsals PIE/PA *R̥ develops differently, generally vocalizing with rounded vowels (cf. Melchert 2020:266–7).

  ▶ In Hittite basic outcome of *R̥ is [oR] next to uvulars and before *r, otherwise [oR]/[uR]:

(46) a. PA *wŕ̥g-i-s   > Hitt. ⟨u-ur-ki-iš⟩   [óːrkis]   'track'
    b. PA *péH^w-r̥   > Hitt. ⟨pa-aḫ-ḫur⟩   [páχʷːor]   'fire'
    c. PA *k^w̥ls-énti > Hitt. ⟨gul-ša-an-zi⟩ [kʷols-ántsi] 'they carve'

  ▶ In Luwian *R̥ yields [oR] next to uvulars, otherwise [uR]/[oR]:

(47) a. PA *péH^w-r̥ > KLuw. ⟨pa-a-ḫu-u-ur⟩ [páːχʷ-oːr]   'fire'
    b. PA *k^w̥ls– > KLuw. ⟨gul-za-at-tar⟩ [kʷults-áːtːar] 'sketch'

▶ For PA fusion of *h₂w– to *H^w (*[χʷ]) see Kloekhorst 2006 (cf. Melchert 2020:262).

▶ But after labialized dorsals PIE/PA *$\mathring{R}$ develops differently, generally vocalizing with rounded vowels (cf. Melchert 2020:266–7).

   ▶ Conditioned lowering in Hittite of *$\mathring{R}$ to [aR] before two consonants:

(46) a. PA *$dw\mathring{r}$-n-h_1-$énti$ > Hitt. ⟨du-wa-ar-na-an-zi⟩   'they break'
         [twarn-ántsi]

   b. PA *$k^w\mathring{r}$-$s\hat{k}é$-ti > Hitt. ⟨ku-wa-ar-aš-ke-ez-zi⟩ 'they cut'
         [kʷar-skːéː-tsi]

   c. PA *$g^w\mathring{n}$-$s\hat{k}é$-ti > Hitt. ⟨ku-wa-as-ke-ez-zi⟩   'they kill'
         [kʷa-skéː-tsi]

Development of PA *R̥ and *[əR] in Anatolian

▶ After labialized dorsals PA *R̥ generally yields [oR]/[uR] in Hitt./Luw.:

(45) a. PA *kʷ̥ls–   >   Hitt. ⟨*gul-ša-an-zi*⟩   [kʷol-sánt͡si]   'they carve'
                          >   KLuw. ⟨*gul-za-at-tar*⟩   [kʷult͡s-áːtːar]   'sketch'
    b. PA *péHʷ-r̥ >   Hitt. ⟨*pa-aḫ-ḫur*⟩   [páχʷː-or]   'fire'
                          >   KLuw. ⟨*pa-a-ḫu-u-ur*⟩   [páːχʷ-oːr]   'fire'

▶ Similar development of PA *[əR] would account for 'kill' and 'cut':

(47) a. PA *[gʷən-] >   Hitt. ⟨*ku-na-an-zi*⟩   [kʷon-ánt͡si]   'they kill'
    b. PA *[kʷər-] >   Hitt. ⟨*ku-ra-an-zi*⟩   [kʷor-ánt͡si]   'they cut'
                       >   KLuw. ⟨*ku-ú-ru-na*⟩   [kʷúːɾ-una]   'to cut'

Further evidence for PA rule extension

- ▶ **Proposal**: In PA vowel reduction was extended into all contexts in which vowel deletion used to create $[C_1eC_2] \sim [C_1C_2]$ root alternations in radical *mi*-verbs.
- ▶ This predicts emergence of [ə] in other Anatolian radical *mi*-verbs built to roots of shape **TeR*:

(48)

	PRE-PA		PA		ANATOLIAN	
a.	*[tr-énti]	>>	*[tər-énti]	>	Hitt. *taranzi*	'they say'
b.	*[mr-éntu]	>>	*[mər-éntu]	>	Hitt. *marandu*	'let them disappear'
c.	*[(s)mr-énti]	>>	*[mər-énti]	cf.	Lyc. *martti*	'authorizes'

Further evidence for PA rule extension

- ▶ **Proposal**: In PA vowel reduction was extended into all contexts in which vowel deletion used to create $[C_1eC_2] \sim [C_1C_2]$ root alternations in radical *mi*-verbs.

- ▶ This predicts emergence of [ə] in other Anatolian radical *mi*-verbs built to roots of shape *TeR*:

(48)

	PRE-PA		PA		ANATOLIAN		
a.	*[tr-énti]	>>	*[tər-énti]	>	Hitt. *taranzi*	'they say'	✓
b.	*[mr-éntu]	>>	*[mər-éntu]	>	Hitt. *marandu*	'let them disappear'	
c.	*[(s)mr-énti]	>>	*[mər-énti]	cf.	Lyc. *martti*	'authorizes'	✓

- ▶ There is positive evidence for *[ə] in (48a) and (48c) (see Appendix I).

Summary: restructuring of ablaut in PA radical *mi*-verbs

▶ **Proposal**: In PA vowel reduction was extended into all contexts in which vowel deletion used to create $[C_1eC_2] \sim [C_1C_2]$ root alternations in radical *mi*-verbs.

Summary: restructuring of ablaut in PA radical *mi*-verbs

▶ **Proposal**: In PA vowel reduction was extended into all contexts in which vowel deletion used to create $[C_1eC_2] \sim [C_1C_2]$ root alternations in radical *mi*-verbs.

▶ This proposal provides a unified account of developments in (49):

(49)

	PRE-PA		PA		ANATOLIAN	
a.	*[h₁s-énti]	>>	*[h₁əs-énti]	>	Hitt. *ašanzi*	'they are'
b.	*[gʷʰn-énti]	>>	*[gʷən-énti]	>	Hitt. *kunanzi*	'they kill'
c.	*[kʷr-énti]	>>	*[kʷər-énti]	>	Hitt. *kuranzi*	'they cut'
d.	*[tr-énti]	>>	*[tər-énti]	>	Hitt. *taranzi*	'they say'
e.	*[(s)mr-énti]	>>	*[mər-énti]	>>	Lyc. *martti*	'authorizes'

Summary: restructuring of ablaut in PA radical *mi*-verbs

▶ **Proposal**: In PA vowel reduction was extended into all contexts in which vowel deletion used to create $[C_1eC_2] \sim [C_1C_2]$ root alternations in radical *mi*-verbs.

▶ This proposal provides a unified account of developments in (49):

(49)	PRE-PA		PA		ANATOLIAN	
a.	*[h₁s-énti]	>>	*[h₁əs-énti]	>	Hitt. *ašanzi*	'they are'
b.	*[gʷʰn-énti]	>>	*[gʷən-énti]	>	Hitt. *kunanzi*	'they kill'
c.	*[kʷr-énti]	>>	*[kʷər-énti]	>	Hitt. *kuranzi*	'they cut'
d.	*[tr-énti]	>>	*[tər-énti]	>	Hitt. *taranzi*	'they say'
e.	*[(s)mr-énti]	>>	*[mər-énti]	>>	Lyc. *martti*	'authorizes'

▶ Some verbs are ambiguous — e.g., Hitt. *marandu* ([m(a)r-ántu]) 'let them disappear' — but clear counter-evidence is lacking.

Summary: restructuring of ablaut in PA radical *mi*-verbs

- ▶ **Proposal**: In PA vowel reduction was extended into all contexts in which vowel deletion used to create $[C_1eC_2] \sim [C_1C_2]$ root alternations in radical *mi*-verbs.

- ▶ This proposal provides a unified account of developments in (49):

(49)	PRE-PA		PA		ANATOLIAN	
a.	*[h₁s-énti]	>>	*[h₁əs-énti]	>	Hitt. *ašanzi*	'they are'
b.	*[gʷʰn-énti]	>>	*[gʷən-énti]	>	Hitt. *kunanzi*	'they kill'
c.	*[kʷr-énti]	>>	*[kʷər-énti]	>	Hitt. *kuranzi*	'they cut'
d.	*[tr-énti]	>>	*[tər-énti]	>	Hitt. *taranzi*	'they say'
e.	*[(s)mr-énti]	>>	*[mər-énti]	>>	Lyc. *martti*	'authorizes'

- ○ **But why did this morphophonological change occur?**

▶ Yates (2014) proposes that crucial PA innovation was elimination of vowel deletion in these verbs:

  ▶ Vowel deletion (PVD) came to be <u>blocked</u> in PL.NPST.ACT.
  ▶ Vowel reduction (PVR) therefore began to apply in these forms.

(50)

	PIE 'sleep'	PIE 'are'		PA 'are'	
	*/ses-énti/	/h₁es-énti/		/h₁es-énti/	UR
	sesénti	h₁ǿsénti	>>	h₁esénti	PVD
	səsénti	—		h₁əsénti	PVR
	*[səs-énti]	[h₁s-énti]		[h₁əsénti]	SR
>	Hitt. *šašanzi*	ˣ*šanzi*		***ašanzi***	

Motivating morphophonological change in PA

▶ Yates (2014) proposes that crucial PA innovation was elimination of vowel deletion in these verbs:

  ▶ Vowel deletion (PVD) came to be <u>blocked</u> in PL.NPST.ACT.
  ▶ Vowel reduction (PVR) therefore began to apply in these forms.

(50)	PIE 'sleep'	PIE 'are'		PA 'are'	
	*/ses-énti/	/h₁es-énti/		/h₁es-énti/	UR
	ses<u>e</u>nti	h₁∅sénti	>>	h₁<u>e</u>sénti	PVD
	səsénti	—		h₁əsénti	PVR
	*[səs-énti]	[h₁s-énti]		[h₁əsénti]	SR
>	Hitt. *šašanzi*	ˣ*šanzi*		*ašanzi*	

⇒ Spread of vowel reduction is epiphenomenal, a consequence of changes in the domain of deletion.

Morphophonological change via phonotactic change?

- ▶ Yates (2014) links elimination of deletion in [éː] ~ [a] ablauting radical *mi*-verbs to emergence of tighter phonotactic restrictions in PA:

  - ▶ PIE permitted falling/level sonority onsets in word-initial position (*#FTV–*, *#TTV–*; see Cooper 2014; Byrd 2015).
  - ▶ But such onsets became dispreferred in PA, resulting in innovative <u>blocking</u> of deletion.

(51)	PIE 'take'	PIE 'are'	>	PA 'take'	PA 'are'	
	$*/h_1ep\text{-}\acute{e}nti/$	$/h_1es\text{-}\acute{e}nti/$		$*/h_1ep\text{-}\acute{e}nti/$	$/h_1es\text{-}\acute{e}nti/$	UR
	$h_1\not\!ep\acute{e}nti$	$h_1\not\!es\acute{e}nti$		$h_1\underline{e}p\acute{e}nti$	$h_1\underline{e}s\acute{e}nti$	PVD
	–	–		$h_1\partial p\acute{e}nti$	$h_1\partial s\acute{e}nti$	PVR
	$[h_1p\text{-}\acute{e}nti]$	$[h_1s\text{-}\acute{e}nti]$		$[h_1\partial p\acute{e}nti]$	$[h_1\partial s\acute{e}nti]$	SR
>	Hitt. $^x panzi$	$^x \check{s}anzi$		*appanzi*	*ašanzi*	

58 / 70

Morphophonological change via phonotactic change?

▶ Evidence for innovative restriction against falling sonority onsets comes from treatment of PIE/PA *#sT– clusters in Anatolian languages.

    ▶ Epenthesis in Hittite.
    ▶ *s-deletion in Luwian.

(52)	PIE	>	HITTITE	KLUWIAN	
a.	*sper–		*išpāri*	*parritti*	'spreads'
b.	*st(e)h₃men– /		*ištāmanan*	*tummān*	'ear'
	st(o)mh₁-on(t)–				

Morphophonological change via phonotactic change?

- Evidence for innovative restriction against falling sonority onsets comes from treatment of PIE/PA *#sT– clusters in Anatolian languages.

  - Epenthesis in Hittite.
  - *s-deletion in Luwian.

(52)	PIE	>	HITTITE	KLUWIAN	
a.	*sper–		išpāri	parritti	'spreads'
b.	*st(e)h₃men– /		ištāmanan	tummān	'ear'
	*st(o)mh₁-on(t)–				

- Diachronic conspiracy against *#sT– could point to dispreference for falling sonority onsets already in PA.

- ▶ But attributing non-application of vowel deletion to phonotactic change has weaknesses.

Morphophonological change via phonotactic change?

- ▶ But attributing non-application of vowel deletion to phonotactic change has weaknesses.
- ▶ Fails to account for emergence of PA *[ə] in 'kill', 'cut', and other PA roots of shape *TeR–.
    - ▶ Wrongly predicts continued PA deletion in (53), where resulting word-initial onset would have rising sonority profile.

(53) a. PA */gʷʰen-énti/ → ˣ[gʷnén.ti] 'they kill' (*[gʷən-énti])

  b. PA */kʷer-énti/ → ˣ[kʷrén.ti] 'they cut' (*[kʷər-énti])

Morphophonological change via phonotactic change?

▶ But attributing non-application of vowel deletion to phonotactic change has weaknesses.

▶ Fails to account for emergence of PA *[ə] in 'kill', 'cut', and other PA roots of shape *TeR–.

▶ Offers little insight into synchronic Hittite situation.

  ▶ After loss of *h₁, phonotactic account would not prevent synchronic alternations like (54) ([#sV-] is licit):

(54) a. Hitt. /es-t͡si/   →   [éːs.t͡s]i]   'is'
                                  ēšzi

  b. Hitt. /es-ánt͡si/   →   ˣ[sán.t͡si]   'are'   ([as-ánt͡si])
                                  ˣ*šanzi*   (*ašanzi*)

- **Proposal:** Extension of vowel reduction in PA radical *mi*-verbs is due to an emergent preference for uniform paradigms — specifically:

Morphophonological change via paradigm uniformity

▶ **Proposal:** Extension of vowel reduction in PA radical *mi*-verbs is due to an emergent preference for uniform paradigms — specifically:

(55) ONSET UNIFORMITY CONDITION (OUC):
Inflectional paradigms must have the same word-initial onset in all paradigm cells.

Morphophonological change via paradigm uniformity

► **Proposal:** Extension of vowel reduction in PA radical *mi*-verbs is due to an emergent preference for uniform paradigms — specifically:

(55) ONSET UNIFORMITY CONDITION (OUC):
Inflectional paradigms must have the same word-initial onset in all paradigm cells.

► This hypothesis has some advantages.

Morphophonological change via paradigm uniformity

▶ OUC correctly predicts extension of reduction (PVR) not only into *h_1eT* roots but also into *TeR* roots:

(53)

	a. PA 'are'		b. PA 'cut'		
	*$/h_1$és-ti/	*$/h_1$es-énti/	*$/k^w$ér-ti/	*$/k^w$er-énti/	UR
	–	$h_1$esénti	–	k^werénti	PVD
	–	h_1əs-énti	–	k^wərénti	PVR
	*[$h_1$es-ti]	[h_1əs-énti]	*[k^wér-ti]	*[k^wər-énti]	SR
>	Hitt. *ēšzi*	*ašanzi*	*kuērzi*	*kuranzi*	

▶ Deletion (PVD) is blocked where it would produce initial complex onsets (*[h_1s-], *[k^wr-]) that mismatch simple onsets in strong stem.
▶ Reduction (PVR) thus applies.

Morphophonological change via paradigm uniformity

▶ OUC also correctly predicts continued synchronic non-deletion in newly vowel-initial roots in Hittite (< PIE/PA *h₁eT–):

(54)   Hittite 'be'

/és-t͡si/	/es-ánt͡si/	UR
–	es̲ánt͡si	PVD
–	a̲sánt͡si	PVR
[éːs-t͡si]	[as-ánt͡si]	SR
ēšzi	*ašanzi*	

▶ Deletion (PVD) is <u>blocked</u> where it would produce an initial onset ([s-]) that mismatches onsetless (i.e., vowel-initial) strong stem forms.

▶ Reduction (PVR) then reduces /e/ to [a] in Hittite (see Appendix II on synchronic Hittite ablaut).

Morphophonological change via paradigm uniformity

- Independent Hittite evidence for OUC comes from ahistorically non-alternating radical *ḫi*-verb paradigms (cf. Melchert 2012).

Morphophonological change via paradigm uniformity

- ▶ Independent Hittite evidence for OUC comes from ahistorically non-alternating radical *ḫi*-verb paradigms (cf. Melchert 2012).
- ▶ Already in PA stress mobility introduced into PL.NPST.ACT of most verbs in this category (cf. Melchert 2013a), yielding *o/∅* alternations:

(55)

		PRE-PA	
a.	3SG	*$nóh_2$-ei*	'frightens'
	3PL	*$\mathring{n}h_2$-énti*	'they frighten'
b.	3SG	*$sóh_2$-ei*	'clogs, fills up'
	3PL	*sh_2-énti*	'they clog, fill up'
c.	3SG	*$lóg^h$-ei*	'knocks out, bends'
	PTCP	*$\mathring{l}\hat{g}^h$-ónt*	'bent'
d.	3SG	*$wóh_2\hat{g}$-ei*	'bites'
	3PL	*$uh_2\hat{g}$-énti*	'they bite'
e.	3SG	*$nó\hat{k}$-ei*	'dies'
	3PL	*$\mathring{n}\hat{k}$-énti*	'they die'

Morphophonological change via paradigm uniformity

- ▶ Independent Hittite evidence for OUC comes from ahistorically non-alternating radical *ḫi*-verb paradigms (cf. Melchert 2012).
- ▶ Expected Hittite outcomes of these verbs would show initial onset alternations in strong vs. weak contexts:

(56)

		PRE-PA		HITTITE	
a.	3SG	*nóh₂-ei	>	nāḫi	'frightens'
	3PL	*n̥h₂-énti	⸖	ˣaḫḫanzi	'they frighten'
b.	3SG	*sóh₂-ei	>	šāḫi	'clogs, fills up'
	3PL	*sh₂-énti	⸖	ˣišḫanzi	'they clog, fill up'
c.	3SG	*lógʰ-ei	>	lāki	'knocks out, bends'
	PTCP	*l̥gʰ-ónt	⸖	ˣalgān	'bent'
d.	3SG	*wóh₂ĝ-ei	>	wāki	'bites'
	3PL	*uh₂ĝ-énti	⸖	ˣukanzi	'they bite'
e.	3SG	*nók̂-ei	⸖	ˣnākki	'dies'
	3PL	*n̥k̂-énti	>	akkanzi	'they die'

Morphophonological change via paradigm uniformity

► Independent Hittite evidence for OUC comes from ahistorically non-alternating radical *ḫi*-verb paradigms (cf. Melchert 2012).

► But attested Hittite outcomes show analogical changes that bring verbs into compliance with OUC:

(57)		PRE-PA		HITTITE	EXPECTED
a.	3SG	*nóh₂-ei	>	nāḫi	
	3PL	*n̥h₂-énti	>>	naḫḫanzi	ˣaḫḫanzi
b.	3SG	*sóh₂-ei	>	šāḫi	
	3PL	*sh₂-énti	>>	šaḫḫanzi	ˣišḫanzi
c.	3SG	*lógʰ-ei	>	lāki	
	PTCP	*l̥gʰ-ónt	>>	lagān	ˣalgān
d.	3SG	*wóh₂ĝ-ei	>	wāki	
	3PL	*uh₂ĝ-énti	>>	wakkanzi	ˣukanzi
e.	3SG	*nók̂-ei	>>	aki	ˣnākki
	3PL	*n̥k̂-énti	>	akkanzi	

Morphophonological change via paradigm uniformity

- OUC aligns with diachronic developments observed elsewhere in IE.

Morphophonological change via paradigm uniformity

- ▶ OUC aligns with diachronic developments observed elsewhere in IE.
- ▶ Well-known tendency for vowel deletion to underapply to *CReC* ("State II") roots in zero-grade contexts.

    - ▶ Thus, e.g., in Vedic (Jamison 1983:209 n. 9):

(58)   a.   Ved. *prathi-ṣtha*   '(s)he spread out'   <<   ^x*pr̥thi-ṣthá*

      b.   Ved. *vyathi-tá–*   'wavering'   <<   ^x*vithi-tá–*

      c.   Ved. *śvas-ánt–*   'snorting'   <<   *śuṣ-ánt–* (RV I.61.10)

Morphophonological change via paradigm uniformity

▶ OUC aligns with diachronic developments observed elsewhere in IE.

▶ Well-known tendency for vowel deletion to underapply to *CReC* ("State II") roots in zero-grade contexts.

  ▶ Thus, e.g., in Vedic (Jamison 1983:209 n. 9):

(58) a. Ved. *prathi-ṣtha* '(s)he spread out' << ˣ*pṛthi-ṣthá*
      b. Ved. *vyathi-tá–* 'wavering' << ˣ*vithi-tá–*
      c. Ved. *śvas-ánt–* 'snorting' << *śuṣ-ánt–* (RV I.61.10)

▶ Non-alternations like (58) could be attributed to dispreference for word-initial onset alternations vis-à-vis stressed contexts — i.e.:

$$*[\text{CRéC}] \sim *[\text{C\r{R}C}´]$$

Morphophonological change via paradigm uniformity

▶ OUC aligns with diachronic developments observed elsewhere in IE.

▶ Well-known tendency for vowel deletion to underapply to *CReC* ("State II") roots in zero-grade contexts.

    ▶ Thus, e.g., in Vedic (Jamison 1983:209 n. 9):

(58) a. Ved. *prathi-ṣṭha* '(s)he spread out' << ^{x}*pr̥thi-ṣṭhá*
    b. Ved. *vyathi-tá–* 'wavering' << ^{x}*vithi-tá–*
    c. Ved. *śvas-ánt–* 'snorting' << *śuṣ-ánt–* (RV I.61.10)

▶ Non-alternations like (58) could be attributed to dispreference for word-initial onset alternations vis-à-vis stressed contexts — i.e.:

$$*[\text{CRéC}] \sim *[\text{C}\text{R}\text{C}´]$$

⇒ (Latent) dispreference for word-initial onset alternations in PIE, which often emerges in daughter languages.

Conclusions & discussion

▶ A top-down summary of the diachronic development of root ablaut in Anatolian radical *mi*-verbs:

    (i) PA inherited from PIE **m*-conjugation root presents and aorists that in pretonic contexts underwent root vowel deletion ($*/e/ \to \varnothing$) if (phonotactically) possible, otherwise reduction ($*/e/ \to [ə]$).

    (ii) In PA reduction was extended through these (radical *mi*-)verbs, replacing deletion wherever it created word-initial onset alternations.

    (iii) (Innovative) *[ə] in these verbs generally yielded [a] in Anatolian, but rounded vowels ([o]/[u]) after labialized dorsals in Hittite and Luwian.

(59)	(i) PIE		(ii) PA		(iii) Hittite	
a.	*[h₁s-énti]	>>	*[h₁əs-énti]	>	*ašanzi*	'they are'
b.	*[səs-énti]	>	*[səs-énti]	>	*šašanzi*	'they sleep'
c.	*[gʷʰn-énti]	>>	*[gʷʰən-énti]	>	[kʷon-]*anzi*	'they kill'
d.	*[kʷr-énti]	>>	*[kʷər-énti]	>	[kʷor-]*anzi*	'they cut'

Thank you!

- Special thanks to the members of the:
  - Indo-European & Modern Linguistic Theory research group
  - UCLA Indo-European Studies Graduate Seminar

- As well as to Craig Melchert, Ron Kim, Jesse Lundquist, and Ryan Sandell.

- ⋆ *This project was supported by a research fellowship from the Alexander von Humboldt Foundation* (`https://www.humboldt-foundation.de/`).

References I

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

Carruthers, Clive H. 1933. More Hittite Words. *Language* 9.151–161.

Cooper, Adam I. 2014. *Reconciling Indo-European Syllabification*. Leiden / Boston: Brill.

Dempsey, Timothy R. 2015. Verbal Reduplication in Anatolian. Ph.D. diss., University of California, Los Angeles.

Francia, Rita. 2018. The Grammar of Hittite Poetry. In Elisabeth Rieken (ed.), *100 Jahre Entzifferung des Hethitischen: Morphosyntaktische Kategorien in Sprachgeschichte und Forschung. Proceedings of the Arbeitstagung of the Indogermanische Gesellschaft, Marburg, 21. bis 23. September 2015*, 83–90. Wiesbaden: Reichert.

Garrett, Andrew. 2008. Paradigmatic Uniformity and Markedness. In *Linguistic Universals and Language Change*, 124–143. Oxford / New York: Oxford University Press.

References II

Güterbock, Hans G. 1952. *The Song of Ullikummi: Revised Text of the Hittite Version of a Hurrian Myth.* New Haven, CN: American Schools of Oriental Research.

Hoffner, Harry A. 1998. *Hittite Myths*, 2 edn. Atlanta, GA: Scholars Press.

Hoffner, Harry A., and H. Craig Melchert. 2008. *A Grammar of the Hittite Language. Vol. I: Reference Grammar.* Winona Lake, IN: Eisenbrauns.

Hrozný, Friedrich. 1919. *Hethitische Keilschrifttexte aus Boghazköi.* Leipzig: Hinrichs.

Jamison, Stephanie W. 1983. *Function and form in the –áya– formations of the Rig Veda and Atharva Veda.* Göttingen: Vandenhoeck and Ruprecht.

Jasanoff, Jay H. 2018. What happened to the perfect in Hittite? A contribution to the theory of the *h₂e*-conjugation. In Elisabeth Rieken (ed.), *100 Jahre Entzifferung des Hethitischen: Morphosyntaktische Kategorien in Sprachgeschichte und Forschung. Proceedings of the Arbeitstagung of the Indogermanische Gesellschaft, Marburg, 21. bis 23. September 2015*, 137–156. Wiesbaden: Reichert.

Kavitskaya, Darya. 2001. Hittite Vowel Epenthesis and the Sonority Hierarchy. *Diachronica* 18(2).267–299.

Kimball, Sara. 1999. *Hittite Historical Phonology*. Innsbruck: Institut für Sprachwissenschaft der Universität Innsbruck.

———. 2017. Luwic *mar–*. *Indogermanische Forschungen* 122.207–218.

Kloekhorst, Alwin. 2006. Initial laryngeals in Anatolian. *Historische Sprachforschung* 119.77–108.

———. 2007. The Hittite Syllabification of PIE *CuR* and *K^wR*. In Detlev Groddek and Marina Zorman (eds.), *Tabula Hethaeorum: Hethitologische Beiträge Silvin Košak zum 65. Geburtstag*, 455–457. Wiesbaden: Harrassowitz.

———. 2008. *Etymological Dictionary of the Hittite Inherited Lexicon.* Leiden / Boston: Brill.

———. 2014. *Accent in Hittite: A Study in Plene Spelling, Consonant Gradation, Clitics, and Metrics.* Wiesbaden: Harrassowitz.

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

———. 2010. The Verbal Prefix "u-" and <u> vs. <ú> Spellings in Anatolian Cuneiform. Paper presented at the 29th Annual East Coast Indo-European Conference, Ithaca, NY, 18–20 June 2010.

———. 2012. Hittite *ḫi*-Verbs of the Type *–āC$_1$i*, *–aC$_1$C$_1$anzi*. *Indogermanische Forschungen* 117.173–185.

———. 2013a. Ablaut Patterns in the Hittite *ḫi*-Conjugation. In Stephanie W. Jamison, H. Craig Melchert and Brent Vine (eds.), *Proceedings of the 24th Annual UCLA Indo-European Conference, Los Angeles, 26-27 October 2012*, 137–150. Bremen: Hempen.

———. 2013b. Hittite "Heteroclite" *s*-Stems. In Adam I. Cooper, Jeremy Rau and Michael Weiss (eds.), *Multi Nominis Grammaticus: Studies in Classical and Indo-European linguistics in honor of Alan J. Nussbaum on the occasion of his sixty-fifth birthday*, 175–184. Ann Arbor / New York: Beech Stave Press.

———. 2017. An Allative Case in Proto-Indo-European? In Bjarne S.S. Hansen, Adam Hyllested, Anders R. Jörgensen, Guus Kroonen, Jenny H. Larsson, Benedicte N. Whitehead, Thomas Olander and Tobias M. Söborg (eds.), *Usque ad Radices: Indo-European studies in honour of Birgit Anne Olsen*, 527–539. Copenhagen: Museum Tusculanum Press.

———. 2020. Hittite Historical Phonology after 100 Years (and after 20 years). In Ronald Kim, Jana Mynářová and Peter Pavúk (eds.), *Hrozný and Hittite: The First 100 Years. Prague, 11–14 November 2015*, 258–276. Leiden / Boston: Brill.

Oettinger, Norbert. 2017. Gall. *Cernunnos*, lat. *cornū* 'Horn' und heth. *Tarḫunna–*. In Bjarne S.S. Hansen, Adam Hyllested, Anders R. Jörgensen, Guus Kroonen, Jenny H. Larsson, Benedicte N. Whitehead, Thomas Olander and Tobias M. Söborg (eds.), *Usque ad Radices: Indo-European studies in honour of Birgit Anne Olsen*, 593–603. Copenhagen: Museum Tusculanum Press.

Patri, Sylvain. 2019. *Phonologie hittite*. Leiden / Boston: Brill.

Puhvel, Jaan. 1997. *Hittite Etymological Dictionary, Vol. 4: Words beginning with K.* Berlin / New York: de Gruyter.

Rix, Helmut, and Martin J. Kümmel (eds.). 2001. *Lexikon der indogermanischen Verben: Die Wurzeln und ihre Primärstammbildungen*, 2 edn. Wiesbaden: Reichert.

Simon, Zsolt. 2010. Das Problem der phonetischen Interpretation der anlautenden scriptio plene im Keilschriftluwischen. In Leonid Kogan (ed.), *Language in the Ancient Near East: Proceedings of the 53e Rencontre Assyriologique Internationale*, 249–265. Winona Lake, IN: Eisenbrauns.

———. 2013. Once Again on the Hieroglyphic Luwian Sign *19 <á>. *Indogermanische Forschungen* 118.1–22.

Watkins, Calvert. 1995. *How To Kill a Dragon: Aspects of Indo-European Poetics.* Oxford/New York: Oxford University Press.

Yates, Anthony D. 2014. On Proto-Anatolian Verbal Ablaut: The Hittite *ašanzi*-Type Reexamined. Paper presented at the Kyoto-UCLA Indo-European Workshop, Kyoto, 24-26 March 2014 (Handout available at: `http://www.adyates.com/research/`).

———. 2015. Anatolian Default Accentuation and its Diachronic Consequences. *Indo-European Linguistics* 3.145–187.

———. 2016a. Hittite Stressed Vowel Lengthening and the Phonology-Orthography Interface. In David M. Goldstein, Stephanie W. Jamison and Brent Vine (eds.), *Proceedings of the 27th Annual UCLA Indo-European Conference*, 235–257. Bremen: Hempen.

———. 2016b. Left But Not Leftmost? On the Interaction between Epenthesis and Ictus Assignment in Anatolian. In Stephanie W. Jamison, H. Craig Melchert and Brent Vine (eds.), *Proceedings of the 26th Annual UCLA Indo-European Conference*, 161–178. Bremen: Hempen.

Further evidence for PA rule extension

- ▶ **Proposal**: In PA vowel reduction was extended into all contexts in which vowel deletion used to create $[C_1eC_2] \sim [C_1C_2]$ root alternations.

- ▶ This predicts emergence of [ə] in at least three further Anatolian radical *mi*-verbs:

(A1)

	PRE-PA		PA		ANATOLIAN	
a.	*[tr-énti]	>>	*[tər-énti]	>	Hitt. *taranzi*	'they say'
b.	*[mr-éntu]	>>	*[mər-éntu]	>	Hitt. *marantu*	'let them disappear'
c.	*[(s)mr-énti]	>>	*[mər-énti]	cf.	Lyc. *martti*	'authorizes'

- ▶ There is positive evidence for [ə] in (A1a) and (A1c).

Further evidence for PA rule extension in Hittite

(A2)	STRONG/STRESSED		WEAK/PRETONIC	
a.	⟨*te-re-er*⟩	'they said'	⟨*ta-ra-an-zi*⟩	'they say'
	[téːrer]		[t(a)r-ánt͡si]	
b.	⟨*me-e-er-tu*⟩	'let him disappear'	⟨*ma-ra-an-du*⟩	'let them disappear'
	[méːr-tːu]		[m(a)r-ánt͡si]	

▶ In Hittite 'say' (suppletive PL of *te*– < PIE *d^heh_1*–) and 'disappear' show root alternations between (orthographic) *ĕ* and *a*.

Further evidence for PA rule extension in Hittite

(A2)	STRONG/STRESSED		WEAK/PRETONIC	
a.	⟨*te-re-er*⟩	'they said'	⟨*ta-ra-an-zi*⟩	'they say'
	[téːrer]		[t(a)r-ánt͡si]	
b.	⟨*me-e-er-tu*⟩	'let him disappear'	⟨*ma-ra-an-du*⟩	'let them disappear'
	[méːr-tːu]		[m(a)r-ánt͡si]	

- ▶ In Hittite 'say' (suppletive PL of *te*– < PIE *$d^h eh_1$–) and 'disappear' show root alternations between (orthographic) *ĕ* and *a*.

- ▶ Vowel is orthographic per Kloekhorst (2008:120):

   "[I]t is quite clear that the –*a*– as written in the weak stem is not phonologically real: *ta-ra-an-zi* 'they speak' reflects **tr-énti* and therefore must represent phonological /tránt͡si/; *ma-ra-an-du* 'they must disappear' < **mr-éntu* must be phonologically interpreted as /mrántu/."

Further evidence for PA rule extension in Hittite

(A2)	STRONG/STRESSED		WEAK/PRETONIC	
a.	⟨*te-re-er*⟩	'they said'	⟨*ta-ra-an-zi*⟩	'they say'
	[téːrer]		[t(a)r-ántsi]	
b.	⟨*me-e-er-tu*⟩	'let him disappear'	⟨*ma-ra-an-du*⟩	'let them disappear'
	[méːr-tːu]		[m(a)r-ántsi]	

▶ But if 'speak' had an initial cluster (*[#tre]), it should have undergone PA epenthesis like (50) (cf. Melchert 2013b:139–40, Yates 2015:154–5):

(A3) a. PIE *tri–* > PA *téri–* > Hitt. *teri–*   'three'
                                  ELuw. *tarriyanalli–* 'third-in-command'

   b. PIE *trép-ti* > PA *térep-ti* > Hitt. *teripzi*   'plows'

Further evidence for PA rule extension in Hittite

(A2)

	STRONG/STRESSED		WEAK/PRETONIC	
a.	⟨*te-re-er*⟩	'they said'	⟨*ta-ra-an-zi*⟩	'they say'
	[téːrer]		[tar-ántsi]	
b.	⟨*me-e-er-tu*⟩	'let him disappear'	⟨*ma-ra-an-du*⟩	'let them disappear'
	[méːr-tːu]		[mar-ántsi]	

▶ But if 'speak' had an initial cluster (*[#tre]), it should have undergone PA epenthesis like (50) (cf. Melchert 2013b:139–40, Yates 2015:154–5):

(A3) a. PIE *tri–*   > PA *téri–*   > Hitt. *teri–*   'three'

                                         ELuw. *tarriyanalli–* 'third-in-command'

   b. PIE *trép-ti* > PA *térep-ti* > Hitt. *teripzi*   'plows'

✓ Non-epenthesis in 'speak' explained by PA extension of [ə] into these roots, yielding Hitt. [a].

Further evidence for PA rule extension in Lycian

(A4)   a.   Lyc.   *martti*   'authorizes'   (e.g., TL 109: 4)

         b.   Lyc.   *mara*   'laws'   (e.g., TL 45b: 4)

         c.   Lyc.   *maraza*–   'judge'   (TL 44c: 4)

► Lycian attests a radical verb *mar*– 'authorize' (only 3SG.NPST.ACT) beside a set of nominal derivatives.

Further evidence for PA rule extension in Lycian

(A4)   a.   Lyc.   *martti*   'authorizes'   (e.g., TL 109: 4)

     b.   Lyc.   *mara*   'laws'   (e.g., TL 45b: 4)

     c.   Lyc.   *maraza–*   'judge'   (TL 44c: 4)

▶ Lycian attests a radical verb *mar–* 'authorize' (only 3SG.NPST.ACT) beside a set of nominal derivatives.

▶ Per Kimball (2017:215) (A4a) reflects the generalized weak stem of PIE root **(s)mer–* (cf. Gk. ἔμμορε 'earned a share', Lat. *mereō* 'deserve').

Further evidence for PA rule extension in Lycian

(A4) a. Lyc. *martti* 'authorizes' (e.g., TL 109: 4)

       b. Lyc. *mara* 'laws' (e.g., TL 45b: 4)

       c. Lyc. *maraza–* 'judge' (TL 44c: 4)

- ▶ Lycian attests a radical verb *mar–* 'authorize' (only 3SG.NPST.ACT) beside a set of nominal derivatives.
- ▶ Per Kimball (2017:215) (A4a) reflects the generalized weak stem of PIE root **(s)mer–* (cf. Gk. ἔμμορε 'earned a share', Lat. *mereō* 'deserve').
- ▶ Generalized weak stem explained straightforwardly if 3PL.NPST.ACT developed [ə] in PA.
    - ▶ cf. Lyc. *apptte* 'took' (<< weak PL.NPST PA **[h₁əp-´]; cf. Hitt. *appanzi*)

Synchronic root ablaut in Hittite radical *mi*-verbs

▶ **Proposal:** Hittite preserves PIE/PA vowel deletion and reduction (modulo sound change), with split of reduction into two distinct (ordered) rules:

(A5) a. PRETONIC /e/-DELETION (PVD)
          $/e/ \rightarrow \varnothing \;/\; \underline{\quad} \; \acute{\sigma}$ (iterative)

      b. PRETONIC /e/-ROUNDING (PVRD):
          $$/e/ \rightarrow [o] \;/\; \begin{bmatrix} \text{DORSAL} \\ \text{LABIAL} \\ -\text{sonorant} \end{bmatrix} \underline{\quad} \; \acute{\sigma}$$

      c. PRETONIC /e/-REDUCTION (PVR):
          $/e/ \rightarrow [a] \;/\; \underline{\quad} \; \acute{\sigma}$

Synchronic root ablaut in Hittite radical *mi*-verbs

▶ **Proposal:** Hittite preserves PIE/PA vowel deletion and reduction (modulo sound change), with split of reduction into two distinct (ordered) rules:

(A5)   a.   PRETONIC /e/-DELETION (PVD)

$$/e/ \rightarrow \varnothing \ / \ \_\_\_ \ \acute{\sigma} \qquad \text{(iterative)}$$

       b.   PRETONIC /e/-ROUNDING (PVRD):

$$/e/ \rightarrow [o] \ / \ \begin{bmatrix} \text{DORSAL} \\ \text{LABIAL} \\ -\text{sonorant} \end{bmatrix} \_\_\_ \ \acute{\sigma}$$

       c.   PRETONIC /e/-REDUCTION (PVR):

$$/e/ \rightarrow [a] \ / \ \_\_\_ \ \acute{\sigma}$$

▶ Ablauting radical *mi*-verbs show operation of (56b–c), but not (56a) due to ONSET UNIFORMITY CONDITION (OUC).

Synchronic root ablaut in Hittite radical *mi*-verbs

▶ These rules generate synchronic alternations in 'kill' between *kuĕn*–
and *kun*– [kʷon-], the latter ahistorical in pretonic prevocalic contexts:

(A6)   Hittite 'kill'

	/kʷén-t͡si/	/kʷen-ánt͡si/	UR
	–	kʷenánt͡si	PVD
	–	kʷonánt͡si	PVRᴅ
	–	–	PVR
	[kʷeːn-t͡si]	[kʷon-ánt͡si]	SR
	kuēnzi	*kunanzi*	

▶ Deletion (PVD) is blocked in weak stem by OUC where it would
produce a word-initial onset mismatch ([kʷ-] ~ [kʷn-]).

▶ Thus rounding (PVRᴅ) applies, bleeding reduction (PVR).

Synchronic root ablaut in Hittite radical *mi*-verbs

► These rules also generate ahistorical weak *kur*– 'kill' [kʷor-] in pretonic prevocalic contexts and in renewed IPFV:

(A7)   Hittite 'cut'

/kʷén-t͡si/	/kʷer-ánt͡si/	/kʷer-sk:é-t͡si/	UR
–	kʷeránt͡si	kʷersk:ét͡si	PVD
–	kʷoránt͡si	kʷorsk:ét͡si	PVRD
–	–	–	PVR
[kʷeːr-t͡si]	[kʷor-ánt͡si]	[kʷor-sk:éː-t͡si]	SR
kuērzi	*kuranzi*	*kur(a)škezzi*	

► Deletion (PVD) is blocked in weak stem by OUC where it would produce a word-initial onset mismatch ([kʷ] ∼ [kʷr]).

► Thus rounding (PVRD) applies, bleeding reduction (PVR).

Synchronic root ablaut in Hittite radical *mi*-verbs

► These rules also generate ahistorical weak *kur*– 'kill' [kʷor-] in pretonic prevocalic contexts and in renewed IPFV:

(A7)   Hittite 'cut'

/kʷén-t͡si/	/kʷer-ánt͡si/	/kʷer-sk:é-t͡si/	UR
–	kʷeránt͡si	kʷersk:ét͡si	PVD
–	kʷoránt͡si	kʷorsk:ét͡si	PVRD
–	–	–	PVR
[kʷeːr-t͡si]	[kʷor-ánt͡si]	[kʷor-sk:éː-t͡si]	SR
kuērzi	*kuranzi*	*kur(a)škezzi*	

► Form derived via synchronically productive phonological process replaces inherited IPFV Hitt. *kuwar(a)ške–* (< **kʷr̥-sḱé–*).

Synchronic root ablaut in Hittite radical *mi*-verbs

► These rules also generate ahistorical weak *aš*– 'be' ([as-]) in pretonic prevocalic contexts:

(A8)

Hittite 'be'

/és-t͡si/	/es-ánt͡si/	UR
–	es̲ánt͡si	PVD
–	–	PVRᴅ
–	a̲sánt͡si	PVR
[éːs-t͡si]	[as-ánt͡si]	SR
ēšzi	*ašanzi*	

► Deletion (PVD) is <u>blocked</u> in weak stem by OUC where it would produce a word-initial onset mismatch ($\varnothing \sim$ [s-]).

► No environment for rounding (PVRᴅ), thus reduction (PVR) applies.

Synchronic root ablaut in Hittite

▶ Synchronically, pretonic deletion (PVD) is maintained in Hittite only in a few nominal paradigms in word-internal position.

(A9)

	a. Hittite 'man'		b. Hittite 'land'		
	/pisén-os/	/pisén-ás/	/utnéi-∅/	/utnéi-ás/	UR
	–	pisén-ás	–	utnéi-as	PVD
	–	–	–	–	PVRD
	–	–	–	–	PVR
	[piséːn-os]	[pisn-áːs]	[utnéː]	[utny-áːs]	SR
>	Hitt. *pišēnuš*	[*p*]*išnāš*	*utnē*	*utniyaš*	
	'men'	'of the man'	'land'	'of the land'	

▶ In (A9b) onset alternations ([n] ~ [ny]) resulting from word-internal deletion do not violate the OUC, thus no blocking is observed.

Synchronic root ablaut in Hittite

▶ Derivations in (A10) illustrate interaction of pretonic deletion (PVD) (subject to <u>blocking</u> by OUC), rounding (PVRD), and reduction (PVR) in Hittite.

(A10)	'of the man'	'they cut'	'they are'	
	/pisén-ás/	/kʷer-ántsi/	/es-ántsi/	UR
	pis∅́n-ás	kʷ<u>e</u>rántsi	<u>e</u>sántsi	PVD
	–	kʷorántsi	–	PVRD
	–	–	asántsi	PVR
	[pisn-áːs]	[kʷor-ántsi]	[as-ántsi]	SR
	[*p*]*išnāš*	*kuranzi*	*ašanzi*	

Independent evidence for Hittite /e/-Rounding

► Two other (homophonous) Hittite ablauting radical *mi*-verbs show a root alternation like 'kill' and 'cut':

(A11)

	STRONG/STRESSED		WEAK/PRETONIC	
a.	⟨ḫu-e-ek-mi⟩	'I conjure'	⟨ḫu-kán-zi⟩	'they conjure'
	[χʷéːk-mi]		[χʷok-ánt͡si]	
b.	⟨ḫu-e-ek-ta⟩	'slaughtered'	⟨ḫu-ga-a-an-ta-an⟩	'slaughtered (by)'
	[χʷéːk-ta]		[χʷok-áːnt-an]	

► ⟨ḫu(-u)-C°⟩ spellings in weak stem are ambiguous, interpretable as as [χʷo] or [χo-] (thus, e.g., Kloekhorst 2014:658–9).

Independent evidence for Hittite /e/-Rounding

▶ Root ablaut in these verbs has a different historical source:

(A12) a. PIE *$h_2wé\widehat{\acute{g}}^h$-mi* > Hitt. ⟨ḫu-e-ek-mi⟩   'conjures'
                                         [χʷéːk-mi]

   ~ PIE *$h_2u\widehat{\acute{g}}^h$-énti* > Hitt. ⟨ḫu-kán-zi⟩   'they conjure'
                                          [χʷok-ánt͡si]

   b. PIE *$h_2wég$-t* > Hitt. ⟨ḫu-e-ek-ta⟩   'slaughtered'
                                          [χʷéːk-ta]

   ~ PIE *h_2ug-ónt-m̥* > Hitt. ⟨ḫu-ga-a-an-ta-an⟩ 'slaughtered (by)'
                                          [χʷok-áːnt-an]

▶ PIE *u* was lowered in PA (*[u̞]) next to uvulars (< *h_2, *h_3), yielding [o(ː)] in Hittite, Luwian, and Palaic (Melchert 2010, 2020).

▶ Unclear whether PA change of *h_2u– to *[χʷu̞] was phonologically regular (thus Kloekhorst 2006?) or analogical to strong stem.

Independent evidence for Hittite /e/-Rounding

▶ But synchronically the alternations in 'conjure' and 'slaughter' can be attributed to same rule in (A5b):

(A5b) PRETONIC /e/-ROUNDING:

$$\text{Hitt. } /e/ \rightarrow [o] \ / \begin{bmatrix} \text{DORSAL} \\ \text{LABIAL} \\ -\text{sonorant} \end{bmatrix} \_\_\_ \acute{\sigma}$$

(A13) a. Hitt. $/\chi^w\text{ek-án}\widehat{\text{ts}}\text{i}/ \rightarrow [\chi^w\text{ok-án}\widehat{\text{ts}}\text{i}]$ 'they conjure'

                     ⟨ḫu-kán-zi⟩   cf. 1SG ⟨ḫu-e-ek-mi⟩

     b. Hitt. $/\chi^w\text{ek-ánt-an}/ \rightarrow [\chi^w\text{ok-áːnt-an}]$ 'slaughtered (by)'

                     ⟨ḫu-ga-a-an-ta-an⟩ cf. 3SG ⟨ḫu-e-ek-ta⟩

Independent evidence for Hittite /e/-Rounding

▶ But synchronically the alternations in 'conjure' and 'slaughter' can be attributed to same rule in (A5b):

(A5b) PRETONIC /e/-ROUNDING:

$$\text{Hitt. } /e/ \rightarrow [o] \ / \ \begin{bmatrix} \text{DORSAL} \\ \text{LABIAL} \\ -\text{sonorant} \end{bmatrix} \underline{\quad} \acute{\sigma}$$

(A13) a. Hitt. $/\chi^w\text{ek-án}\widehat{\text{tsi}}/ \rightarrow [\chi^w\text{ok-án}\widehat{\text{tsi}}]$ 'they conjure'

            ⟨ḫu-kán-zi⟩   cf. 1SG ⟨ḫu-e-ek-mi⟩

    b. Hitt. $/\chi^w\text{ek-ánt-an}/ \rightarrow [\chi^w\text{ok-áːnt-an}]$ 'slaughtered (by)'

            ⟨ḫu-ga-a-an-ta-an⟩ cf. 3SG ⟨ḫu-e-ek-ta⟩

⇒ Verbs in (A13) provide independent evidence for (A5b) as source of $[\text{k}^w\text{oR-}]$ in 'cut' and 'kill'.

Development of *[ə] in Anatolian

- ▶ PIE/PA *e* was subject to reduction in Anatolian in other unstressed contexts.
- ▶ Hittite and Palaic show [a] (via *[ə]?) as reflex of *e* in (A14a–b) post-tonic open syllables and in (A14c–d) word-final unstressed syllables.

(A14)	a.	PA	*´–weni	>	Hitt. *akkuškēwani*	'we drink'
				>	Pal. *ḫapariwani*	'we hand over'
	b.	PA	*´–téni	>	Hitt. *paittani*	'we go'
	c.	PA	*=te	>	Hitt. =*tta*	'(to/for) you'
	d.	PA	*=pe	>	Pal. =*ppa*	(TOP)

Development of *[ə] in Anatolian

▶ PIE/PA *e* was subject to reduction in Anatolian in other unstressed contexts.

▶ But in word-final unstressed syllables after *k^w* reduced *e* ([ə]?) yields a rounded vowel ([u]/[o]) in Hittite and Palaic.

(A15) a.　PA　　*tó-k^we*　>　Hitt. *takku*　'if'

　　　b.　PA　　*=k^w*　　　Hitt. *=kku*　'and, even'?

　　　　　　　　　　　　　　　Pal. *=ku*　'and'?

⇒ (A14–15) support development in Hittite radical *mi*-verbs of PA *[ə] to [a], but [o] after labialized dorsals in 'kill' and 'cut'.

Phonotactic blocking in Anatolian radical *ḫi*-verbs

- ▶ Some PA radical *ḫi*-verbs provide additional evidence for pretonic reduction as general phonological process prior to emergence of OUC.
- ▶ After introduction of stress mobility in pre-PA, pretonic deletion (PVD) was phonotactically <u>blocked</u> in (A16), thus reduction (PVR) applied:

(A16)

	a. Pre-PA 'match'		b. Pre-PA 'dig'		
	*/dók̂-ei	*/dek̂-énti/	*/bʰód̂ʰh₂-ei/	*/bʰed̂ʰh₂-énti/	UR
	–	dek̂-énti	–	bʰed̂ʰh₂énti	PVD
	–	də̂k̂-énti	–	bʰəd̂ʰh₂énti	PVR
	*[dók̂-ei]	[də̂k̂-énti]	*[bʰód̂ʰh₂-ei]	*[bʰəd̂ʰh₂énti]	SR
>	Hitt. *dākki*	*takkanzi*	*pāddai*	*paddanzi*	

Against the "glottal stop hypothesis"

(A17) a. Hitt. *ašanzi*   'they are'   = I-ALuw. ⟨*a-sa-ti*⟩   'id.'
      b. Hitt. *ašandu*   'let them be'   = KLuw. *ašandu*   'id.'
                                                   = Pal. *ašandu*   'id.'
      c. Hitt. *adanzi*   'they eat'   = Pal. *atānti*   'they eat'
      d. Hitt. *adandu*   'let them eat'   = I-ALuw. ⟨*a+ra/i-tu*⟩ 'let them eat'
      e. Hitt. *appanzi* 'they take'   ≈ Lyc. *apptte*   'took'

► Initial *a*-spellings in cuneiform and hieroglyphic scripts have been
argued to represent a glottal stop ([ʔ]) rather than a real [a]-vowel
(Kloekhorst 2006:79–81, 2008:121, Simon 2010, 2013).

Against the "glottal stop hypothesis"

(A17)   a.   Hitt. *ašanzi*   'they are'   = I-ALuw. ⟨*a-sa-ti*⟩   'id.'

      b.   Hitt. *ašandu*   'let them be'   = KLuw. *ašandu*   'id.'

                                                 = Pal. *ašandu*   'id.'

      c.   Hitt. *adanzi*   'they eat'   = Pal. *atānti*   'they eat'

      d.   Hitt. *adandu*   'let them eat'   = I-ALuw. ⟨*a+ra/i-tu*⟩   'let them eat'

      e.   Hitt. *appanzi*   'they take'   ≈ Lyc. *apptte*   'took'

- ▶ Reality of root vowel in (A17) is guaranteed by:
    - ▶ Alphabetic Lyc. *apptte* (with generalized weak stem) in (A17e).
    - ▶ I-ALuw. ⟨*a+ra/i-tu*⟩ in (A17d) with intervocalic "rhotacism" of **d*.

Against the "glottal stop hypothesis"

(A17) a. Hitt. *ašanzi* 'they are' = I-ALuw. ⟨*a-sa-ti*⟩ 'id.'
       b. Hitt. *ašandu* 'let them be' = KLuw. *ašandu* 'id.'
                                       = Pal. *ašandu* 'id.'
       c. Hitt. *adanzi* 'they eat' = Pal. *atānti* 'they eat'
       d. Hitt. *adandu* 'let them eat' = I-ALuw. ⟨*a+ra/i-tu*⟩ 'let them eat'
       e. Hitt. *appanzi* 'they take' ≈ Lyc. *apptte* 'took'

⇒ Initial *a*-spellings do not orthographically represent a glottal stop
(contra Kloekhorst 2006:79–81, 2008:121, Simon 2010, 2013).

▶ For further arguments see Yates (2016a).

     ▶ (Vocalic interpretation now preferred by Kloekhorst 2014:667–8)