On the relationship between stress and vowel quantity in Hittite

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

§1   Introduction

§1.1   On Hittite "plene writing" and vowel quantity: Now generally accepted that Hittite "plene writing" — viz. the repetition of identical vowel signs in the spelling of vowels or diphthongs (cf. Kimball 1999:55) — indicates **vowel length** (already Hrozný 1917:xii; cf. Melchert 1994:27).

§1.2   Hittite vowel quantity: Similarly uncontroversial that:

- Vowel length is contrastive in stressed syllables.

- Hittite shows (historical) vowel lengthening and shortening processes such that:

  · Some Hittite surface long vowels continue Proto-Indo-European (PIE) stressed long vowels (or tautosyllabic *VH*).

  · Other surface long vowels are due to Hittite-internal stress-conditioned lengthening processes.

  · Unstressed long vowels were (historically) shortened.

  · "Stress" refers to the single surface prosodic prominence — called "ictus" in (e.g.) Kiparsky (2010) and Yates (forthcoming a,b) — while "accent" refers to (underlying) lexical specification for prominence.

§1.3   Outstanding questions: In view of (especially) the differing treatments of Melchert (1994), Kimball (1999), and Kloekhorst (2008, 2014), still disputed are:

- The conditions under which (certain) short vowels are lengthened.

- The synchronic status of lengthening (and shortening) processes.

⇒ The extent to which plene writing can be used to diagnose word stress, and so inform our understanding of Proto-Indo-European (PIE) prosody (cf. Yates forthcoming a).

§1.4   Toward an analysis of Hittite vowel quantity: Primary aims for today:

(i) (Re)assess the historical development of vowel quantity in Hittite, arguing in particular for the lengthening of stressed *é* in open and closed syllables (contra Kloekhorst 2014). (§2)

(ii) Provide new evidence for stressed mid vowel lengthening and unstressed vowel shortening as synchronic processes in Hittite (§3).

(iii) Evaluate the consequences of synchronic and diachronic vowel developments for the phonemic inventory of Hittite, and discuss some outstanding problems. (§4)

§2   On the diachrony of stress and vowel quantity in Hittite

§2.1   Anatolian quantitative developments: Two general developments affecting vowel quantity are characteristic of the Anatolian languages:

§2.1.1   Unstressed *$\bar{V}$ shortening: Per Eichner (1973:79, 86 n.15), already in Proto-Anatolian all unstressed vowels were shortened — e.g. PIE *$d^h\acute{e}\hat{g}^h\bar{o}m$ 'earth' > PA *$d\acute{e}\hat{g}om$ > Hitt. *tēkan* [té:kan] (cf. Melchert 1994:76).

§2.1.2   Stressed vowel lengthening: Common to all (2nd mill.) Anatolian languages — post-PA, and likely by areal difffusion — is the lengthening of stressed inherited short vowels: all $\acute{\bar{V}}$ show (historical) lengthening in open syllables, and in closed syllables, a language-specific set of non-high $\acute{\bar{V}}$.

> · Open syllable lengthening may be viewed as a natural consequence of the cross-linguistic preference for stressed syllables to be heavy, which in OT terms has been encoded as the STRESS-TO-WEIGHT PRINCIPLE (SWP) (Riad 1992; cf. Prince and Smolensky's (1993/2004) PK-PROM). More generally, see Smith (2005:34–67) on the tendency for stressed syllables to undergo phonological augmentation (incl. stressed vowel lengthening).

§2.2   *$\acute{V}C.$ lengthening: Until recently, it was standardly held that in closed syllables only *$\acute{e}$, *$\acute{o}$ lengthen in Hittite, which contrasts with across-the-board lengthening of all non-high *$\acute{V}$ in Palaic and Luwian — observe Hitt. [á] from PA *$\acute{a}C.$ in (1) vs. Hitt. [á:] from PA *$\acute{o}C.$ in (2):

(1)   **PA *$\acute{a}C.$ > Hitt. *aC.* :**

    a.   PA *anna–* 'mother' > Hitt. *anna–* [án:a–]   cf. CLuw. *ānni–*, Pal. *ānna–*

    b.   (Post-[?])PA *–ánti* (3PL.PRS.ACT.) > Hitt. *–anzi* [–ánt͡si]   cf. Pal. *–ānti*

    c.   PA *Hát-o* 'pierces' (3S.PRS.MP.) > Hitt. *hatta(ri)* [χát:a(ri)]   cf. Pal. *hāpna–* 'river' < PIE *$h_2\acute{e}b^h$-no–

    d.   PA *–áH–* (FACT) > Hitt. *–ahh–* [–áχ:–]

(2)   **PA *$\acute{o}C.$ > Hitt. *āC.* :**

    a.   PA *ópi* 'back; again' ⤷ Hitt. *āppa* [á:p:a]   cf. CLuw. *āppa*, HLuw. *a-pi*

    b.   PA *obó-s* 'that' (C.NOM.S.) > Hitt. *apāš* [apá:s]   cf. CLuw. *apāš*

    c.   PA *dók̂-ei* 'match; resemble' (3S.PRS.ACT.) > Hitt. *dākki* [tá:k:i]

> · For the Hittite developments, see Melchert (1994:133, 146–7) (cf. Kloekhorst 2008:96–9); and on Palaic and Luwian, Melchert (1994:217–8, 263–4). Note also that Luwian lengthening does not apply to *$\acute{e}$ in initial syllables, which instead undergoes Čop's Law (Čop 1970) to yield [#áC:]. On (2a), see Melchert (2009:335–6), and on (2c), Melchert (2012:175).

§2.3   Hittite consequences: Under this (traditional) view, stressed vowel lengthening led to merger in Hittite of the reflexes of all stressed PA short and long vowels in open syllables; and in closed syllables, of PA *$\acute{e}$, *$\acute{\bar{e}}$, and generally *$\acute{e}i$ as Hitt. [é:] and of *$\acute{o}$, *$\acute{\bar{o}}$, and *$\acute{a}$ as Hitt. [a:] (thus Kloekhorst 2008:89–99).

§2.4   A new theory: While maintaining certain aspects of this analysis, Kloekhorst (2014) has challenged it in several respects, including rejecting the historical lengthening of *$\acute{e}$ in closed syllable — thus PIE/PA *$\acute{e}C.$ should yield only *eC.* ([eC.]), and so **never be spelled plene**.

> · The outcome of *eC would thereby contrast with that of *$\acute{\bar{e}}$, tautosyllabic *$\acute{e}h_1$ and (unconditioned) *$\acute{e}i$, which yield [é:], spelled plene.

§2.4.1   An exceptional class: One major locus of apparent counter-examples to this prediction is the (representative) set of forms in (3), which are "consistently" spelled <*e-eC*> at all stages of Hittite:

	PIE *$h_1\acute{e}s$-ti 'is'	>	PA *$(h_1)\acute{e}s$-ti	>	Hitt. *ēšzi*	<e-eš-zi>
(3)	PIE *$h_1\acute{e}p$-ti 'takes'	>	PA *$(h_1)\acute{e}p$-ti	>	Hitt. *ēpzi*	<e-ep-zi>
	PIE *$h_1\acute{e}sh_2$-r̥ 'blood'	>	PA *$(h_1)\acute{e}sH$-r̥	>	Hitt. *ēšhar*	<e-eš-ḫar>

§2.4.2   The glottal stop hypothesis: In order to explain (3), Kloekhorst (2014) maintains that in word-initial *<e-eC>*, the first vowel sign represents a (phonemic) glottal stop [ʔ] — the direct reflex of PIE *h_x* — which would be regularly written at all periods of Hittite.

· This view is advocated in more detail in Kloekhorst (2004, 2006, 2008:75–6). In Kloekhorst (2014), the Hittite-internal diachronic stability of glottal stop spellings is held to contrast with plene spelling representing vowel length, which decreases in later periods of the language, putatively due to the shortening of OH (half-)long vowels in a wide range of environments.

§2.4.3   Achieving adequacy?   The glottal stop hypothesis has been much critiqued, (in part) for its limited explanatory power and potential circularity (see esp. Weeden 2011:62; cf. Melchert 2010b); to this may be added certain cases in which it makes empirically false predictions — e.g. (4), where initial plene would be expected:

(4)   a.   PIE *h_1esh_2-ó–* > Hitt. *išḫā–* 'master'   (e.g.) *<iš-ḫa-a-aš>* [NOM]   (ˣ*<i-iš-ḫa-a-aš>*)
       b.   PIE *h_1eh_1-s-´* > Hitt. *išš-´* 'mouth' [OBL]   (e.g.) *<iš-ši-i>* [LOC]   (ˣ*<i-iš-ši-i>*)

· In isolated *ēšḫaš* (KUB 41.8 iii 21) with late NH lowering of /i/, I assume that plene writing indicates — if anything — diachronic reversion of stress to the default leftmost pattern with consequent stressed vowel lengthening (cf. Yates forthcoming a). For the etymology of (4a), see Ribezzo (1920) (cf. Nussbaum 2014:244–5), and for (4b), Melchert (2010d) (though Kloekhorst's (2008:166–7) etymology should yield the same initial spelling under his assumptions).

§2.4.4   Exceptions and "explanations":   Moreover, the numerous disparate hypotheses advanced by Kloekhorst (2014) to account for other apparent counter-examples — e.g. (5) — are (at least collectively) implausible:

(5)   a.   *šēšzi* 'sleeps' (KBo 19.128 vi 29)   ⇒   scribal error   (2014:68, 72)
            kēnzu 'lap' (KBo 19.31 ii 17)
       b.   *mērtu* 'let disappear' (KUB 41.23 ii 5)   ⇒   "emphatic lengthening" of imperatives   (2014:94–5)
            s(a)mēzzi 'withdraws' (HKM 5, 14)
       c.   *ḫuēkta* 'slaughtered' (KUB 36.104 obv. 16)   ⇒   plene not indicative of vowel length   (2014:155–61)
            kuēnzi 'kills' (KBo 6.2 i 3)   after labialized obstruents or [w]

· For similar skepticism, see Kimball (forthcoming). Note that *s(a)mēzzi* in (5b) is not even imperative (although in a modal context).

§2.5   Assessing hypotheses: In view of these issues, the Kloekhorst's (2014) objections to the traditional view (cf. §2.3) cannot be upheld — the Hittite outcome of *é* in closed syllables is [éː], thus **optionally** spelled plene.

· I further assume (*pace* Kloekhorst 2014) that vowel quantity is on the whole stable within the attested history of Hittite, although individual words may show stress shifts that in turn drive changes in vowel quantity. Thus except where otherwise motivated, decreasing plene writing in late texts does not reflect diachronic vowel shortening(s), but simply change in the use of an orthographic practice that was, even at the earliest attested stage of the language, fundamentally optional (cf. Kimball forthcoming).

§2.6   Diachrony of vowel quantity: Thus the (stress-dependent) historical vowel developments in (6) are secure for Hittite:

(6)   • Unstressed PA *$\bar{V}$* > Hitt. [V]

       • PA *V̑.* > Hitt. [V́ː.]

       • PA *ó̑, *á̑, *ó* > Hitt. [áː]   vs.   PA *áC.* > Hitt. [áC.]

       • PA *é̑, *éi, *é* > Hitt. [éː]

§3   Toward a synchronic analysis of Hittite vowel quantity

§3.1   Synchronic questions: What are the consequences of the historical developments in (6) for the synchronic phonological system of Hittite?

§3.2   Open syllable lengthening: Inherited short vowels remain underlyingly short (/V/), and are lengthened in stressed open syllables (cf. Melchert 1994:138); the synchronic status of this process is strongly suggested by the absence of light stressed syllables in lexical words, as well as lengthening of /i/ when stressed under interrogative intonation, e.g. (7):

(7)   a.   *ḫartenī* [χarténíː] 'do you hold…?'   (KBo 22.1:31)

       b.   *memaḫḫī* [mémaχːíː] 'should I say…?'   (KBo 18.22 obv. 6)

§3.3   Mid-vowel lengthening: Hitt. [éː] — from **é, *ḗ,* and **éi* per (6) — is most plausibly analyzed as the surface realization of a single phoneme /e/, derived by the same process of MID-VOWEL LENGTHENING (MVL) that gave rise to the historical merger of these distinct PA phonemes (Melchert 1994:107–8, 133; cf. Kloekhorst 2008:96–7). Further evidence for its synchronic operation comes from:

§3.3.1   Synchronic regularity: The continued operation of MVL explains historically unexpected (i.e. non-*lautgesetzlich*) forms like (8) — traditionally ascribed to analogy (cf. Melchert 1994:135) — as the direct result of the application of productive Hittite morphophonological processes:

(8)   Hitt. /kʷen – t͡si/ → *kuēnzi* [kʷéːnt͡si] 'kills'   (ˣ*kuanzi* [kʷánt͡si] < PIE **gʷʰén-ti*)

· Derivation from /e/ rather than /eː/ is likely the natural result of the language acquisition process and LEXICON OPTIMIZATION (e.g. Prince and Smolensky 1993/2004:225–31), which prefers more harmonic underlying forms. The selection of /e/ would fall out from the ranking *MID-V̄ ≫ *NO-LONG-V ≫ DEP-[LONG], which may be assumed to follow from the cross-linguistically marked status of long vowels (Rosenthall 1994).

§3.3.2   Symmetrical developments: MVL also comes to apply to Hitt. "new" /o/, which yields Hitt. [óː] in open and closed syllables even when its source is an inherited short vowel (PA *[ṷ́]), e.g. (9):

(9)   a.   PA **Húsḱesi* *[χṷ́sḱesi] > Hitt. *ḫūškesi* [χóːskːesi] 'you wait'   (KBo 5.13 iii 17–8)

       b.   Pre-Hitt. **Hūpa–* *[χṷ́pa–] > Hitt. *ḫūppa–* [χóːpːa–] 'pile, heap'   (KUB 27.29 iii 7–8)

· The major sources of Hitt. "new" /o/ are the PA diphthongs **ou, *au,* and possibly **eu,* as well as PA *[ṷ], the lowered allophone of **/u/ conditioned by adjacent "laryngeals" (**[χ] , *[ʁ]); see Rieken (2005) and Kloekhorst (2008:35–60), as well as Melchert (2010c) with Anatolian comparanda. Hitt. /o/ likely became phonemic only after the loss of "laryngeals" (in some environments) and its merger with (certain) reflexes of the above diphthongs. Its emergence as a phoneme accords with the cross-linguistic preference for maximally disperse vowel inventories (Lindblom 1986), as it fills the vowel space left unoccupied after the merger of PA **/o/ and **/a/ as Hitt. /a/.

· On (9a), see in detail Yates (forthcoming a). (9b) is a result noun to Hitt. *ḫuwapp–* 'hurl, throw' (Melchert 2007), presumably a recent creation of (pre-)Hittite, since it shows stressed zero-grade of the root (not **ó-grade, derivation from which is formally impossible).

§3.4   The consequences of merger: In words containing Hitt. [áːC.] from PIE/PA **óC.,* the historical lengthening rule has become synchronically opaque — i.e. surface [áːC.] cannot be synchronically derived by lengthening, since there are clear examples of [á] in this environment, e.g. (10) (cf. (1) above):

(10)   a.   Hitt. *walhzi* [wálχt͡si] 'strikes' ← /walχ – t͡si/   ⟵ PIE **wélh₃-ti*

        b.   Hitt. *anda* [ánta] 'in(to)' ← /anta/   < PIE **h₁éndo*

§3.5   Opacity and restructuring: Simplest to assume that the (qualitative) merger of PIE/PA **o* and **a* drove **restructuring** — in words historically derived from PIE/PA **óC.,* Hitt. [áː] is now derived from /aː/.

§3.6　Accounting for alternations:　In Hittite [áː]/[a] alternating paradigms — primarily *ḫi*-verbs with productive late PA *ó/∅* ablaut (cf. Melchert 2013) — vowel length in the strong stem cannot be derived; rather, there must be a process **shortening** unstressed /aː/ in the weak stem:

(11)　　a.　Hitt. /taː – i/ → *dāi* [táːi] 'takes'　　　　　　　　　　　　　(e.g. KBo 6.2 i 8)

　　　　b.　Hitt. /taː – tːéni/ → *dattēni* [tatːéːni] 'you take'　　　　　　(e.g. KUB 36.106 Vs. 8)

(12)　　a.　Hitt. /kaːnkː – i/ → *kānki* [káːnkːi] 'hangs'　　　　　　　　(KBo 17.2 i 7)

　　　　b.　Hitt. /kaːnkː – ántsi/ → *kankanzi* [kankːántsi] 'hang'　　　(e.g. KBo 17.74 ii 27)

(13)　　a.　Hitt. /aːr – χːi/ → *ārḫi* [áːrχːi] 'I arrive'　　　　　　　　　(e.g. KUB 31.130 rev. 6)

　　　　b.　Hitt. /aːr – ántsi/ → *aranzi* [arántsi] 'they arrive'　　　　(e.g. HKM 26 Ro 14)

　　· The need for a synchronic shortening rule was identified already by Melchert (1994:108), but this important observation has been subsequently overlooked.

§3.7　Non-paradigmatic alternations:　The same pattern can be observed inter-paradigmatically for certain derivational suffixes — e.g. (14a) vs. (14b) — and across (15) derivationally related forms, both of which point to synchronic shortening of /aː/:

(14)　　a.　/laːk – áːnt – ∅/ → *lagān* [lakáːn] 'inclined' (PTCP.C.NOM.S.)　　(KBo 12.96 iv 14)

　　　　b.　/áːr – áːnt – s/ → *ārranza* [áːrːants] 'washed' (PTCP.C.NOM.S.)　　(KBo 21.57 iii 8)

(15)　　/maːn/ → *mān* [máːn] 'if' (CONJ)　　　cf. *man* [man] (CL-PTC.IRR.)

　　· The differing stress patterns in (14) reflect a contrast between inherently accented and unaccented roots (cf. Yates 2015). In view of Melchert's (2013:142–3) defense of Jasanoff's (2003; 2013) reconstruction of *ó/é* ablaut in the *ḫi*-conjugation (and his own reconstruction of *ó/ó* in the shallow prehistory of *h_2e*-aorists), it is hardly surprising that a few *ḫi*-verb forming roots are lexically accented, and so preserve fixed root stress as an archaism.

§3.8　High vowel shortening:　Underlying long high vowels likely show the same shortening in unstressed syllables, although few (if any) secure cases — some possible examples in (16):

(16)　　a.　*kūzza* [kúːts] 'wall' (C.NOM.S.)　　vs.　　*kuttaš* [kutːás] (C.GEN.S.)　　: /kuːtː–/

　　　　b.　*ḫuĩšzi* [χʷíːstsi] 'lives' (3S.PRS.ACT.)　　vs.　　*ḫuišnūt* [χʷisnúːt] 'save!' (2S.IMPV.ACT.)　　: /χʷiːs–/

　　· Kloekhorst (2014:497) assumes (secondary) fixed root accent for (16a) on the basis of locative *kutti* (KBo 17.11+ Ro i 44; OH/OS) with non-plene spelling of its final vowel; this scenario is possible, but since plene is optional (cf. §2.5), there is no compelling reason to assume the noun did not remain mobile. In (16b), synchronically [íː] can only reflect phonemic /íː/, since /í/ does not lengthen in closed syllables; it is thus necessary to assume lexicalization of vowel length after the regular raising of *e* (or /e/) between a labial consonant and coronal stop (cf. Melchert 1994:101), at which point the surface long vowel could no longer be derived.

　　· Another paradigm in which [íː] / [í] alternations might be historically expected is *kiš–* 'happen', which would develop via contraction and raising from *éi* in the strong stem vs. *i* in the weak. Yet *kiš–* shows plene [íː] only in open syllables, thus suggesting underlying /i/ (cf. Melchert 1994:145–6), which may reflect overgeneralization of LEXICON OPTIMIZATION (cf. §3.3).

§3.9　A general shortening process?　Taken together, (11–15) and (16) suggest a more general process shortening all unstressed long vowels — thus from an OT perspective (Prince and Smolensky 1993/2004), the (high-ranking) markedness constraint in (17):

(17)　　*UNSTRESSED-$\bar{V}$:　An unstressed long vowel is not permitted in the output.

§3.10　Advantages of the analysis:　This constraint-based approach has (at least) two advantages:

(i)　(17) may be viewed as direct inheritance from PA, where it similarly drove shortening of unstressed long vowels (cf. §2.1.1).

(ii)　(17) would explain why — with few exceptions (cf. §3.11 below) — each prosodic word contains just one surface long vowel.

§3.11　Where generality fails: Some words show multiple vowels spelled plene, which appears to indicate the presence of more than one long vowel, although only one can bear primary stress, e.g. (18–19):

(18)　a.　<*i-da-a-la-u-e-eš-zi*> 'becomes evil' (3S.PRS.ACT.)　　(: *idālu–* 'evil')　　　　<small>(KBo 6.4 iv 2)</small>

　　　b.　<*mu-u-ga-a-mi*> 'I entreat' (1S.PRS.ACT.)　　(: *mūga–** 'goad')　　　<small>(KUB 9.27 obv. 5)</small>

(19)　a.　<*uk-tu-u-ri-i-e-eš*> 'eternal' (C.NOM.PL.)　　　　　　　　　　　　<small>(KBo 4.1 obv. 15)</small>

　　　b.　<*a-aš-ša-u-e-es*> 'good' (C.NOM.PL.)　　　　　　　　　　　　　<small>(KBo 18.66 obv. 12)</small>

　・ On the etymology and derivation of (18b), see Melchert (2010a).

§3.12　Toward a principled explanation: Multiple plene spelling is generally confined to the two loci above — (18) denominal/deadjectival derivation and (19) the nominative plural suffix *–eš*.

§3.13　Nom.pl. *–ēš*: The nominative plural suffix often surfaces with plene even when stress is likely to fall in a preceding syllable, which may thus also be spelled plene.

§3.13.1　Whence plene? Plene typically explained as a long vowel arising after PA **V̄* shortening from contraction of *i-stem **–éy-es* (cf. Lat. *–ēs*), with analogical spread to other nominal classes.

　・ For this analysis, see Kimball (1999:365) with refs.; it has been critiqued by (e.g.) Neu (1979), but for a possible scenario, see Melchert (1984:121–2).

§3.13.2　Analytic alternatives: Two potential analyses for the problematic suffix:

(i)　Restrict vowel shortening such that /eː/ — or else just the nominative plural suffix /–eːs/ — fail to undergo it.

(ii)　With Kloekhorst (2014:158–9), reject that apparent plene spelling in the suffix (usually) indicates vowel length.

　・ Both analyses have non-trivial issues. A major drawback of (i) is that it entails accepting the existence of a phoneme /eː/, for which there is little or no independent evidence. As for (ii), Kloekhorst (2014) raises significant doubts about whether plene marks vowel length when *–eš* is suffixed to vowel- or glide-final stem, where it may instead indicate [–C(i)yes] or [–Cwes]. Since evidence for plene writing of the suffix in non-oxytone, consonant-final stems is extremely limited, his rejection of a long vowel in most examples may be justified; however, his claim in its strong form — viz. that plene writing of /e/ never marks vowel length in <°*a-e-eC*(-)>, <°*i-e-eC*(-)> and <°*u-e-eC(-)*> — seems very unlikely (cf. Kimball forthcoming).

§3.14　Denominal derivation: Frequent multiple plene spellings appear to preserve the vocalism of their base noun/adjective, which has led to analogical explanations (e.g. Kimball 1999:62–3).

§3.14.1　"Synchronic analogy": Since vowel shortening (esp. of /aː/) is evidently productive (cf. §3.6–3.7), it is necessary to adopt a synchronic model of analogy — thus here OUTPUT-OUTPUT (OO-) CORRESPONDENCE (e.g Benua 1997), which requires faithfulness to a corresponding base (noun/adjective).

§3.14.2　Predictions of the model: When highly-ranked, OO-CORRESPONDENCE correctly predicts that (18) denominal derivatives will "inherit" the long vowel of their free-standing base, but that roots and suffixes — e.g. (11–14) above — lacking such bases will regularly undergo unstressed vowel shortening. This contrast is illustrated in (20) vs. (21):

(20)　/idáːl – aw – éːs – t͡si/ → *idālawēšzi* [idaːlawéːst͡si]　　　BASE: *idāluš* [idáːlus]

　　　　　　　　　　　　　　　　　IDENT-OO[LONG]

(21)　a.　Hitt. /kaːnk – ánt͡si/ → *kankanzi* [kank:ánt͡si] 'hang'　　　BASE: –　　(⇒ Shortening)

　　　b.　Hitt. /áːr – áːnt – s/ → *ārranza* [áːrːant͡s] 'washed'　　　BASE: –　　(⇒ Shortening)

　・ Crucially, IDENT-OO[LONG] must dominate (17) *UNSTRESSED-*V̄*.

§3.15   Prosodic headedness: To correctly generate (20) with stress on the fientive suffix *–ēšš–* [–éːsː–], (provisionally) assume that derivational suffixes which (i) can select complex stems and (ii) are class-changing (e.g. A, N → V) receive stress as a consequence of being **morphological heads** (⇒ **prosodic heads**; cf. Revithiadou 1999).

> · This additional assumption is necessary because suffixal stress violates the general Hittite (and PIE) preference for leftmost lexical accent (Yates 2015), which Kiparsky and Halle (1977) have reconstructed in the form of the BASIC ACCENTUATION PRINCIPLE (BAP).

> · For a recent demonstration of the importance of morphological headedness in the lexical accent systems of Ancient Greek and Vedic Sanskrit, see Sandell (2015); a similar effect is achieved by Kiparsky (2010, forthcoming) by positing accentually DOMINANT morphemes.

§4   (Preliminary) conclusions & outstanding questions

§4.1   A synchronic grammar: An adequate account of the distributional regularities of Hittite vowel quantity requires positing synchronic lengthening and shortening processes, in particular:

(i) Lengthening of all vowels in open syllables, and of /e, o/ in closed syllables.

(ii) Shortening of long vowels in unstressed syllables.

§4.2   Plene writing and Hittite prosody: The result of these processes is a close relationship between word stress and plene writing — plene observed in one or more attestations of a given word form can be (cautiously) used to diagnose stress, controlling for the problematic cases discussed in §3.13–3.14.

§4.3   Other quantitative processes: Vowel shortening is just one aspect of synchronic "ablaut" in Hittite, which also shows clear evidence for stress-conditioned (22a–22b) deletion and (22c) weakening of /a(ː), e/; yet establishing these in the synchronic grammar — and more problematically, determining the morphophonological restrictions on its operation — will necessitate further investigation.

(22)   a. Hitt. /kʷen – ántsi/ → *kunanzi* [kʷnántsi] 'they kill' (3PL.PRS.ACT)   (e.g. StBoT 25 13 i 12, 14)

   b. Hitt. /ta(ː)i – ántsi/ → *tiyanzi* [tiyántsi] 'they place' (3PL.PRS.ACT)   (e.g. StBoT 25 25 i 38´)

   c. Hitt. /ses – ántsi/ → *šašanzi* [sasántsi] 'they sleep' (3PL.PRS.ACT)   (e.g. KUB 42.78 ii 17)

§4.4   On the vowel inventory: (Preliminary) analysis of Hittite vowel quantity thus points to the inventory of vowel phonemes in (23):

(23)   /i/, /iː/   /u/, /uː/

                    /e/, [eː]   /o/, [oː]

                         /a/, /aː/

> · Under this analysis, [a] is not only the (shortened) allophone of /aː/, but also the (reduced) allophone of /e/ when it is subject to further stress-conditioned reduction in pretonic syllables, but is blocked from undergoing reduction to [∅] by high-ranking phonotactic constraints (cf. Yates 2014). Both /a(ː)/ and /e/ would also alternate with [∅] under these conditions. For discussion of vowel systems in which /a/ functions as a reduced vowel, see Crosswhite (2001:25–33).

§4.5   Implications for PIE prosody: Per §3.15, Hittite matches Vedic Sanskrit and Greek in that stress patterns cannot be determined by directionality (i.e. preference for left-edge lexical accent) alone, but is necessarily sensitive to morphological structure — most likely, prosodic headedness.

References

Benua, Laura. 1997. Transderivational identity: Phonological relations between words. Ph.D. diss., University of Massachusetts, Amherst.

Crosswhite, Katherine M. 2001. *Vowel Reduction in Optimality Theory*. New York / London: Routledgr.

Eichner, Heiner. 1973. Die Etymologie von heth. *meḫur*. *Münchener Studien zur Sprachwissenschaft* 31.53–107.

Hrozný, Friedrich. 1917. *Die Sprache der Hethiter*. Leipzig: J.C. Hinrichs.

Jasanoff, Jay H. 2003. *Hittite and the Indo-European Verb*. Oxford University Press.

———. 2013. The Tocharian Subjunctive and Preterite in **–a–*. 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*, 105–120. Beech Stave Press.

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

———. forthcoming. Review Article: A. Kloekhorst (2014), *Accent in Hittite. Kratylos* .

Kiparsky, Paul. 2010. Compositional vs. Paradigmatic Approaches to Accent and Ablaut (revised version at http://www.stanford.edu/~kiparsky/). In Stephanie W. Jamison, H. Craig Melchert and Brent Vine (eds.), *Proceedings of the 21st Annual UCLA Indo-European Conference, Los Angeles, October 30-31, 2009*, 137–181 [1–39]. Bremen: Hempen.

———. forthcoming. Accent and Ablaut. In Andrew Garrett and Michael Weiss (eds.), *Handbook of Indo-European Studies*. Oxford / New York: Oxford University Press.

Kiparsky, Paul, and Morris Halle. 1977. Towards a Reconstruction of the Indo-European Accent. In Larry Hyman (ed.), *Studies in Stress and Accent*, 209–238. Los Angeles: University of Southern California Press.

Kloekhorst, Alwin. 2004. The Preservation of **h₁* in Hieroglyphic Luwian: Two Separate *a*-Signs. *Historische Sprachforschung* 117(1).26–49.

———. 2006. Initial laryngeals in Anatolian. *Historische Sprachforschung* 119.77–108.

———. 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.

Lindblom, Björn. 1986. Phonetic Universals in Vowel Systems. In John J. Ohala and Jeri J. Jaeger (eds.), *Experimental Phonology*, 13–44. Orlando, FL: Academic Press.

Melchert, H. Craig. 1984. *Studies in Hittite Historical Phonology*. Göttingen: Vandenhöck & Ruprecht.

———. 1994. *Anatolian Historical Phonology*. Amsterdam / Atlanta: Rodopi.

———. 2007. Hittite *ḫuwapp–, ḫŭppā(i)–* and *ḫuppiya–*. In Detlev Groddek and Marina Zorman (eds.), *Tabularia Hethaeorum: Hethitologische Beiträge Silvin Košak zum 65. Geburtstag*, 513–510. Wiesbaden: Harrassowitz.

———. 2009. Hittite *ḫi*-verbs from Adverbs. In Rosemarie Lühr and Sabine Ziegler (eds.), *Protolanguage and Prehistory: Fachtagung der Indogermanischen Gesellschaft, Krakau 11. bis 15. Oktober 2004*. Wiesbaden: Reichert.

———. 2010a. On Hittite *mūgā(i)–*. *Orientalia* 79(207–215).

———. 2010b. The Spelling of Initial /A-/ in Hieroglyphic Luwian. In Itamar Singer (ed.), *ipamati kistamati pari tumatimis: Luwian and Hittite Studies Presented to J. David Hawkins on the Occasion of his 70th Birthday*, 147–58. Tel Aviv: Emery and Claire Yass Publications in Archaeology.

———. 2010c. 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.

———. 2010d. The word for 'mouth' in Hittite and Proto-Indo-European. *International Journal of Diachronic Linguistics and Linguistic Reconstruction* 7.55–63.

———. 2012. Hittite ḫi-Verbs of the Type $-\bar{a}C_1i$, $-aC_1C_1anzi$. *Indogermanische Forschungen* 117.173–185.

———. 2013. 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.

Neu, Erich. 1979. Einige Überlegungen zu den hethitischen Kasusendungen. In Erich Neu and Wolfgang Meid (eds.), *Hethitisch und Indogermanisch: Vergleichende Studien zur historischen Grammatik und zur dialekt-geographischen Stellung der indogermanischen Sprachgruppe Altkleinasiens*, 177–196. Innsbruck: Institut für Sprachwissenschaft der Universität Innsbruck.

Nussbaum, Alan J. 2014. The PIE Proprietor and His Goods. In H. Craig Melchert, Elisabeth Rieken and Thomas Steer (eds.), *munus amicitiae: Norbert Oettinger a collegis et amicis dicatum*, 228–254. Ann Arbor / New York: Beech Stave Press.

Prince, Alan, and Paul Smolensky. 1993/2004. *Optimality Theory: Constraint Interaction in Generative Grammar*. Oxford / Malden, MA: Blackwell.

Revithiadou, Anthoula. 1999. Headmost Accent Wins: Head Dominance and Ideal Prosodic Form in Lexical Accent Systems. Ph.D. diss., Leiden University.

Riad, Tomas. 1992. Structures in Germanic prosody: A diachronic study with specila reference to Nordic languages. Ph.D. diss., Stockholm University.

Ribezzo, Francesco. 1920. Appunta di etimologia hittitica. *Revista indo-greco-italica* 4.127–131.

Rieken, Elisabeth. 2005. Zur Wiedergabe von hethitisch /o/. In Gerhard Meiser and Olav Hackstein (eds.), *Sprachkontakt und Sprachwandel: Akten der XI. Fachtagung der indogermanischen Gesellschaft, Halle an der Saale, 17. bis 23 September 2000*, 537–549. Wiesbaden: Reichert.

Rosenthall, Sam. 1994. Vowel/Glide Alternation in a Theory of Constraint Interaction. Ph.D. diss., University of Massachusetts, Amherst.

Sandell, Ryan. 2015. Morphological Productivity in Historical Linguistics. Ph.D. diss., University of Californa, Los Angeles.

Smith, Jennifer L. 2005. *Phonological Augmentation in Prominent Positions*. London / New York: Routledge.

Čop, Bojan. 1970. Eine luwische orthographisch–phonetische Regel. *Indogermanische Forschungen* 85–96.

Weeden, Mark. 2011. Spelling, phonology and etymology in Hittite historical linguistics. *Bulletin of the School of Oriental and African Studies* 74(01).59–76. doi: 10.1017/S0041977X10000716.

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 https://ucla.academia.edu/AnthonyYates).

———. 2015. On Hittite Verbal Prosody: Synchronic Evidence for (Non-)Default Accentuation. Paper presented at the 226th Annual Meeting of the American Oriental Society, New Orleans, LA, 13–16 March 2015.

———. forthcoming a. Anatolian Default Accentuation and its Diachronic Consequences. *Indo-European Linguistics* (Ms. available at https://ucla.academia.edu/AnthonyYates).

———. forthcoming b. Left But Not Leftmost? On the Interaction between Epenthesis and Ictus Assignment in Anatolian (Ms., https://ucla.academia.edu/AnthonyYates). In Stephanie W. Jamison, H. Craig Melchert and Brent Vine (eds.), *Proceedings of the 26th Annual UCLA Indo-European Conference*. Bremen: Hempen.