

Issues in the Reconstruction of Anatolian and Indo-European Prosody

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§1 Introduction – The object of inquiry; some premises; aims

§1.1 A synchronic grammar: Proto-Indo-European (PIE)—viz. the last reconstructible stage of the language directly accessible by the comparative method—had a synchronic grammar with structure-building morpho-syntactic processes and phonological rules/constraints.

- Recently, Byrd (2010, forthcoming) and Cooper (2012, 2014) have made significant contributions to the understanding of the phonological component of this synchronic grammar.

§1.2 The status of ‘kinetic’ paradigms: What position did accent/ablaut paradigms posited by Schindler (1972, 1975b,a) and the ‘Erlangen School’ (see esp. Rix 1992) or the ‘Leiden school’ (Beekes 1985; cf. Pedersen 1926; Kuiper 1942; Kloekhorst 2013) have in the synchronic grammar of PIE?

§1.2.1 Synchronically generated? This synchronic grammar *did not* generate these pristine ‘kinetic’ (or ‘dynamic’) paradigms—so explicitly Schindler (1975b:261), who situates these paradigms “in einem früheren Stadium” when “die Ablautstufen im Wort akzentabhängig waren.”

- Similarly, Schindler (1975b:261) refers explicitly to the rule proposed to account for ablaut patterns in these paradigms as “[e]ine voridg. Regel, nach der unbetontes *e* (*è*) schwand, laßt sich für alle phonologischen Kontexte, vortonig und nachtonig, sichern.” For an insightful discussion of Schindler’s methodology, see Hale (2010:85–91) (cf. Sandell 2014a).
- cf. Watkins (1998:62): “To the degree that for the theory the ablaut is required to be conditioned by the accent, the formations would have to belong to the remote prehistory of the proto-language; ablaut variants and accent are independent variables already in reconstructed Proto-Indo-European”.

§1.2.2 Traces of Pre-PIE paradigms? There can be no doubt that PIE had a diachronic residue of a still earlier stage, i.e. Pre-PIE; this residue is constituted by *archaisms*—viz. forms that are not regularly generated by the synchronic grammar—and includes (at least) ‘extra-paradigmatic’ forms, e.g. **mens dheh₁-*, etc.

- For a cogent assessment of the implications of ‘extra-paradigmaticity’, as well as the possibility of ‘exceptional’ paradigms in PIE, see again Hale (2010:88–91).

§1.2.3 A grammar of Pre-PIE? These archaisms, together with an understanding of the rules/constraints of the synchronic grammar of PIE, allow indirect access (via internal reconstruction) to Pre-PIE, where certain features of the system reconstructed by Schindler (1972, 1975b,a) et al. undoubtedly obtained.

- Other aspects are doubtful for any stage, e.g. proterokinesis. Note the significant difficulties encountered by Kim (2002, 2013) in modeling this type, and compare the critiques of Kümmel (2013, 2014), Keydana (2005, 2013b), Kiparsky (2010:15–19) and Lundquist (2014). For a generative perspective on internal reconstruction, cf. Ringe and Eska (2013:253).

§1.3 The paradigms of PIE: The vast majority of attested athematic (nominal) forms must therefore be traced to the paradigms directly reconstructible for PIE—e.g. the “nicht zu bezweifeln” PIE neut. **s*-stem paradigm in (1) set up by Schindler (1975b:259).

(1) **Inflection of PIE neuter **s*-stems per Schindler (1975b:259):**

NAs.	<i>*uék^w-os</i> ‘word; speech’
Oblique	<i>*uék^w-es-</i>

- However, the Anatolian forms traditionally cited to support the reconstruction of this paradigm—Hitt. *nēpiš-*, CLuw. *tappaš-*, HLuw. *tipas-* ‘sky’; Hitt. *āiš / išš-* ‘, CLuw. *āš* ‘mouth’—cannot stand; see now Yates (2014), building on Melchert (2010b) and Oettinger (forthcoming).

§1.4 The adequacy of description? Is a full description of the surface accent/ablaut alternations in all directly reconstructible paradigms—including the ‘paradigms’ for thematic formations, complex derivation, etc.—a sufficient analysis of PIE prosody?

- It is not clear whether the evidence is sufficient to permit such a complete reconstruction (esp. for complex derivation). Even if possible, such an account would be just observationally adequate (in terms of Chomsky 1964) for PIE (cf. Sandell 2014a).

§1.5 ‘Compositional’ approaches to PIE prosody: Kiparsky (e.g. 1973, 2010, forthcoming) has argued for a synchronic account of surface word accent (or ICTUS) in PIE, deriving its position from the interaction of lexically-specified accentual properties of morphemes and a phonological principle of accent assignment (cf. §2.3.2)—thereby providing a synchronic account of PIE prosody that is both comprehensive and typologically natural (cf. Keydana 2013a:107–8).

§1.6 Toward a synchronic account of PIE prosody: The over-arching aim of this talk is to demonstrate the need for a better understanding of the morphophonological processes operative in the synchronic grammar of PIE; empirical evidence comes from two case studies of (non-analogic) prosodic change in Anatolian which are economically explained by the inheritance of synchronic phonological rules/constraints:

§1.6.1 Accent ‘retraction’ in Hittite: Descriptive ‘retraction’ of ICTUS (= surface accent) in Hittite and Proto-Anatolian (PA) is motivated by an inherited phonological principle of default leftmost ICTUS assignment of the type posited for PIE by Kiparsky (e.g. 1973, 2010) (§2).

§1.6.2 PA verbal ablaut and the Hittite *ašanzi*-type: The unexpected root *a*-vocalism of Hittite *mi*-verbs to PIE roots of the shape $*h_1eT-$ (where T = any stop or $*s$)—e.g. *ašanzi* ‘they are’—is derived from the interaction of an inherited ablaut rule and evolving phonotactic constraints in the synchronic grammar of PA (§3).

§2 Accent ‘Retraction’ in Hittite

§2.1 Introduction

§2.1.1 The bigger picture: At stake in this problem:

- To what extent is ICTUS in Anatolian (and PIE) morphologically-determined and to what extent phonologically-determined?
- Did Anatolian (and PIE) have a principle of default ICTUS assignment? And if so, how did it operate?
- How can ‘default’ accentuation lead to phonological change in lexical accent systems?

§2.1.2 The problem(s): A number of (Old) Hittite forms exhibit surface accents that appear, descriptively, to be ‘retracted’ from their expected Proto-Indo-European (PIE) positions, falling instead on the initial (or leftmost) syllable, e.g. (2):

(2) ‘Retraction’ of inherited accent:

a. *hūnikzi* [χó:miktsi] ‘batters’ < PIE $*h_2u-né-g-ti$

(cf. LIV² s.v. $*h_2ueg-$; Kloekhorst 2008:363)

b. *nīninkzi* [ní:niŋktsi] ‘mobilizes’ < PIE $*ni-né-k-ti$

(cf. Lith. *į-nikti*, Gk. νεῖχος)

(cf. LIV², s.v. $*neik-$; Kloekhorst 2008:606–7)

c. *terippi* [té(:)riptsɪ] ‘plows’ < PIE $*trép-ti$

(cf. Gk. τρέπω, Lat. *trepō*)

(cf. LIV² s.v. $*trep-$; Oettinger 1979:229–30, Melchert 2014:139–40)

d. *pūnušzi* [pú:muštsɪ] ‘interrogates’ < PIE $*pné)uH-s-ti$

(cf. Gk. πέπυσαι)

(cf. LIV² s.v. $*pneuH-$; Oettinger 1976:95; Eichner 1978:160, Kimball 1999:199)

e. *teri-* [té(:)ri-] ‘3’ < PIE $*trí-$

(cf. Skt. *tráyah*; Att. Gk. τρεῖς, etc.)

(cf. Oettinger 1979:230; Melchert 1994a:84; Kimball 1999:195–6)

- To (2) should likely be added *hulle/a-* ‘fight’ (< PIE $*h_{2/3}ul-ne-h_1-$) which shows no evidence for plene writing of the peninitial syllable in 8 OS spellings; rather, NS spellings with initial plene (e.g. KBo 6.26 ii 11 <*hu-u-ul-la-az-zi*>) support leftmost surface accent. Due to the ambiguity of LE/I, OS spellings interpreted *hulle-* by (e.g) Hoffner and Melchert (2008:200-1) may all be read *hulli-* (cf. Kloekhorst 2008:359); similarly, KUB 36.98a obv. 5 (OH/NS) is best read <*hu-ul-li-e-ez-zi*>, hence built to the secondary $*-yé/\acute{o}-$ denominative stem found only in NS texts. Similarly, *duwarni-* and *zinni-* ‘finish’, where further evidence for initial accent could come from the singleton spelling of *-z-* in <*zi-in-ni-z[i]*> (KBo XX 10 i 5) (per Yoshida 1998) via lenition between unaccented morae (Adiego 2001).
- Additional potential examples of ‘retraction’ include the causatives *lukke-* ‘ignite’ (< $*lowk-éye-$; cf. Lat. *lūcēre* with Watkins (1971:68–9)) and *wašše-* ‘clothe’ (< $*wos-éye-$ with Eichner (1969); cf. Melchert (1984:31–5)), where the complete absence of plene spelling of the suffix is very unexpected if indeed synchronically accented, and suggests the possibility of leftmost surface accent.

§2.1.3 Nasal-infix presents in PIE vs. Hittite: Morphological behavior in PIE exemplified by Vedic (3), where accented full-grade of nasal-infix in strong stem is clearly evident; in contrast, Hittite (4) requires leftmost surface accent.

(3) **Nasal-infix presents in Vedic & PIE:**

- Ved. *yunákti* ‘yokes’ (VII) < PIE $*yu-né-g-ti$
- Ved. *punáti* ‘cleanses’ (IX) < PIE $*pu-né-h_2-ti$

(4) **Nasal-infix presents in (Pre-)Hittite:**

- Hitt. *hūnikzi* < Pre-Hitt. $*h_2ú-ne-g-ti$
- Hitt. *nīninkzi* < Pre-Hitt. $*nī-ne-k-ti$

§2.1.4 Hittite accented anaptyctic vowels: In Hittite (2c–2e), the inherited word-initial consonant cluster shows insertion of an anaptyctic vowel that subsequently surfaces with the accent; leftmost surface accent for *pūnušš-* indicated by plene writing, and for *teripp-* and *teri-* by consistent spelling with word-initial *TE-*.

- Per Melchert (2014:139) (contra Kloekhorst 2012:157–9), exceptionless spelling *TE-* in both *teripp-* and *teri-* necessarily indicates [#te(:)-]. Because pretonic $*e$ is raised to [i] (Melchert 1994a:139), the interpretation of Kloekhorst (forthcoming) [terép-] is also impossible; again with Melchert (2013, 2014), understand rather [té(:)rip-]. Similarly untenable are Kloekhorst’s (forthcoming) new arguments for PA $*téri-$ from an inherited “ablaut variant” $*ter-i-$ (Eichner 1992:69); Lycian *trisāni* and Milyan (!) *trisu* are non-probative, since they may well result from language-internal syncope (which awaits a full treatment; cf. Melchert 1994a:318–21). For cogent objections to Eichner’s proposal, see the earlier discussion of Kloekhorst (2008: s.v. *teri-*).

§2.1.5 Accent ‘retraction’ in PA? Leftmost surface accent of Hitt. *teri-* all but confirmed by equation with CLuw. *tarrīyanalli-* ‘third in command’, where geminate *-rr-* via Čop’s Law assures position of accent and, moreover, strongly suggests accent ‘retraction’ at the PA stage, i.e. PA $*téri-$ (and by implication, $*térep-$); similarly, Pal. *sūnat* ‘filled’ (< PIE $*su-né-h_3-t$) points to accent ‘retraction’ for nasal-infix presents already in PA.

- On morphological grounds, the Palaic *mi-*verb *sūnat* can only be an archaism beside the innovated Hittite *hi-*verb, which is likely formed by intraparadigmatic analogy to the (ambiguous) 3rd pl. *šunnanzi* (: 3rd s. *sunnāi*), where assimilation is regular (< $*su-n-h_3-énti$; cf. Melchert 1994a:79–80).

§2.1.6 Previous scholarship: No generally accepted explanation for accent ‘retraction’ in nasal-infix presents (2a–2b) (cf. Melchert 1994a:89); however, (2c–2e) fall under the scope of the rule formulated, most explicitly, by Melchert (2013:178–9), according to whom “a prehistoric anaptyctic vowel to the left of the original accent regularly drew the accent and was thereby lengthened in an open syllable, while a post-tonic anaptyctic vowel remained unaccented” (cf. Melchert 1994a:174–5).

§2.1.7 A new proposal: Hittite forms in (2) belong to a coherent group in which accent ‘retraction’ owes to the same phonological principle, namely, assignment of a ‘default’ phonological accent to the leftmost syllable of a prosodic word; in what follows, I aim to:

- Show that the (2c–2e) are plausibly accounted for by PA DEFAULT ACCENTUATION, a phonological mechanism analogous to the BASIC ACCENTUATION PRINCIPLE (BAP), posited for Vedic by Kiparsky (e.g. 1973, 2010) (§2.3)
- Motivate the application of PA DEFAULT ACCENTUATION to nasal-infix presents, e.g. (2a–2b), in PA (§2.4).
- Consider some implications of this analysis, including the possibility of PA DEFAULT ACCENTUATION as diachronic inheritance (§2.5).

§2.2 Anaptyxis & accent ‘retraction’: Cause or coincidence?

§2.2.1 **Accent ‘retraction’ as ‘attraction’?** (2c–2e) provide important evidence for Melchert’s (2013) rule whereby an anaptyctic vowel to left of the inherited accent automatically ‘attracts’ the surface accent; note, however, that all three involve retraction to the word-initial syllable.

§2.2.2 **Evidence for word-medial accent ‘attraction’/‘retraction’?** Word-medial anaptyxis allows for testing of the causal connection between anaptyxis and accent ‘retraction’ assumed by Melchert (2013); putative examples of a Hittite pre-tonic word-medial anaptyctic vowel ‘attracting’ original accent in (5):

(5) **Word-medial anaptyxis according to Oettinger (1982:170–2):**

- a. *pišēn(a)-* [pisé:n(a)-] ‘man; male’ < PIE **pes-nó-*
- b. *paršēna-* [parsé:na-] ‘hip; cheek’ < PIE **pers-nó/éh₂(-)*
- c. *°ūman-* ‘(appurtenance/ethnicon suffix)’ < PIE **-mén-/°-wén-*

§2.2.2.1 **Hittite ‘man; male’:** (5a) from **pes-ńo-* problematic in view of consistent spelling with singleton *-š-* and OH/OS gen. s. [p]išnaš without anaptyctic vowel; rather, with Zucha (1988:53–4) and Carruba (1993) from ablauting **pes-ēn / *pes-n-’* (cf. Melchert 1994a:175; 2013:178–9 n. 11)

§2.2.2.2 **Hittite ‘hip; cheek’:** Assumed pre-form for (5b) hardly secure—in particular, accent entirely *ad hoc*; likely root equations Gk. πτέρονη, Skt. *párṣṇi-* both show initial accent; moreover, no clear phonological motivation for anaptyxis in this lexical item.

- No anaptyxis occurs in phonologically-similar *parš(a)na-* ‘leopard’ (< **pfs-no-*; cf. Oettinger 1986:22), spelled < *pár-aš° / pár-ša°* >; perhaps, then, with Melchert (1994a:175) from PIE **pfs-éno-*.

§2.2.2.3 **Hittite *-ūman-*:** Likely via phonologically-driven anaptyxis to **-CC-* final roots, e.g. ^{LÚ}*hištūman-* ‘man of the bone-house (^É*hištā-*)’; ^{URU}*Salampūmeneš* ‘inhabitants of Salampa’ (Oettinger 2003:147; cf. Oettinger 1982), yet clearly extended, e.g. ^{URU}*Katapūmeneš* ‘inhabitants of Katapa’; these remain otherwise unexplained.

- Melchert (2013) also explains *-e/i-* alternations in Hittite *-s/-n-* heteroclitics as the result of “competing levelings” of a prehistoric paradigm made irregular by the interaction of anaptyxis and accentual mobility.

§2.2.3 **Counter-evidence to accent ‘attraction’:** Hittite verbal formations with iterative-inchoative suffix *-škkē-* (< **-ské-*) consistently surface with surface accent on the suffix despite an anaptyctic vowel to the left, e.g. (6); total lack of evidence for accented anaptyctic vowel in this category constitutes strong evidence against ‘attraction’ (at least) as a synchronic phonological rule in Hittite.

(6) **Hittite *-škkē-* presents with anaptyxis:**

- a. *zikkēt* ‘places’ : *dāi-* ‘place’
- b. *akkuškkēši* ‘you drink’ : *e/aku-* ‘drink’

(cf. Kavitskaya 2001:282, 288)

- With Kavitskaya (2001), *zikkē-* ‘place’ is derived from laryngeal-less /d-ské-/ , hence certain to be a synchronic Hittite creation (beside archaic *zaške-*), and similarly, *tarniške-* ‘release’ (beside older *taršikke-*); Melchert (2013:179), for whom the anaptyxis rule is “prehistoric”, argues that “regular retraction of the accent is blocked in this productive formation under pressure of stems without anaptyxis.”
- Other counter-evidence to the rule as formulated includes Hitt. *šumittant-* ‘axe’ < PIE **smit-é/ont-*; Craig Melchert (p.c.) therefore suggests a more limited formulation of the rule, according to which only an anaptyctic vowel in the *immediately* pretonic syllable attracts the accent. The *-škkē-* forms nevertheless remain problematic.

§2.2.4 Anaptyxis & accent ‘attraction’ in typological perspective: Anaptyctic vowels frequently invisible to phonological processes such as stress assignment (Hall 2011:1586; cf. Hall 2006), e.g. (7a) and (8a) vs. (7b) and (8b) with anaptyxis from Lebanese Arabic (LA) and Mohawk (M):

(7) **Stress in Lebanese Arabic:**

- a. LA /fihim – na/ → [fi.‘him.na] ‘he understood us’
 b. LA /fihm – na/ → [‘fi.him.na] ‘our understanding’

(cf. Haddad 1984:26–7; Hall 2011:1586)

(8) **Stress in Mohawk:**

- a. M. /k – ohar – haʔ/ → [ko.‘har.haʔ] ‘I attach it’
 b. M. /te – k – rik – s/ → [‘te.ke.riks] ‘I put them together’

(cf. Michelson 1981, 1989)

- The (Latin-like) stress rule in LA relevant to (7) is ‘stress a closed penult, otherwise the antepenult’; Mohawk has consistent penultimate stress except in words like (8b) with anaptyxis.

§2.2.4.1 Accented anaptyctic vowels: In some cases, anaptyctic vowels do bear surface word accent—rarely (if ever), however, by virtue of being anaptyctic, but rather by occupying a position where stress is regularly assigned by phonological rule—e.g. (9), again from Lebanese Arabic:

(9) LA /katab-t-l-ha/ → [ka.tab.‘tɪl.ha] ‘I wrote to her’

- This exceptional accentual pattern is found only when the anaptyctic vowel is inserted into a CCCC sequence (cf. Hall 2011:1586). Per Michelson (1989), Mohawk also has some stressed epenthetic vowels, namely, those which emerge from “*e*-Epenthesis II” (cf. Michelson 1981).

§2.2.5 Reassessing ‘retraction’/‘attraction’: In view of limited positive evidence for and non-trivial evidence against a causal connection between anaptyxis and accent ‘retraction’, as well as potential typological objections, the rule of Melchert (2013) should be invoked cautiously, and an alternative explanation for (2d–2e) preferred, if available.

§2.3 Anaptyxis & ‘default’ accent in PA/PIE

§2.3.1 ‘Default’ phonological accent: Many languages in which surface word accent is morphologically determined also have a principle of ‘default’ phonological accent assignment operative when no constituent morphemes are lexically-specified for accent, e.g. ‘default’ (10) vs. lexical (11) in Cupeño (cf. Hill and Hill 1968; Alderete 2001b):

(10) **Leftmost ‘default’ accent in Cupeño:**

- a. /yax – əm/ → *yáx-ə̃m* ‘Say!’ (‘say’ + IMPV.PL)
 b. /max – əm/ → *máx-ə̃m* ‘Give!’ (‘give’ + IMPV.PL)
 c. /wə̃n – əm/ → *wə̃n-ə̃m* ‘Put (it) in’ (‘put in’ + IMPV.PL)
 d. /ma – max – wen – t/ → *mám.xenet* ‘given away’ (RED + ‘give’ + P.I.PL + NPN)

(11) **Lexically-determined accent in Cupeño:**

- a. /max – qá/ → *max-qá* ‘giving’ (‘give’ + PRES.SING)
 b. /wə̃n – qá/ → *wə̃n-qá* ‘put (it)’ (‘put’ + PRES.SING)

(cf. Alderete 2001b:472; Hill 2005:29)

§2.3.2 ‘Default’ accent in Vedic and the BAP: Mixed prosodic system of this type proposed for Vedic by Kiparsky (1973, 2010), who argues that surface accent—or ICTUS—in Vedic is governed by the BASIC ACCENTUATION PRINCIPLE (BAP) in (12):

(12) **BASIC ACCENTUATION PRINCIPLE (BAP):**

If a word has more than one inherently accented syllable, the leftmost of these gets the ICTUS. If a word has no inherently accented syllable, the leftmost syllable gets the ICTUS.

(based on Kiparsky and Halle (1977:209) and Kiparsky (2010:6))

- For other synchronic analyses of mixed prosodic systems, see Halle (1973), Halle and Kiparsky (1979), and Melvold (1990) on Russian; Blevins (1993) on Lithuanian; Revithiadou (1999) on Modern Greek; McCawley (1965) and Poser (1984) on Japanese; and generally Alderete (1999, 2001a).

§2.3.3 BAP and ‘mobile’ root nouns: This system effectively accounts (*inter alia*) for the distinction in Vedic between (inherently accented) root nouns exhibiting fixed root ICTUS and (inherently unaccented) ‘mobile’ root nouns, e.g. (13):

(13) **Fixed root (= Accented) vs. ‘Mobile’ (= Unaccented)**

Strong: Ved. /gáv - s/ → *gáuh* ‘cow’ vs. Ved. /nāv - s/ → *náuh* ‘boat’
Weak: Ved. /gáv - ás/ → *gávah* [gen.s.] vs. Ved. /nāv - ás/ → *nāváh* [gen.s.]

§2.3.4 An Anatolian analogue of the BAP? Pattern of ‘retraction’ to leftmost syllable evident in (2) suggests the possibility of a PA principle of default leftmost ICTUS assignment analogous to the BAP which may be tentatively formulated as in (14):

(14) **PROTO-ANATOLIAN DEFAULT ACCENTUATION:**

If a word has no inherently accented syllable, the leftmost syllable gets the ICTUS.

§2.3.5 The accentuation of PA ‘3’: Assuming an inherited unaccented root */tr(e)y-/, the (post-epenthesis) PA surface form can be similarly derived as in (15) by the BAP-like principle in (14):

(15) PA */t(e)ri - / → **téri-* ‘3’ > Hitt. *teri-*, CLuw. *tariyanalli-*

- Whether the anaptyctic vowel is still synchronically epenthetic or has been phonologized in late PA, the derivation is theoretically unproblematic: the interaction between ICTUS assignment and anaptyxis is transparent in OT, or in a rule-based framework can be accounted for by ordering anaptyxis before ICTUS assignment.

§2.3.5.1 ‘3’ in Vedic and PIE: Unaccented PIE */tr(e)y-/ supported by Ved. accentual data, where ‘mobile’ paradigm indicates an unaccented root in Vedic with schematic derivation in (16):

(16) **Vedic ‘3’:**

Strong: Ved. /tray - as/ → *tráyah* [nom. pl.]
Weak: Ved. /tray - bhís/ → *tribháh* [instr. pl.]

§2.3.6 Accentuation of simplex athematic *mi*-verbs in PA: Default accentuation may be operative in the strong stem of simplex athematic *mi*-verbs in PA (cf. §2.6), which consistently bear root (= leftmost) ICTUS, e.g. (17):

(17) **Simplex athematic *mi*-verbs in PA:**

Strong: PA */g^wen-ti/ → **g^wénti* ‘kills’ > Hitt. *kuēnzi*
Weak: PA */g^wen-énti/ → **g^wnénti* ‘they kill’ > Hitt. *kunanzi*

§2.3.7 Default accent and PA ‘plows’: If so, the leftmost ICTUS of (post-epenthesis) PA **térep-* follows straightforwardly from the normal application of (14) PA DEFAULT ACCENTUATION, i.e. (18):

(18) PA */t(e)rep-ti/ → **térepti* > Hitt. *terippzi* ‘plows’

- With subsequent generalization of the strong stem (including accent!) in the plural per Melchert (2014:140). I tentatively assume that this analogic leveling (and similar leveling in *-nin-* infix verbs of the type further discussed in §2.4) is post-PA, but the chronology is uncertain.

§2.3.8 Anaptyctic ‘retraction’ as leftmost default in PA: It is possible to account for ‘retraction’ of inherited accent to leftmost syllable in PA **térep-* and *téri-* by a principle of ICTUS assignment akin to the BAP, which is typologically well-founded and established for synchronic Vedic (Kiparsky 2010); in §2.4, independent support for PA default leftmost ICTUS is adduced.

§2.4 Default accent & PA nasal-infix presents

§2.4.1 Accentuation of PA nasal-infix presents: As noted already in §2.1, nasal-infix presents in Hittite (and PA) bore ICTUS on the leftmost syllable; this situation clearly innovative vs. PIE, where ICTUS fell on the nasal-infix, e.g. Hitt. *hūnikzi* ‘batters’ vs. Ved. *yunákti* ‘yokes’.

§2.4.2 PA nasal-infix presents: ‘retraction’ as default? Previously unexplained ‘retraction’ in this morphological category may be mechanically derived by application of (14) PA DEFAULT ACCENTUATION—hence (2a–2b) as in (19), with default assignment of leftmost ICTUS:

(19) **Deriving Hittite nasal-infix presents:**

- a. /Honink – zi / → *hūnikzi* [χó:niŋktsi] ‘batters’
- b. /ninink – zi / → *nīnikzi* [ní:niŋktsi] ‘mobilizes’

§2.4.3 A PA innovation? Proposed derivation in (19) assumes an unaccented, monomorphemic stem which must be innovatory with respect to PIE, where the inflectional base was morphologically complex, derived via infixation of PIE */-né-/.

§2.4.4 Morphological innovations in PA: Application of PA DEFAULT ACCENTUATION thus entails two minimal innovations: (i) reanalysis of the inherited morphologically complex stem as simplex—a process termed ‘demorphologization’ by Probert (2006)—and (ii) subsequent loss of inherent accent.

- cf. Probert (2006:291): “When a word has undergone ‘demorphologization’, its accentuation can no longer be determined by the presence of an inherently accented suffix as the suffix is no longer treated synchronically as present. The word may retain its... accentuation, but the necessary accentual property now becomes a characteristic of the whole synchronically unanalysed stem. On the other hand, the word may lose its inherent accent altogether, in which case... accent will be assigned by default.”

§2.4.5 ‘Demorphologization’—how and why? Determining causes for ‘demorphologization’ remains an open research question; however, much progress toward this end by Probert (2006:259), according to whom “a stem formed with [a suffix] may come to be treated synchronically as monomorphemic if, for some formal or functional reason, the word loses its connection with a synchronically clear category of words containing the suffix.”

§2.4.6 Motivating PA ‘demorphologization’: In the case of nasal-infix verbs, ‘demorphologization’ due to general PA loss of nasal-infix verbs as a synchronically-derived morphological class; this development likely owes to:

§2.4.6.1 Paucity of evidence: Traces of a derivational relationship between simplex base and derived nasal-infix verb are extremely limited—only (20a–20b) in Hittite—which is indicative of (at least) non-productivity in this function:

(20) **Simplex : derived nasal-infix verbs in Hittite:**

- a. *ištarnink-* ‘cause to be sick’ : *ištark-* ‘be(come) sick’
- b. *harnink-* ‘destroy’ : *hark-* ‘die’ ⇒ *harg(a)nu-* ‘destroy’ (!!)

- For the inner-Hittite development of a second nasal (i.e. *-ni-*) in the inherited infix in formations to velar-final roots, see Hart (1977); though *hurnink-* may be related to *huk-* ‘slaughter’ etymologically (cf. Kloekhorst 2008:363), it is very unlikely that a derivational relationship held between them synchronically PA, since the nasal-infix present reflects the older PIE pattern of forming a derived imperfective stem from a telic root (cf. LIV² s.v. **h₂ueg-*) rather than the pattern of derived transitive/causative beside stative/intransitive base that is reconstructible for (early) PA.

§2.4.6.2 Functional replacement: Original PA ‘transitivizing’ function of **-ne-* is productively continued instead by *-nu-* suffixation (cf. Luraghi 2012:7–9)—and note esp. Hitt. (20b), where *-nin-* infix stem has been renewed by productive *-nu-* formation.

- Luwian formations assure the productivity of **-nu-* in this function already in PA, e.g. CLuw. *hwinuwa-* ‘cause to run’ (: *hwiya-* ‘run’); HLuw. (CRUS) *tanu(wa)-* ‘cause to stand’ (: *ta-* ‘stand’), (SOLIUM) *isanu(wa)-* ‘to seat’ (: *as-* ‘sit’).

§2.4.7 PA ‘demorphologization’: Exposed to a small (and gradually diminishing) number of exemplars to instantiate the derivational relationship between nasal-infix verbs and synchronic base, it is plausible that language learners failed to acquire the complex morphological structure of this category, instead treating (e.g.) earlier PA **/Hu – né – g-* as monomorphemic **/Hunég-* (→ **Hunékti*) with lexically-listed accent.

§2.4.8 Consequences of ‘demorphologization’: Once accent has been lexically-listed on a word-by-word basis, there is little motivation for speakers to treat (historical) nasal-infix verbs as a coherent synchronic category.

§2.4.9 Motivating PA default accentuation: Without a clear synchronic category to support their idiosyncratic non-initial ICTUS (among athematic *mi*-verbs), nasal-infix verbs were regularized by elimination of lexical accent—hence (e.g.) PA */Hunég- / > */Huneg- / → *Húnekti (Hitt. *hūnikzi*) via PA DEFAULT ACCENTUATION.

- This process is likely best understood as grammar optimization in the sense of Kiparsky (1996). For the development, cf. Eng. *mustache*—Amer. [ˈmɑs.tæʃ] vs. (conservative) Brit. [ˈmɑs.tɑːʃ] via MFr.

§2.4.10 Synopsis of the development of PA nasal-infix verbs: Trajectory for (2a–2b) proposed in §2.4 is schematized in (21):

		‘batters’		‘mobilizes’	
(21)	Stage I	*/Heu – né – g – ti/	→	*Hunékti	*/ney – né – k – ti/ → *ninékti
	Stage II	*/Hunég – ti/	→	*Hunékti	*/ninék – ti/ → *ninékti
	Stage III	*/Huneg – ti/	→	*Húnekti	*/ninek – ti/ → *ninékti
	Hittite	/Honink – zi/	→	<i>hūnikzi</i> [χó:niktsi]	/ninink – zi/ → <i>nūninkzi</i> [ní:nɪŋktsi]

Stage I: PA preserves inherited PIE morphological pattern of deriving nasal-infix verbs.

Stage II: Nasal-infix verbs undergo ‘demorphologization’ due to formal and functional opacity of derivational infix **-ne-*; surface forms remain stable due to lexicalization of accent.

Stage III: Lexical accent is lost, leading to PA DEFAULT ACCENTUATION and consequent leftmost ICTUS in these forms.

§2.5 Implications of ‘default’ accentuation

§2.5.1 A unified phonological account: In §§2.3–2.4, evidence has been presented in support of PA DEFAULT ACCENTUATION—a principle of default leftmost ICTUS assignment, the operation of which allows for a unified phonological account of accent ‘retraction’ in (2).

§2.5.2 The (diachronic) domain of default accentuation: (PA) default accentuation may be(come) operative and introduce prosodic change in at least two separate categories:

§2.5.2.1 Historically unaccented formations: Default accentuation may persist even when phonological change results in assignment of ICTUS to a (historically) new position; in the case of PA (2c) **térep-*, (2d) **púnuss-*, and (2e) **téri-*, PA DEFAULT ACCENTUATION assigns ICTUS to the (historically) new epenthetic vowel, yielding descriptive ‘retraction’ with respect to the inherited form.

§2.5.2.2 ‘Demorphologized’ formations: Default accentuation may come to apply to historically unaccented formations when morphological complexity fails to be acquired (‘demorphologization’) and underlying accent is lost; when nasal-infix verbs undergo these developments in PA, PA DEFAULT ACCENTUATION assigns leftmost ICTUS, which appears to be ‘retracted’ from PIE **-né-*.

§2.5.3 Default accentuation as inheritance: Like other synchronic rules—e.g. the ‘Double Dental Rule’ in PA and OH; cf. Melchert (1994a:49, 58, 109)—PA DEFAULT ACCENTUATION may be inherited into the Anatolian languages—and there is now evidence to support this hypothesis (§2.6).

- Inheritance is, in fact, expected, in the absence of a clear reason for opacity.

§2.5.4 Default accentuation in IE perspective: With the establishment of PA DEFAULT ACCENTUATION, PA joins Greek, Vedic, and Balto-Slavic as an ancient IE language (branch) where ICTUS is synchronically determined by the interaction of morphologically-specified accentual properties and phonological principles.

- ‘Compositional’ analyses of ancient IE languages employing such principles include: for Greek, Kiparsky (1967, 1973, 2003, 2010, forthcoming), Steriade (1988), Sauzet (1989), Golston (1990), Probert (2006, 2010), Gunkel (2014), and Lundquist (2014); for Vedic, Kiparsky (1973, 1984, 2010, forthcoming), Kiparsky and Halle (1977), and Lundquist (2014); and for Balto-Slavic, Garde (1976, 2006), Halle and Kiparsky (1979, 1981), Dybo (1981, 2000), and Halle (2001).

§2.5.5 Default accentuation in PIE? Significant evidence for leftmost default in Vedic (cf. §2.3.2) and Balto-Slavic (e.g. Kiparsky and Halle 1977), and Greek ‘recessive’ accentuation—the phonological default (Probert 2006:128–44)—may reflect the same rule in modified form, viz. leftmost within the accentable domain; PA DEFAULT ACCENTUATION would match this pattern, and thereby provide support for a PIE principle of default leftmost ICTUS assignment, i.e. (22):

(22) PROTO-INDO-EUROPEAN DEFAULT ACCENTUATION:

If a word has no inherently accented syllable, the leftmost syllable gets the ICTUS.

- (22) is properly a subset of the BAP in (12), the PIE status of which has been advocated by Kiparsky (e.g. 2010, forthcoming).

§2.6 On synchronic accentuation in Hittite and Anatolian

§2.6.1 Hittite prosody: Over the last thirty-five years, scholarship on Hittite prosody—e.g. Hart (1980), Carruba (1981), Kimball (1983, 1999), Melchert (1984, 1992, 1994a), and most recently Kloekhorst (2008, 2014)—has made significant progress toward determining the relationship between plene writing and ICTUS, and how Hittite thereby continues prosodic patterns inherited from Proto-Indo-European; significantly less attention, however, has been paid to the synchronic principles of ICTUS assignment—including ‘default’ accentuation.

§2.6.2 Anatolian default accentuation: Both indirect and direct evidence for the inheritance of PA DEFAULT ACCENTUATION as a synchronic rule into the Anatolian languages.

§2.6.3 Indirect evidence for ‘default’ accent: Retention of PA DEFAULT ACCENTUATION as a synchronic rule into the Anatolian languages predicts a general tendency for ‘retraction’ of ICTUS to the leftmost syllable within other morphological categories (some perhaps reconstructible for PA).

- The diachronic tendency to innovate ‘default’ accentuation in Greek is discussed at length by Probert (2006:138–44) (cf. Gunkel 2014); for another case of this phenomenon in Greek and Vedic, see Lundquist (2014) on PIE */-tí-/ , who shows that all evidence for accentual proterokinesis is better explained by leftmost ‘default’ accentuation (the ‘death of proterokinetic’).

§2.6.4 ‘Retraction’ in Luwian? Support for inheritance of PA DEFAULT ACCENTUATION may come from (previously unexplained) ‘retraction’ in generalized verbal weak stems, e.g. CLuw. *tūwa-* ‘put’; *pīya-* ‘give’ (cf. Melchert 1994a:89).

- In these cases, it is easy to see why learners would intuit an unaccented stem, since the ICTUS—their only positive evidence for underlying accent—consistently falls on the inflectional endings in all forms with weak stem allomorph. Pal. *pīša-* ‘give’ (iter.) and perhaps Lyd. *bid* seem to show the same generalization with ‘retraction.’

§2.6.5 Direct evidence for ‘default’ accentuation: Identification of a synchronic contrast between unaccented roots (subject to PA DEFAULT ACCENTUATION) and accented roots (not subject to PA DEFAULT ACCENTUATION) would establish this principle for Hittite just as in Cupeño, where the unaccented roots in (23) are opposed to accented (24):

(23) **Unaccented roots in Cupeño:** (= (11))
 a. /max - qá/ → *max-qá* ‘giving’ (‘give’ + PRES.SING)
 b. /wən - qá/ → *wən-qá* ‘put (it)’ (‘put’ + PRES.SING)

(24) **Accented roots in Cupeño:**
 a. /ʔáyu - qá/ → *ʔáyu-qa* ‘(he) wants’ (‘want’ + PRES.SING.)
 b. /nánva - yax - qá/ → *nánva-ya-qa* ‘(the time) comes (that)...’ (‘be ready’ + YAX + PRES.SING)

§2.6.6 Mobility in verbal formations: It was proposed in §2.3.6 above that the mobile ICTUS of most PA simplex athematic *mi-*verbs falls out from the unaccented status of their verbal roots; yet these contrast synchronically with a small set of verbs exhibiting fixed root ICTUS, e.g. (25–27):

(25) *wekanzi* [wé(:)gantsi] : *wek-* ‘demand’ [3pl.pres.act.] (KBo 19.133 6)

(26) *ārranzi* [á:rrantsi] ‘wash’ : *arr-* ‘wash’ [3pl.pres.act.] (KUB 9.28 iv 8 / KBo 11.45 iv 19)

(27) *ānšanzi* (KBo 5.1 iv 4) [á:nsantsi] : *ans-* ‘wipe’ (KBo 23.23 Vs. 77 / KBo 19.163 i 23; iv 4)

- (26–27) are in fact *hi-*verbs, but this category shows the same alternation in the present between ICTUS on the root in the strong stem and ICTUS on the personal endings in the plural, where the same morphemes are used for both verbal classes.

§2.6.7 A systematic contrast: The same fixed root ICTUS in (25–27) also found in $-škē-$ iterative-inchoative forms, which bore ICTUS on the derivational suffix in PIE (e.g. Fortson 2010:98–9) and Hittite (cf. Yoshida 2010:386–7), as well as the $-nt-$ participle, which regularly surfaces with plene writing of suffix (cf. Melchert 1994a:146–7), i.e. (28–30):

- (28) a. *wekiškizzi* [wé(:)giskitsi] (KBo 10.5 iii 4*)
 b. *wekantan* [wé(:)gantán] (KUB 4.3 Vs 16)
- (29) a. *āřšikitta* [á:řsikitta] / *āřreškizzi* [á:řřikitsi] (KUB 9.28 iv 8 / KBo 11.45 iv 19)
 b. *āřranza* [á:řřants] (KBo 21.57 iii 8)
- (30) a. *āňřikizzi* [á:ňřikitsi] / *āňařkizzi* [á:ňřkitsi] (KBo 23.23 Vs. 77 / KBo 19.163 i 23; iv 4)
 b. *āňřanza* [á:ňřants] (KBo 16.97 Vs. 35)

- Significantly, note that both archaic and renewed iterative-inchoative stems in (29a–30a) show initial ICTUS, which suggests that the principles operative in determining their ICTUS remain stable in Hittite.

§2.6.8 Accented roots? Minimal contrast between (25–27) and most other simplex athematic verbal formations may be attributed to a difference in accentual status—specifically, these roots are inherently **accented**, i.e. /wé(:)g-/ ‘demand’, /ářr-/ ‘wash’, /áňř-/ ‘wipe’ vs. (e.g.) /kwen-/ ‘kill’.

§2.6.9 Synchronic default accentuation: If this hypothesis is correct, then PA DEFAULT ACCENTUATION is established as the synchronic mechanism responsible for ICTUS assignment in simplex athematic verbal formations (as proposed in §2.5.3).

§2.6.10 Development of accented roots: Insight into historical development of synchronically accented roots may be offered by /wég-/. With Melchert (forthcoming), no such thing as “Narten roots”; rather, only “Narten formations” as a derived morphological category, which Sandell (2014b) has recently argued can be traced back to reduplicative formations.

§2.6.10.1 Deriving Narten presents: Sandell (2014b) drives the characteristic long vowel of this class through the interaction of two markedness constraints, the SSP and OCP- σ , which Zukoff (2014) has shown to be operative in (Proto-)Greek reduplication:

§2.6.10.2 Greek reduplication: Per Zukoff (2014), the reduplicative pattern evident in Proto-Greek 1.sg.perf.mid.ind *[h₂ə.géh₂.ger.mai] (> ἀγῆγερωι : ἀγείρω ‘gather’):

(31)

RED(e)-h ₂ ger-mai	* _σ [HC]	OCP- σ	DEP-V-IO	ALIGN-ROOT-L
a. h ₂ e.h ₂ ger.mai	*!			**
b. h ₂ eh ₂ .ger.mai		*!		**
c. 𐎧𐎺 h ₂ ə.geh ₂ .ger.mai			*	****
d. h ₂ ə.ge.h ₂ ger.mai	*!		*	****

§2.6.10.3 Deriving *weg-*: The derivation of *weg-* would be identical to Sandell (2014b)’s analysis of the ‘long-vowel’ presents to roots of the shape **ReT*, e.g. 3.s.impf. /lé-lg-t/ → *[légt] (: **leĝ-* > Lat. *lēgī*, Toch.B. *lyāka*, Alb. *mblodhi*; cf. LIV² svv.):

(32)

Input: /le-l̥g-t/	OCP-	SSP	MAX-	DEP-IO-V	ONSET	MAX-IO-C
a. 𐎎𐎗 légt						*
b. lélgt	*!					
c. légt			*!			
d. égt					*!	
e. lé.ləgt				*!		
f. lé.l̥gət		*!		*		

§2.6.11 Leftmost wins?: The consistent leftmost ICTUS in formations to these accented roots suggest a principle according to which, when multiple accented morphemes combine, the leftmost surfaces with the ICTUS:

(33) **Formations to roots with fixed ICTUS:**

- /wé(:)g – zi / → *wēkzi* [wé:ɡtsi] : //wé(:)g – ánzī / → *wekanzi* [wé(:)ɡantsi]
- /wé(:)g – ské – zī / → *wekiškizzi* [wé(:)ɡiskitsi]
- /wé(:)g – ánt – an / → *wekantan* [wé(:)ɡantan]

§2.6.12 A PA BAP? If the Hittite pattern of accent resolution in favor of the leftmost accented syllable can be reconstructed for PA, then Hittite synchronic accentuation appears to be governed by the same BAP established for Vedic (and reconstructed for PIE) by Kiparsky and Halle (e.g. 1977); Kiparsky (e.g. 2010, forthcoming), i.e. (34)

(34) **PA BASIC ACCENTUATION PRINCIPLE (PA BAP):**

If a word has more than one inherently accented syllable, the leftmost of these gets the ICTUS. If a word has no inherently accented syllable, the leftmost syllable gets the ICTUS.

(based on Kiparsky and Halle (1977:209) and Kiparsky (2010:6))

§3 On Proto-Anatolian Verbal Ablaut: The Hittite *ašanzi*-Type Reexamined

§3.1 Introduction

§3.1.1 The bigger picture: At stake in this problem:

- Did Anatolian (and PIE) have (at least $*e/\emptyset$) ablaut as an (inherited) synchronic phonological process?
- Are there advantages in using Optimality Theory (vs. traditional rule-based accounts) to model synchronic and diachronic phonology?

§3.1.2 The problem: A matter of ongoing controversy is the source of the initial vowel [$\#a$ -] apparent in the weak stem of Proto-Anatolian (PA) verbal paradigms which continue Proto-Indo-European (PIE) roots of the shape $*h_1eT$ (where $*T$ = any stop or $*s$). The four roots in question are in (35), all very frequent and belonging to the core of the lexicon:

(35)

PIE $*h_1eT$ -	(strong) PA $*eT$ - > Hitt. eT -	(weak) PA $*aT$ - > Hitt. aT -
$*h_1eg^{wh}$ ‘drink’	<i>ekuzi</i> ‘drinks’ [3s.pres.act.]	<i>akuanzi</i> ‘they drink’ [3pl.pres.act]
$*h_1ed$ ‘eat’	<i>ēz(za)z(z)i</i> ‘eats’ [3s.pres.act.]	<i>adanzi</i> ‘they eat’ [3pl.pres.act]
$*h_1ep$ ‘take’	<i>ēpzi</i> ‘takes’ [3s.pres.act.]	<i>appanzi</i> ‘they take’ [3pl.pres.act]
$*h_1es$ ‘be’	<i>ēšzi</i> ‘is’ [3s.pres.act.]	<i>ašanzi</i> ‘they are’ [3pl.pres.act]

cf. Pal./Luw. *as*-, Lyc. *ah*- ‘be’; Pal./Luw. *ad*- ‘eat’; Lyc. *app*- ‘take’, etc.

§3.1.3 Previous scholarship: Essentially three accounts have been proposed to explain the vocalism of the weak stem:

- (i) The vowel directly reflects vocalization of the laryngeal $*h_1$ in the zero-grade, i.e. PIE $*\#h_1T-$ > PA $*\#aT-$ (cf. Kimball 1999: 390-91, with lit.).
- (ii) The vowel is the orthographic representation of a glottal stop [ʔ], the preserved reflex of the PIE glottal stop $*h_1$ (cf. Kloekhorst 2004, 2008).
- (iii) The vowel is analogical on the basis of $*TeT$ roots and $*ses-$ ‘sleep’, where PA $*TaT-$, $*sas-$ is the development of (already) PIE $*T_\theta T-$, $*s_\theta s-$ (cf. Melchert 1994b: 66-67).

§3.1.4 ... and its issues: Each of these accounts is, to varying degrees, problematic:

§3.1.4.1 The ‘vocalization’ account (i): As observed already by Melchert (1994b:67), there is no compelling evidence for the vocalization of $*h_1$, viz. outside of the very paradigms ‘vocalization’ is intended to explain.

§3.1.4.2 The ‘spelling’ account (ii): The proposal advanced by Kloekhorst (2004, 2008) that initial Hitt. <a>, HLuw. <á> spells a glottal stop [ʔ] is untenable; for critiques of the Hittite and Luvian evidence, see Weeden (2011) and Melchert (2010a) respectively.

§3.1.4.3 The ‘analogic’ account (iii): The evidence for a nucleus of verbs manifesting an e/a morphophonological pattern assumed by Melchert (1994b:66-67) is less than robust—in fact, the only assured example is $*ses-$: $*sas-$ ‘sleep’; its analogic extension is therefore unlikely

§3.1.5 A new proposal: I will develop an alternative approach whereby $*\#a-$ emerges directly from the interaction of inherited ablaut patterns and evolving phonotactic constraints in the synchronic grammar of PA; in what follows, I will argue that:

- (i) the $*e/\emptyset$ root ablaut of PA *mi*-verb paradigms may be modeled as a *synchronic* morphophonological process of vowel reduction (to zero, if possible) that stably continues the PIE situation (§3.2)
- (ii) the problematic PA $*[\#a-]$ vocalism is the expected outcome of the interaction between this synchronic process and the same blocking principle invoked to explain the root vocalism of Hitt. *šašanzi* ‘they sleep’ < PA/PIE $*[s_\theta s-énti]$, which has been extended to roots of the shape $*FeT$ (where $*F =$ PIE $*s$, $*h_x$), whence (e.g.) Hitt. *ašanzi* ‘they are’ like *šašanzi* (§3.3)
- (iii) this extension owes to the emergence of new phonotactic constraints in PA—specifically, a highly-ranked SONORITY SEQUENCING PRINCIPLE—the role of which in the grammar can be motivated by the treatment of initial $*[\#FT-]$ onsets in the attested Anatolian languages (§3.4)
- (iv) modeling PA phonology in terms of OPTIMALITY THEORY (Prince and Smolensky 1993) allows for a unified analysis of both the effects of the SSP on initial $*[\#FT-]$ onsets and its interaction with PA ablaut (§3.5)

§3.2 Toward a Synchronic Model of PA Ablaut

§3.2.1 $*[e/\emptyset]$ Verbal ablaut in PA and PIE Root formations of the PA *mi*-conjugation preserve regular paradigmatic alternations between full-grade $*[e]$ singular (strong stem) and zero-grade $*[\emptyset]$ plural (weak) which are generally assumed to recapitulate their PIE paradigms; this parallelism is illustrated schematically for $*TeT$ and $*TeR$ root shapes in (36):

		PIE		Proto-Anatolian		Examples
(36)	3rd s.	$*[TéT-ti]$	$*[TéR-ti]$	$*[TéT-ti]$	$*[TéR-ti]$	Hitt. <i>šēšzi</i> Hitt. <i>kuēnzi</i>
	3rd pl.	$*[T_\theta T-énti]$	$*[TR-énti]$	$*[TaT-énti]$	$*[TR-énti]$	<i>šašanzi</i> <i>kunanzi</i>

cf. Ved. *sásti* : *sasánti*, *hánti* : *ghnánti*

§3.2.2 An observable alternation: The data in (36) show a one-to-one correlation between surface accent and full-grade; unaccented morphemes appear in zero-grade, except in the weak stem of **TeT* roots, where the normal operation of ablaut would yield the phonotactically inadmissible sequence ^X*TT-*, whence PA **[-a-]* < PIE **[-ə-]*.

- On weak **[TəT]* already in PIE, see Mayrhofer (1986:175-76) and Oettinger (1979:78); cf. Schindler (1977:31)

§3.2.3 Toward a synchronic analysis: This distribution recalls the situation traditionally posited for Pre-PIE, where it is assumed that full-grade **/e/* was underlying, and surface alternations between **[e]* and **[ə]* governed by a synchronic process of syncope in unstressed syllables (cf. Schindler 1975b: 261); the same regular alternations in PA strongly suggest that, in this morphological class, this synchronic process of (Pre-)PIE is inherited stably into PA and continued into the attested Anatolian languages, e.g. PIE/PA **/TeR-énti/* → **[TR-énti]*.

- While it has long been clear that the exact correspondence between accent and ablaut internally reconstructed for pre-PIE no longer holds for PIE generally, this fact does not invalidate the claim that this relationship is maintained in a specific morphological class (cf. §3.6 for further discussion).

§3.2.4 Modeling PIE/PA Ablaut: This process may be modeled, in a rule-based framework, with two basic (ordered) rules, (37a) and (37b), which together instantiate PIE/PA ABLAUT:

(37) PIE/PA ABLAUT:

- ZERO-GRADE (*ø-Gr.*): Unaccented **/e/* → **[ə]*
- UNACCENTED VOWEL REDUCTION (VR): Unaccented **/e/* → **[ə]*

- Rule (37b) can be conceived as a much shallower process, operative only at the postlexical even just phonetic level; on the gradient nature of vowel reduction—with deletion as the extreme case (cf. Zuraw 2002)—see the cogent discussion of Nishimura (2008:44-49, 121-22).

§3.2.5 Deriving PA Verbal Ablaut Patterns: Applying the rules in (37) to the data in (36), the surface forms are correctly derived in (38); as in (Pre-)PIE, phonotactic constraints block the application of (37a) in the 3rd pl. of **TeT* roots:

		PIE (=PA)			
(38)	UR	<i>*/TeT-ti/</i>	<i>*/TeT-énti/</i>	<i>*/TeR-ti/</i>	<i>*/TeR-énti/</i>
	‘Default’	<i>*/TéT-ti/</i>	–	<i>*/TéR-ti/</i>	–
	<i>ø-Gr.</i>	–	X	–	<i>*TR-énti</i>
	VR	–	<i>*TəT-énti</i>	–	–
	SR	<i>*[TéT-ti]</i>	<i>*[TəT-énti]</i>	<i>*[TéR-ti]</i>	<i>*[TR-énti]</i>

- In (38), ‘–’ indicates that the environment for the rule is not met, while ‘X’ means that the rule’s application has been blocked by phonotactic constraints; this derivation is treated in a constraint-based framework in §??, below.

§3.2.6 To what end? Up to this point, the analysis of PIE/PA verbal ablaut proposed here will yield precisely the same patterns as the traditional paradigmatic approach, which may seem to call into the question the necessity of introducing new formal apparatus; there are, however, at least two advantages:

§3.2.6.1 Learnability: Like speakers of living languages, PIE/PA language learners did not simply lexically list the surface phonetic forms they encountered; rather, they constructed underlying phonemic representations and phonological rules on the basis of which surface forms are predictable (cf. Hale 2007:146-47); in the case at hand, a speaker need acquire only the knowledge that the root bears an accent in the singular, but is unaccented in the plural, and vice-versa for the inflectional suffix, as well as the simple generalization in (39):

(39) PIE/PA ABLAUT GENERALIZATION:

Unaccented **/e/* is reduced to **[ə]* if possible, otherwise to **[ə]*

§3.2.6.2 PA **[#a-]*vocalism: The need for a synchronic approach will become apparent when, in §3.3, we turn to roots of the shape **h₁eT* and their problematic **[#a-]*vocalism in the weak stem of verbal paradigms.

§3.3 An Innovation in PA: the Hittite *ašanzi*-Type Reexamined

§3.3.1 The PIE pattern: There can be no doubt that, in PIE, $*h_1eT$ - roots inflected in the same way as roots of the shape $*TeR$; the derivation of (e.g.) $*h_1es$ - ‘be’ is schematized in (40a), with forms reflecting the derived SRs in the attested languages in (40b):

		$*h_1eT$ Roots in PIE		
(40)	a.	UR	$*/h_1es-ti/$	$*/h_1es-énti/$
		‘Default’	$*h_1és-ti$	–
		∅-Gr.	–	$*h_1s-énti$
		VR	–	–
		SR	$*[h_1és-ti]$	$*[h_1s-énti]$
		b.		
		$*[h_1és-ti]$	>	Ved. <i>ásti</i> ; Lat. <i>est</i> ; Goth. <i>ist</i> ; OCS <i>jestŭ</i> ; etc.
		$*[h_1s-énti]$	>	Ved. <i>sánti</i> ; Osc. <i>sent</i> ; Goth. <i>sind</i> ; OCS <i>sŏtŭ</i> ; etc.

§3.3.2 Divergence in PA: Attested Anatolian 3rd pl. forms do not directly continue $*[h_1T-énti]$ as in PIE, but rather $*[h_{1\sigma}T-énti]$ > Hitt. *ašanzi*; however, since the surface ablaut pattern of $*h_1eT$ roots is descriptively identical to $*TeT$ (: Hitt. *šašanzi*) roots in PA, this SR can be mechanically derived in (41) by the (non-)application of the same rules:

		$*h_1eT$ Roots in PA		
(41)	UR	$*/h_1es-ti/$	$*/h_1es-énti/$	cf. $*/TeT-énti/$
	‘Default’	$*h_1és-ti$	–	$*/TeT-énti/$
	∅-Gr.	–	X?	X
	VR	–	$*h_{1\sigma}s-énti$	$*T_{\sigma}T-énti$
	SR	$*[h_1és-ti]$	$*[h_{1\sigma}s-énti]$	$*[*T_{\sigma}T-énti]$

§3.3.3 Extending the blocking principle: While PIE ablaut was blocked by a strong constraint against word-initial onsets $*[#\mathit{TT-}]$, $*[#\mathit{h}_1T-]$ onsets were clearly permissible (whence $*[h_1s-énti]$ > Ved. *sánti*, etc. in (40b), above); the unexplained blocking apparent in (41) can be attributed to phonotactic changes in PA, where $*[#\mathit{h}_1T-]$ had evidently become problematic—but why?

§3.3.4 A minimal innovation in PA (hypothesis): Problematicity of word-initial onsets $*[#\mathit{FT-}]$ (where $*F = \text{PIE } *s, *h_x$) in PA is due to the emergence of a highly-ranked SONORITY SEQUENCING PRINCIPLE (SSP); the evidence for this development will be assessed in §3.4.

- For $*s$ and $*h_x$ as a natural class of fricatives in PIE, cf. Byrd (2010: 4-5 with lit.).

§3.4 Motivating the SSP in PA:

§3.4.1 What is the SSP? The observed cross-linguistic tendency—perhaps universal—for segment sonority to increase approaching a syllabic nucleus, formalized in (42):

- (42) SONORITY SEQUENCING PRINCIPLE (SSP): Between any member of a syllable and the syllable peak, only sounds of higher sonority rank are permitted

(cf. Clements 1990)

§3.4.2 The SSP in Hittite: The important role of the SSP in the phonology of Hittite has been demonstrated by Kavitskaya (2001) (cf. Yates 2014); it motivates (*inter alia*) the treatment of PIE/PA $*[#\mathit{sT-}]$ clusters, which are regularly repaired by epenthesis (or prothesis; cf. Melchert 1994b:29-33) in Hittite, e.g. (43):

		PIE $*[#\mathit{sT-}]$	Hitt. $*[i\mathit{s}T-]$
(43)		$*spend-$	<i>išpanti</i> ‘libates’
		$*skolH-$	<i>iškallai</i> ‘splits’
		$*st(e)w-$	<i>ištuwāri</i> ‘becomes visible’
		$*sh_2em-$	<i>išhamai</i> ‘sings’

- The phonological interpretation of the *very* few secure examples of inherited $*/\#h_xT-/$ clusters (e.g. Hitt. *hatukzi* ‘is fearful’; cf. Gk. ἀπόφοβος ‘am afraid’)—viz. direct evidence for the treatment of an underlying $*/\#h_xT-/$ onset in PA—remains unclear; one possibility is that there was a very early epenthesis in this sequence, as suggested by Keydana (2012:233 and n. 24) (cf. Yates 2014). Yakubovich and Kassian (2002) discuss the SSP (“SSG”), but I do not endorse most of the views therein.

§3.4.2.1 A non-problem: Since $*/\#h_xR-/$ does not violate the SSP, no repair is necessary; this initial sequence is preserved until the general loss of $*h_1$ in late PA, whence Hitt. *link-*, CLuw. *likk-* ‘swear’ < $*h_1lenḡ^h-$ (cf. Gk. ἐλέγχω).

§3.4.3 The SSP in Luwian and the comparison with Hittite: Luwian similarly exhibits effects of a highly-ranked SSP, where it instead drives deletion, e.g. (44):

	PIE $*/\#sT-/$	CLuw. <i>T-</i>	Hitt. <i>išT-</i>
(44)	<i>*spor-</i> ‘spread’	<i>parritti</i>	<i>išpāri</i>
	<i>*st(e)h₃men-</i> ‘ear’	<i>tummān</i>	<i>ištāmanan</i>

- Significantly, note that the root-initial $*\#s-$ remains where it does not violate the SSP: CLuw. *hišhiyanti* ‘they bind’ (< PIE $*/h_2i-sh_2-/$)

§3.4.4 Reconstructing the SSP in PA: The treatment of underlying PIE/PA $*/\#FT-/$ onsets in Hittite and Luwian—summarized in (45)—provide independent motivation for a highly-ranked SSP in PA and, as such, compelling evidence for its function in blocking the regular operation of PA ablaut (viz. rule (37a), above).

(45) PA $*/\#FT-/$ > Hitt. [$\#iFT-$], Luw. [$\#T-$]

§3.4.5 Ranking is relative: PA ablaut is blocked where it would create SSP violations; however, the differing developments of *underlying* $*/\#FT-/$ in Hittite and Luwian strongly suggest that this sequence remained intact in PA surface forms, viz. $*/\#FT-/ \rightarrow *[\#FT-]$; these facts point to the general principle in (46), which will be formalized in §3.5:

- (46) PROTO-ANATOLIAN SSP GENERALIZATION::
Falling sonority (viz. SSP-violating) onsets are phonotactically problematic in PA: underlying sequences are not phonologically repaired, but additional violations are not permitted on the surface.

§3.5 Modeling SSP-Effects in Proto-Anatolian:

§3.5.1 Toward a formal model: While this phonological generalization is difficult to capture in a (purely) rule-based approach, it may be formally implemented in terms of OPTIMALITY THEORY (OT) (Prince and Smolensky 1993); this analysis utilizes the three basic and two PIE/PA-specific constraints in (47):

- (47)
- | | | |
|----------------------|----------------------------------------------------------------------------|------------------------|
| MAX-C: | A [-syll] segment (C) in the input must have a correspondent in the output | (= Don’t delete!) |
| DEP-V: | A [+syll] segment (V) in the output must have a correspondent in the input | (= Don’t epenthesize!) |
| SSP: | Violations of the SSP are not permitted. | |
| $*\dot{\epsilon}$: | Pretonic unaccented [e] is not permitted in the output. | (= rule (37a), above) |
| $*\dot{\emptyset}$: | [\emptyset] is not permitted in the output. | (= rule (37b), above) |

§3.5.2 The (non-)repair of PA $*/\#FT-/$: As noted in §3.4.5, underlying $*/\#FT-/$ onsets surface unchanged in PA, undergoing neither epenthesis (as in Hittite) nor deletion (Luwian); this PA pattern emerges from the ranking in (48a), correctly generating SR $*[sp\acute{o}r-ei]$, as confirmed by the tableau in (48b):

- (48) a. **Proto-Anatolian:** MAX-C, DEP-V \gg *SSP
b.

Input: / <i>spór-ei</i> /	MAX-C	DEP-V	SSP
a. $\text{[sp]}\text{[p]}\text{[o]}\text{[r]}\text{[e]}\text{[i]}$ <i>spór-ei</i>			*
b. <i>pór-ei</i>	*!		
c. <i>ispór-ei</i>		*!	

§3.5.3 An independent innovation: Hittite and Luwian have separately innovated in re-ranking of the SSP with respect to one of these faithfulness constraints; it is promoted above DEP-V in Hittite, resulting in epenthesis, and above MAX-C in Luwian, resulting in deletion; (49) contrasts the relative rankings in Hittite and Luwian with Proto-Anatolian; the corresponding tableaux are in (49b) and (49c) respectively:

- (49) a. **Proto-Anatolian:** MAX-C, DEP-V \gg *SSP
Hittite: MAX-C \gg SSP \gg DEP-V ⇒ epenthesis
Luwian: DEP-V \gg SSP \gg MAX-C ⇒ deletion

- b. **Hittite:** Hitt. *išpāri* ‘spreads’

Input: /spór-ei/	MAX-C	SSP	DEP-V
a. <i>spór-ei</i>		*!	
b. <i>pór-ei</i>	*!		
c. <i>ispór-ei</i>			*

- c. **Luwian:** CLuw. *pari(tti)* ‘spreads’

Input: /spór-ei/	DEP-V	SSP	MAX-C
a. <i>spór-ei</i>		*!	
b. <i>pór-ei</i>			*
c. <i>ispór-ei</i>	*!		

§3.5.4 Motivating reversal(s): The separate ranking reversals evident in Hittite and Luwian are explained most plausibly by assuming a highly-ranked SSP in PA, the effects of which are (minimally) suppressed by still higher-ranked MAX-C and DEP-V; as argued already in §3.4.4, they constitute *independent* motivation for ranking the SSP such that it blocks PA ablaut processes.

§3.5.5 PA Ablaut and the SSP: The constraint ranking in (50a) will predict the correct surface form *[*h₁ə_s-énti*] > Hitt. *ašanzi*, as shown in the tableau in (50b):

- (50) a. **Proto-Anatolian:** **ə*, SSP \gg **ə*
b. PA *[*ašánti*] < *[*h₁ə_s-énti*]

Input: <i>h₁es-énti</i> /	* <i>ə</i>	SSP	* <i>ə</i>
a. <i>h₁es-énti</i>	*!		
b. <i>h₁s-énti</i>		*!	
c. <i>h₁ə_s-énti</i>			*

§3.5.6 Building a constraint grammar for PA: Unifying the constraint rankings established in (48a) and (50a), it is possible to reconstruct for PA, Hittite, and Luwian the preliminary constraint grammars in (51); these rankings capture in formal terms the phonological generalization stated in (46), repeated below:

- (51) **Proto-Anatolian:** MAX-C, DEP-V \gg SSP, **ə* \gg **ə*
Hittite: MAX-C \gg SSP, **ə* \gg DEP-V \gg **ə*
Luwian: DEP-V \gg SSP, **ə* \gg MAX-C \gg **ə*

- (46) **PROTO-ANATOLIAN SSP GENERALIZATION:**
Falling sonority (viz. SSP-violating) onsets are phonotactically problematic in PA: underlying sequences are not phonologically repaired, but additional violations are not permitted on the surface.

- This analysis is simplified slightly; for discussion and refinements, see now Yates (2014).

§3.6 Implications of the analysis

§3.6.1 Toward a new conception of PA ablaut: I have demonstrated that a primarily synchronic (and shallow diachronic) approach to PA ablaut grounded in traditional assumptions about its operation in the proto-language can not only account for the ‘normal’ alternations reconstructed for PIE verbal paradigms, but also for a wider range of phenomena, including offering a purely morphophonological explanation for the problematic PA weak stem $*[\#a\text{-}]$ -vocalism in Hitt. *ašanzi*, *adanzi*, etc.

§3.6.2 OT in diachronic phonology: This problematic vocalism is derived in OT from the interaction of ablaut and phonotactic constraints which are *independently* motivated in the grammar—in the case at hand, the observable effects of the SSP in Hittite and Luwian on initial $*[\#FT\text{-}]$ onsets.

- For the correct application of this principle, see Byrd (2010:128-29 and *passim*).

§3.6.3 On Reconstructing Ablaut in PA and PIE: In the case of PA verbal ablaut, the attempt to map directly from a (Pre-)PIE reconstructed form into the attested languages has obscured a morphophonological problem that can be solved by reconstructing synchronic phonological systems at intermediate stage(s) (viz. PA)

§3.6.4 An easy case? PA simple root *mi*-verbs constitute a very exceptional morphological class in that full-grade and surface accent correlate 1-to-1; to apply this approach to more complex categories will require a more nuanced view of the principles of accent assignment in PIE (cf. Kiparsky 2010; Kümmel 2013, 2014; Keydana 2005, 2013b).

§3.6.5 Looking forward: Some potential applications of the synchronic, constraint-approach here employed:

§3.6.5.1 Refining the constraint set: In determining the constraints necessary to account for SSP-effects in Proto-Anatolian and the attested Anatolian languages, a preliminary constraint grammar has been established for PA that can be used to investigate other phonological phenomena in the attested Anatolian languages, such as Hittite *-ške-* (< PIE $*\text{-ské}/\acute{o}\text{-}$) epenthesis, e.g. Hitt. *appiške-* : *epp-/app-* ‘take’ (cf. Melchert 2013:178-80).

§3.6.5.2 Extension to nominal paradigms: If this approach to PA ablaut is correct, it should be possible to extend it to the nominal system; it is recommended by the correct predictions it makes for Hitt. *tēkan* / *takn-* ‘earth’ < $*[d^h\acute{e}g^h\text{-}\acute{o}m]$ / $*[d^h\acute{o}g^hm\text{-}\acute{V}]$, but the question calls for much further systematic research.

(52) **Hittite:** Hitt. *taknāš* ‘earth’ [n. gen. s.] < $*[d^h\acute{o}g^hm\acute{o}s]$

Input: $/d^heg^h\text{-}em\text{-}\acute{o}s/$	$*\acute{e}$	SSP	$*\acute{o}$
a. $d^heg^h\text{-}em\text{-}\acute{o}s$	*!*		
b. $d^heg^h\text{-}m\text{-}\acute{o}s$	*!		
c. $d^hg^h\text{-}m\text{-}\acute{o}s$		*!	
d. $d^h\acute{o}g^h\text{-}m\text{-}\acute{o}s$			*

§4 Some conclusions; discussion; future research

§4.1 Questions revisited: Some bigger questions asked today:

- To what extent is ICTUS in Anatolian (and PIE) morphologically-determined and to what extent phonologically-determined?
- Did Anatolian (and PIE) have a principle of default ICTUS assignment? And if so, how did it operate?
- How can ‘default’ accentuation lead to phonological change in lexical accent systems?
- Did Anatolian (and PIE) have (at least $*e/\emptyset$) ablaut as an (inherited) synchronic phonological process?
- Are there advantages in using Optimality Theory (vs. traditional rule-based accounts) to model synchronic and diachronic phonology?

§4.2 On reconstructing phonology: The reconstruction of PIE phonology is more abstract—and rather more like syntax in many respects—than generally regarded; cf. Watkins (1963) in (53):

- (53) “In considering syntax from the historical point of view, it would be absurd to think that the physical body of a sentence or similar utterance can be historically transmitted. **The same is valid for phonology or morphology; it is the phonological and morphological structure of the language which constitutes a set of linguistic systems which undergo historical transmission, not any given physical realization.** The underlying syntactic structure of a sentence, for example the rules of arrangement of its constituent elements, can be presumed in the same fashion to form a linguistic system or set of systems functioning in time, and historically transmittable. As such, it is susceptible to analysis by the comparative method, as well as by other techniques of historical linguistics.”

§4.3 Toward a (predictive) theory of diachronic prosody: Tremendous potential for PIE data/analyses to contribute toward a general theory of prosodic change; yet to do so requires a firm foundation, which can be established only from the bottom up, viz. on the basis of synchronic (and shallow) diachronic analyses of its oldest daughters.

- The accentual systems of Proto-Italic and Proto-Germanic appear naturally explicable in terms of a PIE principle of default leftmost ICTUS assignment—and this may illustrate a more general diachronic trend.

§4.4 Future research: We’re going to need a lot more. . .

- We should be happy about this, I think.

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