SYLLABLE WEIGHT GRADATION IN THE LUWIC LANGUAGES

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ABSTRACT

This paper offers a new perspective on Čop’s Law and Open Syllable Lengthening, two commonly accepted sound laws that lengthened both consonants and vowels in the Luwic languages. It is proposed that both developments take similar inputs and ultimately yield the same effect: neutralisation of the syllable weight opposition in accented (stressed) syllables. This development is in line with a tendency already observable in Proto-Anatolian, according to which unstressed syllables were made light, while stressed syllables were made heavy. Thus, it is argued, in the prehistory of the Luwic languages, vocalic length, consonantal length and syllable weight in general became increasingly dependent to the position of the stress and therefore became phonologically neutralised to a certain extent.

1. INTRODUCTION

The Luwic languages, of which Luwian and Lycian are best known, show a phonological opposition between two series of consonants: traditionally, these are referred to as ‘fortis’ and ‘lenis’. In addition, Luwian seems to have distinguished long and short vowels. Each of the three attested writing systems applied to these languages (cuneiform, hieroglyphic, alphabetic) has a different way of expressing these distinctions.¹

The cuneiform scribes, when writing Luwian, used geminate and singleton spelling (<VC-CV> vs. <V-CV>) to mark the differences between fortis and lenis consonants, respectively. In Hieroglyphic Luwian, fortis dental stops followed by a are indicated using the signs <tā> and <tā>, while the sign <tā> expresses the lenis stop (Rieken 2008). As far as we know, fortis/lenis distinctions for other consonants are not expressed in hieroglyphic writing. Lastly, the alphabetic script of Lycian employs different signs to indicate the contrast between fortis and lenis obstruents (<p> vs. <b>, <t> vs. <d> etc.).

The phonetic realisation of fortis (< PIE *p, *t, *k, *kʷ) and lenis (< PIE *bʰ, *dʰ), *gʰ, *gʷ) consonants has been the subject of debate for over a century, and no real consensus has been reached on all details. With regard to the cuneiform languages, most scholars agree that fortis consonants were at least phonetically longer than their lenis counterparts: [tː/dː] vs. [t/d] (Melchert 1994a: 20f.; Kloekhorst 2008: 21–5).² In Lycian, on the

¹ In this paper, I will make frequent use of the labels ‘Hieroglyphic Luwian’ and ‘Cuneiform Luwian’ to refer to two “[corpora] of linguistic data recorded using a particular writing system” (as per Yakubovich 2010: 70), without implying that the distinction in writing system marks an important dialectal divide. The phonetic changes that are at the heart of this paper seem to have been completed in Proto-Luwian times already.

² For this reason, I will use geminates (/tt/) and singletons (/t/) contrastively in my phonological representation of Hittite, Cuneiform Luwian and Palaic forms, e.g. Hitt. mi-li-iti-ta-aš/milittas/ ‘honey’ (gen.sg.) vs. CLuw. ma-al-li-ta-a-ti/mallitāti/ ‘id.’ (abl.-ins.).
other hand, there are indications that the distinctive factor between fortis and lenis consonants was frication (Van den Hout 1995: 131–3), and the same has been claimed for Hieroglyphic Luwian (Hajnal 1995: 3211; Rieken 2010: 306). In both languages, it is commonly assumed that the fricatives represent an innovation, since it is typologically much more common for occlusives to become fricatives than the other way around (Melchert 1994a: 301; Kümmel 2007: 55, 147).

Vowel length is also marked in different ways. In cuneiform writing, long vowels are marked using plene writing: <Ca-a>/*aCaC/ = [aː]; <Ca>/aCaC/ = [a]. Moreover, the hieroglyphic scribes may have occasionally marked the presence of a long vowel using plene writing (Vertegaal 2018). In Lycian, lastly, vocalic length seems to have been lost.

For the most part, the distribution between long and short vowels and consonants is governed by their etymological origins. Fortis (long) stops generally represent the reflexes of the Proto-Indo-European tenues (*p, *t, *k, *h*), cf. CLuw. -tta/*-tta/ ~ Lyc. -te/*-te/ (3sg.pret.act.) < PIE *-to. Lenis (short) stops, on the other hand, normally continue Proto-Indo-European mediae (aspiratae), cf. CLuw. pa-a-ta/*-pāta/- ~ Lyc. pedi/*pēdi/- ‘foot’ < PIE *pod*d*ed*.

Inherited long vowels in Luwian are generally the direct continuants of PIE/PAnat. diphthongs (e.g. CLuw. ḫu-u-ḫa-ṭi/*hōḥati/ ‘grandfather’ [abl.-ins.], < PIE *h₂éuḥ₂>,)5 accented long vowels (e.g. CLuw. za-a-ar-za/*tsāṛta/ ‘heart’ < virtual PIE *kērd-,) or combinations of accented vowels and tautosyllabic laryngeals (e.g. CLuw. ṣā-a-at-ta/*sāṭta/ ‘he released’ < PIE *sōh₁-to).6

These general observations do not explain the phonological shape of all words in the Luwic languages, however. For instance, we often find that lenis consonants continue PIE tenues (e.g. PIE *h₂éi-ti > CLuw. ḫi-ti/*ʔiṭi/ ‘he goes’, never ** i-it-ti/*ʔiṭi/) and that plene spellings are often conspicuously absent in vowels that on etymological grounds can be assumed to continue a long vowel, monophthongised diphthong or combination of vowel + laryngeal, e.g. CLuw. -a (a-stem nom.sg.c. ending < PIE *-eh₂). As is commonly accepted, most of these discrepancies are caused by various prehistoric lengthenings and shortenings which are specific to the Anatolian subbranch of Indo-European.

In this paper I will focus on two separately proposed sound laws with clear lengthening/fortition effects in Luwian and, to some extent, also in Lycian. Presumably, therefore, these laws had run their course already in Proto-Luwic:

3 Rieken (2010) arrived at this interpretation in her analysis of the HLuw. sign <tā>, arguing that it represents [da], with a voiced stop. Therefore, she proposes that <tā> = [t(ṭ)a] or [d(ṭ)a], <tā> = [b(a) and <tā> = [d(d)a], identifying the synchronic distinction between HLuw. fortis and lenis consonants with the one we find in Lycian (where <t> = [t], <d> = [d]). However, in an earlier paper (Rieken 2008), she attributed the same phonetic value [da] to the sign <tā>, as it appears to merge with /t/ in texts after ca. 800 BCE (‘rhotacism’, cf. Morpurgo Davies 1982/1983: 246-250, Melchert 2003: 179–182, Goedegebuure 2010: 76–78). These analyses are irreconcilable, but both have been suggested on good grounds. A new analysis of Luwian dental stop phonology as apparent from the hieroglyphic corpus is provided in Vertegaal fhc., where it is argued that <tā> writes a short stop [t,d]. In my phonological representations of Hieroglyphic Luwian and Lycian, I will use the symbols /t/ and /d/ to distinguish fortis from lenis, respectively.

4 This interpretation of plene writing seems to be supported by the majority of scholars nowadays (Melchert 1994a: 27; Kimball 1999: 59; Kloekhorst 2014: 13–18, q.v. for a succinct overview of previous scholarship). For Cuneiform Luwian, Rieken (2017) has recently confirmed the long-standing hypothesis that plene writing of * marks vocalic length as it does in Hittite. Plene writing in Palaic awaits a separate treatment, but it is unlikely that its basic principles will be any different from Hittite and Luwian.

5 Note that the plene spelling in ḫu-u is ambiguous: we often find plene spelling after the sign ḫu where we do not expect to find a long vowel, and it has been proposed that the sign U in *hu-u serves to disambiguate *HU from the sign RI, which closely resembles it in form (Kimball 1999: 67). In the case of CLuw. ḫu-u-ḥa-ṭi, however, the length of the vowel in the initial syllable can be inferred from the shortening effect it had on the following consonant, due to Proto-Anatolian lenition, see Section 5.1.

6 The fortis stop in CLuw. ṣa-a-at-ta must be analogical. Note that the lengthening effects mentioned here make it very likely that the Proto-Anatolian accent had at least a very strong stress component (Melchert 1994a: 47).
1 Čop’s Law (e.g. Čop 1970; Melchert 1994a: 252f.; Kloekhorst 2014: 571–85.)

2 Lengthening of accented short vowels in open syllables (e.g. Hrozný 1917: 1861; Melchert 1994a: 131–3, 215–18, 261–64).

This paper will not provide a new interpretation of the attested Luwian and Lycian material, nor will it propose any substantial changes to the scope and formulations of these sound laws beyond those advanced in other studies. Rather, it will offer a new way of viewing these well-known sound laws by showing their underlying coherence. I will argue that these are not two random, independent rules, as they are often presented in the scholarly literature. Rather, they demonstrate a high degree of functional similarity on a more abstract, phonological level, by taking complementary inputs while yielding identical results. Together, these two developments constitute a general Luwic fortition under influence of the accent. In the second half of this paper it will be shown that a motivation for the eventual phonologisation of these two changes in the Luwic languages can be found in the Proto-Anatolian phonological system. The resulting picture, as we will see in Section 6, is an extension of ideas already proposed in Kloekhorst 2006/2008 and Hajnal 1995: 50f. Without taking over these authors’ ultimate conclusions, it combines their approaches to lay bare the complimentary structural relations between four distinct phonetic developments in the history of the Luwic languages.

2. Čop’s Law

In 1970, Bojan Čop observed that on numerous occasions, fortis consonants in Luwian correspond to lenis consonants in their Hittite counterparts, e.g. CLuw. ma-al-li /malli/ ~ Hitt. mi-li-it /milit/ ‘honey’, CLuw. ta-ap-pa-aši (=ša) /tappas=sa/ ~ Hitt. ne-(e)-pi-išt /nēpis/ ‘heaven’. He explained this variation as the result of a historical development: ‘Die indogermanischen Konsonanten l, r, n, m, *bh, *dh, *gh wurden im Luwischen nach einem betonten kurzen indogermanischen *ɛ in doppelte Konsonanten verwandelt (...). In der Orthographie des Keilschrift-Luwischen werden diese Konsonanten ll, rr, nn, mm, šš, pp, tt, kk geschrieben’ (Čop 1970: 96). In the following years, this sound law received general acceptance and was termed ‘Čop’s Law’ as more instances were found in Luwian. Some strong examples are Cuneiform Luwian ma-ad-du /māttu/ ‘wine’ (< PIE *méd-d-u; Morpurgo Davies and Hawkins 1987: 283) and pār-ra-an /pāran/ ‘before, in front’ (< PIE *pēr-om; Čop 1970: 86). Only in the last decade did it become clear that Čop’s Law also affected Hieroglyphic Luwian and Lycian, cf. HLuw. zati /tsāti/ ‘this’ (dat.-loc.sg.) and HLuw. āpati ‘that’ (dat.-loc.sg.) (both < PIE *-ē d/i; Čop’s Law manifests itself as the complete absence of rhotacism in these words; Goedegebuure 2010: 87) and Lycian ebette ‘that’ /ɛfete/ (dat.-loc.pl.; < *-ēdʰos; Kloekhorst 2012a: 261f.). We find a (fortis) stop phoneme /t/ in both languages. If the fortition due to Čop’s Law had not affected these words, we would have expected to find a fricative /θ/: HLuw. **za-ti /tsātʰi/ (alternating with rhotacised **za+ra/i) and Lyc. **ebede /ɛfetʰe/.

Despite the wide adoption of Čop’s Law in some form or another in historical accounts of Luwian phonology, no absolute consensus has been reached on its precise conditioning and effects. In particular, it is unclear which consonants are affected by Čop’s Law and whether only consonants after certain vowels are geminated by this rule. These features will be discussed in the sections below.

7 Melchert (1994b) has also argued for a ‘limited version of Čop’s Law’ affecting word-initial syllables in Proto-Anatolian already, citing examples from Hittite and Lydian. Recently, however, he has retracted this view (Melchert 2015).
2.1. Vocalism

In his 1970 article, Čop only mentioned *ēCV as a potential input for his newly found law, and this view is held until this day by several scholars who believe that consonants preceded by the other Proto-Anatolian short vowels (*āCV, *ōCV, *īCV, *ũCV) were not liable to gemination, e.g. Melchert (2015: 4), Rieken (2010: 305) and Goedegebuure (2010: 87). The reason to assume this restriction to *ē is that almost all of the examples we have for Čop’s Law continue PAnat. *ē. This should not surprise us for two reasons. First, other short accented vowels *ā, *ō, *ī and *ũ must have been quite rare: PAnat. *ā and (short) *ō in open syllables can only continue PIE *h₂ē and *h₂ē, respectively, while *ī and *ũ were regularly unaccented in PIE unless they attracted the accent analogically (cf. CLuw. piqa- in Section 3 for an example).

Second, I assume with Kloekhorst (2008: 120) that PIE *ō was lengthened to *ō in pre-PAnat. already, as it causes Proto-Anatolian lenition (cf. Section 5.1) in forms such as Hitt. ša-a-ku-ya-/sākʰ ‘eye’ < *sōkʰ-o- and Hitt. ša-a-hi /sāhi/ ‘he stuffs’ < *sōh₂-ē. Thus, words like PIE *dōru- > CLuw. ta-a-ru-/tāru/- (never *tarru- /tārru-/) are no good counterexamples to a more general application of Čop’s Law to all short accented vowels. I assume that PIE *dōru- had developed into *dōru- in Proto-Anatolian already, meaning that it was unaffected by Čop’s Law, which required a short vowel.

Nevertheless, after the lengthening of pre-PAnat. *ō > PAnat. *ō, a new short PAnat. *ō developed from PIE *h₂ē. This new short *ō did undergo Čop’s Law, as can be seen from CLuw. ḥarrani(a)i/- /harrani(a)i/- (< PAnat. *Hōron- < PIE *h₂ér-on-), which provides a good example of a geminated stop after another vowel than *ē. Since so much hinges on this etymology, it is worth treating it in more detail.

HW² (Vol. H, p. 271f.) lists fourteen attestations in NH texts (not counting duplicates). We come across the following forms: ḥar-ra-ni-eš, ḥar-ra-ni-iš, ḥar-ra-ni-iš (nom.sg.c.); ḥar-ra-ni-in, ḥar-ra-ni-i-in (acc.sg.c.), [ḥar]-ra-ni-i-ūs (acc.pl.c.). There is also one attestation of ḥarrani(a)i/- in a CLuw. text (KUB 35.97, 2’; cf. Starke 1985: 247), but the text is too fragmentary to determine the meaning of the word. The New Hittite contexts clearly show that the word must refer to an oracle bird, for example:

KUB 5.22 obv. 28: nu=kαn ḥar-ra-ni-i-š dUTU-un EGIR UGU SIG₅-uq-[az-ú-et]

‘Der ḥ-Vogel [kam] in Richtung auf die Sonne zu hinten nach oben von der günstigen (Seite)’ (transl. HW² Vol. H, p. 271f.).

8 This early lengthening of PIE *ō is not commonly accepted, cf. Melchert (2015: 9f). Melchert (2012b: 175) cites Hittite da-a-ak-ki /tākki/ ‘resembles’ < PIE dōkei and ḥu-ua-ap-pi /h₁-appi/ ‘throws’ < PIE *h₂wōpei as counterexamples, and indeed, these forms show an unlimited (geminate) stop after an original PIE *ō. At the same time, however, unlimited stops are regularly expected in the plural forms of this paradigm (Hitt. tāk-ka-an-zi / takkánazi and ḥu-ap-pa-an-zi /huppantsi; from which these stops could have been analogically introduced into the strong stem. In addition, Melchert does allow for a special lenition of just PIE *h₂ after *ō (following Kimball 1999: 397), marking the well-known “stronger” or “longer” quality of what we call phonological “short” *ō/o in PIE’ (Melchert 2012b: 179). The geminate-singleton alternation we see in Hitt. nāh₁i/nab₂h₁anzi ‘to fear’ would be regular, and was extended from there to stems ending in s (h₂diši/h₂šānzi ‘to beget’) and subsequently spread from there to other verbs as well (e.g. Hitt. ｉšṭānį/išṭappanzi ‘to clog up’). I prefer to interpret the ‘stronger’/’longer’ quality of *o/o as something which caused it to be lengthened early, so that we can take the leniting effects of *h₂ as an instance of the independently established Proto-Anatolian lenition laws (see Section 5 and Kloekhorst 2014: 551²017). In this way, the ablaut we see in h₂diši, h₂šānzi and other verbs belonging to this class is phonetically regular. I readily concede that an early lengthening of *o is not without problems and requires alternative solutions for etymologies proposed in the past, e.g. the Luwian suffix -att(a)- (if it truly continues *-ō-V-, as one reviewer suggests). I would argue, however, that these inconveniences do not outweigh the problems associated with the massive analogical spread of the Hittite ḥi-conjugation stem pattern from a relatively small group of *h₂-final verbal stems as proposed by Melchert.
A direct identification of ḥarrani(a)/-i- as a variant of Hittite ḫāran- ‘eagle’ is impossible, as per *HED (Vol. 3, p. 139) and Melchert (1993: s.v.), because of the -rr- and -r-. Nevertheless, the close similarity between ḥarrani(a)/-i- on the one hand and Hittite ḫa-a-ra-n° /ḫāran-/ ‘eagle’ and Palaic [ḥa]-a-ra-na-as /ḥāran-/ ‘id.’ (gen.sg.; cf. Melchert 1994a: 196; both < PAnat. *Hōron- < PIE *h₂erōn-) on the other cannot be denied. For this reason, Starke (1987: 265) has proposed that ḥarrani(a)/-i- represents the direct cognate of the Hittite and Palaic forms.9 A good indication of the Luwian character of this word is the spelling of its ending, which frequently shows plene i, e.g. nom.sg.c. ḫar-ra-ni-i-iš (e.g. KUB 5.22 obv. 28) and acc.sg.c. ḫar-ra-ni-i-in (KUB 18.5 + 49.13 i 28). While final -iš/-in is hardly ever seen on Hittite nouns and adjectives (the only notable exception being Hitt. nakki- ‘important’), it has a clear parallel in Luwian, where we find formations such as CLuw. ta-a-ti-i-iš ‘paternal’ (nom.sg.c.) and GĒME-i-iš ‘of a female servant’ (nom.sg.c.). As per Melchert (1990: 200f.) and Rieken (2017: 24f.), these are best interpreted as denominial adjectives built on PAnat. *-io- (< PIE *-io-), which were transferred to the highly productive i-stem (‘i-mutated’) class. Its plene spellings -Ci-i-iš (nom.sg.c.) and -Ci-i-in (acc.sg.c.) would then represent the resulting [-iij] (nom.sg.c.) and [-iijn] (acc.sg.c.), respectively. The stem ḥarrani(a)- can be interpreted in the same way, as a derivative in *-ia- from an unattested stem ḥarran- or ḥarrani-.

It is highly unlikely that CLuw. ḥarrani(a)- straightforwardly means ‘eagle’ for two reasons. First, it co-occurs with Hittite ḫāran- (represented Sumerographically as TI₃) in several contexts, suggesting that it cannot refer to the same type of bird as the Hittite word.10 Second, we have just seen that this word is a derivative from the ‘eagle’-root, means that it is unlikely to mean ‘eagle’ itself. Nevertheless, exactly this latter point opens up the possibility anew that the derivational basis ḥarran- itself, on which ḥarrani(a)/-i- seems to have been built, is in fact the Luwian cognate of Hittite ḫāran-. While the derivative ḥarrani(a)/i/- cannot mean ‘eagle’, its root may still have had that semantic value. Instead, ḥarrani(a)/-i- may have referred to an eagle subspecies, as suggested by Haas (2008: 35), or a bird with eagle-like properties.11

In any case, given the strong formal and semantic similarity existing between Luw. ḥarrani(a)/- and Hittite ḫāran-, Starke’s identification of ḥarrani(a)/-i- as etymologically related (but not a direct cognate) to Hittite ḫāran- is likely to be correct. It follows that the geminate -rr- alternating with the singleton -r- in Hittite and Palaic is only explicable through Čop’s Law. The analysis CLuw. ḥarrani(a)/i- ~ Hitt. ḫāran- < PAnat. *Hōron- (for the PAnat. reconstruction *Hör-, cf. Kimball 1999: 141 and Melchert 1994a: 98) shows that Čop’s Law is not restricted to PAnat. *ēCV, but also takes PAnat. *ōCV (< *h₂ēCV) as its input, suggesting that the consonant gemination is not dependent on just the vowel *ē, and may well have applied to *ā/i/üCV as well (becoming *ā/i/üCCV; thus Kloekhorst 2006/2008: 132). Since evidence for the input of this change is expected to be quite rare (see the beginning of this section), the absence of positive evidence for this generalisation is not very surprising. Furthermore, this claim is not vitiated by any counterevidence: there are no cases of Proto-Anatolian *ā/i/üCV which did not yield *ā/i/üCV. Personally, I am therefore inclined to believe that vocalic quality does not affect Čop’s Law. Nevertheless, this point is not of crucial importance for the rest of this paper. Even if PAnat. *ōCV, *īCV and *üCV did not undergo Čop’s Law, these sequences would still undergo vowel lengthening as per OSL (see Section 3).

9 This argument is repeated in Starke (1990: 76) and Kloekhorst (2014: 584f.).
10 Cf. KUB 18.5 + 49.13 ii 36f.: na-aš-ta *TI₃ MUSEN har-ra-ni-i-iš-sa ‘ID'-az ża-ra-a pé-ra-an aš-a-a-a-as [i-]-e-er ‘Ein Adler und ein ḥarrani-Vogel kamen vom Fluß nach oben, vorne vom günstigen (Bereich), geflogen’ (Sakuma 2009: 575).
11 It is not uncommon to find animal names containing names of similar but unrelated animals. In the case of English bird names, compare the lark sparrow (Chondestes grammacus), which is not a lark, and the turkey vulture (Cathartes aura), which is not a turkey.
In addition, it is often claimed that apart from gemination, Çop’s Law entails a change from *e to ā (Melchert 1994a: 305; Rieken 2010: 305). In part, this idea is prompted by CLuw. ti-ia-am-mi- /tiammi- ‘earth’, which is cognate to HLuw. ta-ka-mi’ /t(a)kmī/ and Hitt. te-ekān /tēkan/12. All forms continue PIE *dʰegʰom- in some way or another. Kimball (1983: 42720) takes the endling less locative form PIE *dʰegʰ-em as the starting point for CLuw. tiāmmɨ-, which would yield *dɡēm in Proto-Anatolian. In principle, this form is expected to show raising through regular sound change: PAnat. *gē > PLuw. *(j)i. Accordingly, *dɡēm-should have developed into **djūm(?).13 The attested form (CLuw. tiāmmɨ-) betrays no such effect, however. For this reason, Melchert (1994a: 254) argues that the ‘raising is blocked by the prior effect of “Çop’s Law”: *dyēm(V) - > t(i)amm-“, implying that Çop’s Law changed PAnat. *ē to *ā before PAnat. *gē- could develop into *(j)i-.

Although suggestive, this analysis of CLuw. tiāmmɨ- is not the only possible solution, and its formal features have been explained in various alternative ways. Çop (1970: 91) and Hajnal (1995: 102f.72) argue for a secondary accent shift from inherited PAnat. *dʰegʰom- to pre-PLuw. *dʰegʰ-em. Kloekhorst (2008: s.v. “tēkan”) proposes that the change (*gē >) *iē > *(j)i was blocked in tiāmmɨ- because of the preceding dental *d-.

Incontrovertible evidence showing that there was no change in vocalic quality associated with Çop’s Law is hard to find. In Luwian, both PAnat. *ē and *ā merge anyway, making any prehistoric difference impossible to spot. In Lycian, inherited *ē and *ā are usually kept apart, but the effects of umlaut and proportional analogy make the evidence difficult to interpret. Such is the case of Lyc. ebette /eqete/ ‘this’ (8x; dat.-loc.pl.) < PAnat. *Hobēdōs, which can only be equated with Hitt. a-pē-(e)-da-aš /apētas/ ‘that’ if we explain the former’s fortis stop /t/ through Çop’s Law (Kloekhorst 2014: 572f.). The fact that we do not find Lyc. **ebatte would indicate that no separate change from *ē to *ā has taken place here, and that the gemination caused by Çop’s Law should be detached completely from the change PIE *ē > Luwian ā. However, we cannot exclude that a stem *ebas- would have been analogically replaced by its more common stem variant *ebe-.

In the end, the evidence in favour of the claim that Çop’s Law came with a change in phonetic quality is meagre. The only example that could provide evidence in this direction is CLuw. tiāmmɨ-, but the history of this form is open to multiple interpretations. In absence of better evidence in favour of any change beyond the fortition of the intervocalic stop, I will adopt the most conservative definition of Çop’s Law as a merely consonantal change that did not alter the quality of the vowel.14

### 2.2. Consonantism

It is clear that Çop’s Law affected inherited PIE resonants (e.g. CLuw. ma-al-li /mālli/ < PIE *mēlīt) as well as aspiratae (e.g. CLuw. ma-ad-du /māttu/ ‘wine’ < PIE *mēd ū). It is also clear that Çop’s Law did not affect the Proto-Anatolian fortis stops *p, *t, *k, *g, *kʷ or the phoneme *H (< PIE *h₂3), since these were phonetically long anyway. Also unaffected are the semivowels *i [j] and *u [w], as exemplified by CLuw. ha-ā-ā-i- /hāu-/ ‘sheep’, see Section 3.

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13 This development is also found in CLuw. i-ia-ṣarī- (probably [i:s-ri-] or contracted [i:s-ri-]) = Lyc. izīr [iziri-] ‘hand’ < PAnat. *gieṣ-r- and CLuw. im-ma-r̥ /immi- /‘open country’ = HLuw. i-maraj-i- /immr-i/ < PAnat. *gēm-ro- (Melchert 1994a: 262).

14 Personally, I share the sentiment expressed in Melchert 1994b: 305: ‘One aspect of the phonetics of “Çop’s Law” remain puzzling: why are the changes in coloring of the vowel and the gemination of the following consonant (both unremarkable per se) inextricably bound together in this case?’ My suggestion would be to say that the change from *e to *a and Çop’s Law (the gemination proper) are unrelated changes and that vowel quality itself is not linked to Çop’s Law in any way. I do not see how the two could be connected on a phonetic level.
It is still debated whether the PIE mediae (*b, *d, *g, *gʷ*) were geminated by Cop's Law, and this depends on the etymologies to which one adheres. In Cop's original article, it was claimed that the mediae remained unaffected, based on CLuw. forms belonging to the paradigm 'to eat' (< PIE *h₁ed-), such as CLuw. a-du-na /satu/na /'to eat' (inf.), which does not show a fortitioned stop (written **a-ad-du-na**). All of Cop's examples could in principle, however, have reintroduced a lenis stem consonant from the weak stem (PIE *h₁-d-), where fortition did not take place anyway, for instance the 3pl.imp.act. form a-da-an-du < PIE *h₁d-éntu. Other scholars, such Melchert (1994a: 231), Kimball (1999: 261) and Yakubovich (2016: 294), do assume gemination of the PIE mediae, based on cases such as CLuw. a-ad-du-ya-f̩ /ʔattua/- 'evil' (~ Hitt. i-da-a-la- /ʔátu/ < PIE *h₁d-é- /*biting', CLuw. pa-ad-du-na-áš /pátunás/ 'carrying'? < *pédV- and ya-at-ta-an-ti/- /úáttanti/- 'having a spring as source'? < *úódV-. Kloekhorst (2014: 574–80), however, has put forward different explanations for all these examples. The matter is still undecided, and because the discussion is less relevant for the remainder of this paper, and I will leave the question open.

Likewise, opinions differ on whether the Proto-Anatolian lenis velars were affected by Cop's Law. It is commonly accepted that these phonemes (*g, *g, *gʷ*) were lost or developed into semivowels under certain conditions before Proto-Luwic (for details and treatment of cases where they appear to have been retained, cf. Melchert 1994a: 253–6 and Kimball 1994). We can date the weakening of the word-internal lenis velars relative to Cop's Law in two different ways.

The chronology by which the loss of lenis velars preceded Cop's Law is sometimes used to derive CLuw. pár-ra-(i)-ja- /parrai(a/i)/ 'high' from PIE *bʰér̩g-V-. Thus, PIE *bʰér̩g-V- > PAnat. *bérg-V- > pre-PLuw. *bör-V- > PLuw. *börər-V- > CLuw. pár- (Melchert 1994a: 254). However, this scenario is vitiated by Luw. *nän(i)- 'brother'. Together with Hitt. nek-na-/nekna- and Lyc. nēn- /nēn(i)/- 'brother', Luw. *nän(i)- must continue PAnat. *néghno-. After the loss of the lenis velar (*nēghno- > *nōno-) and Cop's Law (*nōmno-) in pre-Proto-Luwic, we would expect to find Luwian **nām(i)/- , not *nān(i)-.16

For this reason, the alternative chronology, by which the loss of lenis velars follows Cop's Law is more attractive. It implies that intervocalic lenis velars were fortitioned and retained. Cop
applied this chronology in order to derive the HLuw. hapax ("TERRA")tau-ka-mi²
(SULTANHAN  § 39) ‘land’ (dat.-loc.sg.) from PIE *Pé₂g₂ḥom- via PLuw. *rakkam-, with a
germinate/fortis velar (thus also Melchert 1994a: 256). On the other hand, Oettinger (2002:
101) and Kloekhorst (2014: 583) prefer to take *dʰg₂ḥ-m-éi (which also yielded Hittite taknī
‘id.’) as the proto-form and assume that the lenis velar was not lost in this (interconsonantal)
position: CLuw. /tkmi/. If this is true, Čop’ s Law simply did not operate in this word.

In conclusion, we can formulate Čop’s Law as follows: all pre-PLuw. intervocalic short
cconsonants – except for [j], [w] – were lengthened when they are immediately preceded by
a short accented vowel: PAnat. *VCV > PLuw. *VCCV. 20 Thus, Čop’s Law is a clear case of
post-tonic gemination.

3. Open syllable lengthening (OSL)

Almost a quarter of a century after the discovery of Čop’s Law, Melchert (1994a: 261, 263)
described another sound law whose effects are visible in Luwian: a lengthening of accented
short vowels in open syllables: *V(CV) > *V(CV). Apart from several Luwian examples,
Melchert notes that similar vowel lengthening effects are found in Hittite (Melchert 1994a:
131) and Palaic (Melchert 1994a: 215ff.). In addition, recent insights have refined the picture
for Hittite (Kloekhorst 2014: 218, 385, 483, 519) and added new HLuw. evidence to the
dossier (Vertegaal 2018). I will treat these cases in the Excursus at the end of this paper. In the
remainder of this section, the most important Luwian cases of open syllable lengthening,
abbreviated henceforth as OSL, will be treated.

First, there is CLuw. na-a-(i)-ya /nāu/ ‘not’. Even though the final element -ya is unclear,
its base has clear correspondences in other IE languages (Lat. ne, OCS ne, Go. ni) and
continues PIE *ne. 21 The presence of a long vowel is independently suggested by HLuw.
NEG₂-a /nā/, whose word-final <a> cannot be interpreted as a space-filler and is most likely
to be a marker of vocalic length (cf. Vertegaal 2018: 197ff).

In addition, I take CLuw. ha-a-ú-i- /hāū(i)-/ ‘sheep’ to show the reflex of PAnat. *Houī-
< PIE *h₂eu-i-, following Kloekhorst (2006: 92f). 22

20 This development has many parallels among the world’s languages, such as Italian (legittimo ‘legitimate’, čabbaco
‘abacus’, mácchina ‘machine’ (Borrelli 2000: 26ff.) and various Austronesian languages (Blevins 2004: 173ff.).

21 Eight attestations of na-(a)-u-ya*-ti, na-ú-ya*-te /nāu/ have previously been interpreted as ablative-instrumental
case forms of an adjective nā(u-)a/- ‘new’ (Melchert 1993: s.v.; Melchert 1994a: 244), connected to Hitt. nēʰ-a-,
Lat. novus, Skt. nāra-, Gr. νέος. Go. nāu/u, ToB hūve- etc., all from PIE *néw-. Recently, however, Marcuson (2016:
293-94) has convincingly argued (following Yakubovich 2013ff.) that these forms are better interpreted as nāu ‘not’ +
=ti (reflexive particle). Although some difficulties remain, Hittite parallels to the Luwian clauses in which na-(a)-u-ya-
ti and na-ú-ya-te are found suggest that they correspond to U-UL ‘not’ in the Hittite text. In both interpretations
(‘not’ and ‘new’), the long vowel in the forms can only be explained through OSL.

22 This reconstruction, also found in, e.g., Martirosyan (2009: s.v.) “hoviv”, is not accepted by everyone, mainly on
account of Tocharian B əw- ‘ewe’, which seems to require a preform with *h₂ (cf. Adams 2013: s.v. “əw;/w; Pinault
1997: 190–3). The reconstruction with *h₂ forces one to put both an o-grade (to account for Gr. ὅς) and o-grade (to
account for the absence of Brugmann’s Law in Skt. əv-) in the PIE i-stem paradigm: PIE *h₂eu-i-/*h₂eu-i-. Apart
from the curious homophony with the ‘bird’-root *h₂eu-, this alternating o/e-ablaut would be morphologically
unexpected for a common gender PIE i-stem. I therefore prefer to view ToB əw- as the result of an inner-Tocharian
development, and reconstruct PIE *h₂eu-i-.
Next, there is a class of Cuneiform Luwian ḫi-verbs with plene writings in their root syllable, suggesting the presence of a long vowel. These are the following.

1. *piḫa- ‘to give’, e.g. CLuw. pi-i-ja-at-ta /piat타/ (3sg.pret.act.)
2. *liya- ‘pour’, e.g. CLuw. lu-u-ya-an-da /lūanta/ (3pl.pret.act.)
3. *tūya- ‘put’, e.g. CLuw. du-ū-ya-an-du /tūantu/ (3pl.imp.act.)
4. *šūya- ‘fill’, e.g. CLuw. šu-u-ya-at-ta /šūatta/ (3sg.pret.act.)

We know that incidentally, plene spellings of i and u are found before homorganic glides (<I>[A], <U>[A]) in places where it is unlikely that they mark vocalic length, e.g. CLuw. ta-a-ti-i-ja-an ‘fatherly’ (nom.-acc.sg.n.; KUB 35.43 ii 5), occurring next to expected ta-a-ti-i-ja-an (KUB 35.45 ii 2; KBo XXIX 9*, 11) ‘id.’. Nevertheless, these graphic (?) plene spellings are only attested a few times in the entire corpus, which makes their relative prevalence in the verbal stems here quite salient. I am therefore more inclined to follow Melchert (1994a: 240f.) in interpreting these plene spellings as markers of vocalic length. Melchert argues that in piḫa-, liya- and tūya-, a secondary shift of the accent to the verbal root has taken place, after which the vowel was lengthened: *piḫV- > *piV- > *piV-. While the motive of the accent shift is unclear, we find effects of a similar accent retraction (and accent-based lengthening) in the Hittite cognate to CLuw. piḫa-: the verb pai-/pi- ‘to give’ shows occasional plene spelling of its root syllable in the forms pi-i-ū-e-ni /piueni/ (6x, 1pl.pres.act.) and pi-i-ū-en /piuen/ (1x, 1pl.pres.act.; cf. Kloekhorst 2014: 478f). The lengthening in these Luwian forms following this accent retraction can only be explained through OSL.

Another possible case of OSL is HLuw. tiwad- ‘Sun-god’, attested with plene spelling of the i in KÜRTÜL (DEUS)ti-i-wa/i-ti-x /tiwab-/ and as the second element of the compound name KARATEPE 1 § 1 Hu. ¹(LITUUS)d-za-ti-i-wa/i-ta-sa. The plene spellings in this word are unlikely to serve an aesthetic purpose, and it has been argued that they mark vocalic length instead (Vertegaal 2018: 182). Accent-based lengthening has also been suggested independently for its Hittite cognate ši-(i)-ya-at-ta /šuatt-/ ‘day’ (< PAnat. *diuot-; cf. Melchert 1994a: 131). Alternatively, the long vowel in the Luwian form can also be explained from a full-grade form (*diuot-), cf. Rieken 1999: 105. In that case, OSL need not have applied.

In addition, OSL could also be attested in CLuw. ku-ū-rV- /kūr-/ ‘to cut’, attested in kiiramman- ‘cutting’, kūri-/kurai- ‘cut into slices’ and the form ku-ū-r-na /kūrtna/ ‘to cut’ (inf.) (Melchert 1993). The contexts in which these verbal forms are found do not straightforwardly corroborate their identification as cognates of Hittite kuer-iz ‘to cut’ (< PIE *kuer-), which presumably rests on formal considerations. If this connection is correct, however, the plene spellings of ku-ū-rV- may well represent the results of OSL, following a retraction of the accent to the weak stem: *kV- > *kurV- > *kürV- > *kürV-, as per Melchert (1994a: 241). Alternatively, the long vowel may be due to contraction of [uwa] to [u].
mentioned in, e.g., Melchert (2004: 474) and Rieken (2017: 24), although the details of this development are very unclear.26

HLuw. tu-u |tū/ ‘you’ (orthot.dat.sg.) < PIE *tū (Melchert 1994a: 262; Vertegaal 2018: 179) could very well show the effects of open syllable lengthening, although we may also be looking at the results of a separate lengthening of accented monosyllables.27

Lastly, another possible case of OSL is found in verbal stems ending in -ir/-āir-.28 These are: CLuw. ḫapi-/ḥapār- ‘bind’, gangati-/gangatā- ‘treat with the g.-plant’, mali-/malā- ‘think’, šannī-/šannāi- ‘overturn’, sarli-/sarlāi- ‘offer’, and dupi-/dupār- (~ dupāi-) ‘strike’.29 The weak stem of verbs belonging to this verbal class is spelled with either -Ca-a-iC- or -Ca-i-iC-, cf. CLuw. sa<-an>-na-a-en-ta (3pl.pret.act.) vs. sa-an-na-i-in-du (3pl.imp.act.) < šannī-/šannāi- ‘overturn’. The plene -i- in -Ca-i-iC- may well be interpreted as [ji], as per Rieken (2017: 26). The occasional spellings with -Ca-a-iC-, however, seem to suggest that the -a- was long: /-CāiC-. If Melchert’s (2018) etymology of this verbal class in terms of PIE *-ēi/-ēio- is correct, then the accented vowel in the weak stem could only have yielded long -ā- through OSL: *[ējo-] > *[ā:ja-], after which syncope would have yielded [-ā:j-]. This development is quite uncertain, however.

In summary, even though there are often multiple interpretations for the examples presented here, their combined force makes a compelling case for the presence of Open Syllable Lengthening in the prehistory of Luwian. Not only PAnat. *é, but presumably also *ó (< PIE *h3é) and secondarily accented *ù and *ī seem to have yielded long vowels in open syllables in Luwian, cf. CLuw. näqa ‘not’ (< PIE *né) and piīa- ‘give’. The absence of good examples for *á (< PIE *h3é) is likely to be coincidental, so that we may generalise the scope of OSL to include vowels of all qualities: PAnat. *ā, *ē, *ī, *o, *ū. It is important to note that this development in principle only affected short accented vowels which either 1.) stood in word-final position or 2.) were followed by a glide (PAnat. *[w] or *[j]).

4. Synthesis: Proto-Luwic Fortition

So far, we have looked at two distinct sound changes: Čop’s Law was responsible for the lengthening of short consonants in pre-Proto-Luwic (*VCV > *VCCV). In addition, we have seen evidence for a lengthening of short vowels in open syllables that took place in Luwian, but possibly even as early as Proto-Luwic (*VCV > *VCCV).30

Apart from the fact that both sound laws describe a phonological lengthening, they have more aspects in common, regarding both their input and their output (cf. Table 1).

Both changes probably affected all accented short vowel sounds (*ā, *ē, *ī, *o, *ū). The only difference here is that open syllable lengthening (OSL) only affected vowels preceding [w], [j] or the end of a word, while Čop’s Law applied to short accented vowels that did not precede

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26 There are a few cases in Luwian where [uwa] seems to alternate with [u], e.g. du-i-ú-n-du /túntu/ ~ du-i-ú-yu-an-du /tuuntu/ ‘they must put’. Despite this, there are still many counterexamples to this change, such as CLuw. pīqa ‘formerly’ and pīqatīl- ‘past’, never *pā or *pātīl-. The matter still awaits a dedicated treatment.

27 This is impossible to decide on the basis of this form alone. Monosyllabic lengthening has been proposed for Hittite by Kloekhorst (2012b: 251f.), although it has been noted before that accented words, as a rule, are never spelled with just one sign (Sturtevant & Hahn 1951: 24; Otten & Souček 1969: 49; Hoffner & Melchert 2008: 25). As far as I know, the validity of monosyllabic lengthening for other Anatolian languages has not been investigated in full detail, but I am not aware of any counterexamples.

28 Plene writing of the -i- is quite rare and not attested for any of the -i/-āi verbs listed here. It is found in other verbs of this class, such as tarṣītu (3sg.pres.act.) vs. tarṣāintu (3pl.imp.act.) ‘?’. In addition, HLuw. (SA.)sa-ni-i-ti (3sg.pres.act.) and (LIBARE)sa+ra/i-li-i-tu (3sg.imp.act.), which are cognate to CLuw. šannī- and sarli-, both show non-space-filling plene writing. As argued in Vertegaal (2018: 171–3), these may well be interpreted as indications of vocalic length.


30 On a phonetic level, OSL may have even operated in Proto-Anatolian, cf. the Excursus.
[w], [j] or the end of a word. In this respect, Čop’s Law and OSL are complementary developments.

While the respective outputs of Čop’s Law (*\( \hat{V}CCV \)) and OSL (*\( \hat{V}CV \)) look quite different from a phonetic and phonological point of view, they are equivalent under a ‘moraic’ analysis: both sound laws take light syllables as their input and yield a heavy syllable (cf. Figure 1).\(^{31}\)

On the basis of this analysis, one could ask whether the similarities (input vowel quality, quality and accentuation, and output syllable weight) and complementarities (combinations with consonants) of these phonological changes are simply due to chance. Is it a coincidence that two sound laws with such similar conditionings and outcomes affected the same language (Luwian or possibly even Proto-Luwic)? I believe this is not the case. Rather than taking Čop’s Law and OSL as two unrelated and distinct sound laws, we would do more justice to their similarities by interpreting these sound changes as two complementary parts of one general Proto-Luwic fortition. Together, they affected all inherited light accented syllables and added one mora to make them heavy: Čop’s Law by adding a syllable coda (*\( \hat{V}.CV > *\hat{V}C.CV \)) and OSL by lengthening the vowel (*\( \hat{V}.CV > *\hat{V}.C.V \)). Thus, they eliminated all light

<table>
<thead>
<tr>
<th>Table 1. Input and output of Čop’s Law and OSL</th>
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<tbody>
<tr>
<td><strong>Input</strong></td>
</tr>
<tr>
<td>*( \hat{V}CV ) (C ( \not= ) [w]/[j])</td>
</tr>
<tr>
<td>*( \hat{V}(CV) ) (C = [w]/[j] or word-end)</td>
</tr>
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</table>

\[^{31}\] Cf. Hyman 1985 for a general introduction to moraic phonology. Morae are weight units assigned to syllables: ‘light’ syllables are said to consist of one mora, while ‘heavy’ syllables contain two. The classification of syllable structures as ‘heavy’ or ‘light’ is language-specific, although there appear to be two main types, exemplified here by Latin and Lardil (Hayes 1989: 255f.). In languages such as Latin, \( CVC \) and \( CVV \) syllables are heavy, while \( CV \) is light. Languages like Lardil, however, only take \( CVV \) as heavy, whereas both \( CV \) and \( CVC \) are light. Luwian would follow the pattern of Latin, by which syllables with a coda \( (CVC) \) or a long vowel \( (C^f = CVV) \) count as heavy. For another application of moraic theory to the historical phonology of the Anatolian languages (cf. Section 4.1).
accented syllables from the language and made sure that all accented syllables became heavy. 32 The result was that the phonological opposition between heavy and light syllables was neutralised in accented position.

4.1. Interrelatedness of Čop’s Law and OSL

One remaining question is why light accented syllables in the Luwic languages underwent two fortiting developments instead of one. Why did Čop’s Law not affect both PIE *mélít- ‘honey’ and PIE h₃ëui- ‘sheep’, creating not only attested CLuw. malli- but also Luw. **h₂ayy(i)-? For this, we need to take a closer look at features that set glides apart from other consonant classes.

Synchronically, the Luwian phonological system shows an clearly maintained opposition between singleton and geminates, except for the glides. This is very much in line with the typological observation that [jj] and [ww] are among the consonants most likely to be missing from a language’s geminate inventory. This is the case for Classical Nahuatl (Andrews 2003: 35), Modern Icelandic (Garnes 1974: 38), Kurdish and Yatee Zapotec, which have length oppositions for all segments except glides, (cf. Hansen & Myers 2017: 184 and Maddieson 2008: 1928f. for references and more examples). Phonetically, this relative rarity of geminate glides among the world’s languages seems to be related to difficulties in the perception of length contrasts in glides. Experimental research suggests that this is due to blurrier boundaries between glides and their surrounding vowels, as well as smaller differences in amplitude between glides and neighbouring vowels (cf. Kawahara & Pangilinan 2017). In my opinion, there are two ways in which the perceptual difficulties for a length contrast in glides can account for the absence of geminate glides in Luwian (and its relative rarity among the languages of the world in general):

1 Length oppositions in glides hardly ever arise.
2 Once a length opposition between long and short glides develops, it is very easily lost again.

These two explanations account in different ways for the absence of a glide length contrast in Luwian. On the one hand, we could argue that Čop’s Law was constrained in some way, so that it only affected obstruents, liquids and nasals (i.e. all consonants except for glides). However, if Čop’s Law is truly a rhythmic post-tonic gemination rule operating on the level of the syllable, as proposed in this analysis, we would not expect it to select only particular types of consonants, especially seeing that a fair number of the world’s languages do have a long vs. short opposition in glides, despite their overall relative rarity. 33

Therefore, I want to propose an alternative scenario, without insisting that it is superior to the one presented above: perhaps Čop’s Law did in fact affect all consonants (including glides), yielding pre-PLuw. *VyyV and *ViiV. Due to the instability or imperceptibility of such a length contrast, however, these geminated glides were soon degeminated again, leaving behind traces in the shape of compensatory lengthening. 34 Thus; PIE *h₃ëui- > PAnat. *Hóui- > pre-PLuw. *h₃ayy(i)- (Čop’s Law) > *h₃ayy(i)- (degemination + compensatory lengthening) > CLuw. h₃ayy(i)-. At first sight, the second scenario is much more convoluted than the first,

32 In this interpretation of Čop’s Law as a reinforcement of the connection between the accent and heavy syllable weight, it is no less than expected that consonant clusters are exempt from gemination. We would also not expect any concomitant change in vowel quality associated with Čop’s Law (cf. Section 2.1).


34 I am grateful to professor Adiego for suggesting this option to me. Needless to say, the responsibility for the opinion expressed here is mine.
giving the impression of a needlessly complicated *Duke of York gambit (*A > *B > A; Pullum 1976). Nevertheless, there are several points which add credibility to this scenario. First, the assumed extra steps (degemination and compensatory lengthening) are not unmotivated. The perceptual difficulties in distinguishing long from short glides have already been noted before; for this reason, length contrasts for glides were presumably more prone to neutralisation, explaining the relative rarity of length opposition for glides in the world’s languages. In addition, Proto-Luwic had a concrete impetus for degemination of [jj]: it is commonly assumed that at some point in pre-Luwian, intervocalic *[j] was lost without a trace in between identical vowels (Rieken 2005: 67–71; Norbruis forthcoming). With the loss of *[j], the opposition between singleton and geminate glides likewise vanished, allowing the phonetic duration of the glides to shorten. Unfortunately, since there is no similar general loss of intervocalic *[w], this scenario will not explain the degemination of *[w]. For another possible instance of compensatory lengthening in Luwian (cf. footnote 19 above).

By expanding the scope of Čop’s Law to account for all consonants, we can also explain the long vowels in verbs where the accent has been secondarily retracted to the root syllable, such as *pi̯a- ‘to give’, if the accent retraction took place before Čop’s Law took effect. This leaves OSL to account only for word-final light accented syllables such as *HLuw. tū ‘you’ and nā ‘not’. Lastly, the Luwian situation finds a parallel in Tiberian Hebrew. In this language, consonant gemination is found at clitic junctures or required in the form of a morphologically distinctive feature. All consonants are liable to be geminated except for a class of guttural consonants (h, ḥ, ʕ). Instead of lengthening, these consonants instead show lengthening of the preceding vowel (Joüon & Muraoka 2009: 77). It is commonly accepted that at some point in time, these guttural consonants were in fact capable of gemination, but were subsequently degeminated with lengthening of the preceding vowel (Blau 1993: 38).

The two scenarios presented here are given here simply for consideration. They do not change the linguistic facts we see in our texts. Also, a choice for one or the other does not alter our main conclusion for the first part of this paper: OSL and Čop’s Law are two complementary developments, which together made all light accented syllables heavy.

5. Systemic pressure

The Luwian state of affairs, in which all accented syllables are heavy, has a great number of parallels among the world’s languages (Gordon 1999: 23–31), and seems to be a stable point of convergence of stress-based phonological systems. Apart from universal tendencies, however, there are also strong language-internal indications that Proto-Luwic was especially prone to remodelling along the lines of a strengthening of accented syllables. Several (pre-) Proto-Luwic sound changes had rendered accented light syllables increasingly rare and thus attenuated the functional load of the contrast between light and heavy accented syllables to a considerable degree. In what follows, I will argue that Čop’s Law and OSL simply represent the final neutralisation of this contrast, creating the situation in which all light accented syllables were made heavy. To understand this, we need to treat several developments which

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35 In addition, it is notable that all of these cases involve monosyllabic words. If these cases are due to monosyllabic lengthening, and if CLuw. ku-ār- is the result of contraction from *ku-ya-ār- as an anonymous reviewer suggests to me, then we might not even need to assume OSL in the prehistory of Luwian at all.

36 Especially the following description of the Hebrew data is also valid for Luwic: “[V]owels lengthen, exactly where consonants cannot geminate.” (Lowenstamm and Kaye 1986: 109).

37 Naturally, the Hebrew situation differs from Luwic in the sense that 1.) gemination serves a grammatical function in Hebrew; 2.) geminated gutturals are attested languages closely related to Hebrew, such as Arabic, where degemination did not take place.
profundely reshaped the pre-Proto-Luwic phonological system. I will treat these in order below.

5.1. Phonetic changes from pre-Proto-Anatolian to pre-Proto-Luwic

5.1.1. PIE *ó > PAnat. *ő

Kloekhorst (2014: 549–59) has argued in detail that this lengthening of PIE short accented *ó must precede the Proto-Anatolian consonantal lenition effects treated below (cf. footnote 8). Even if one does not follow this chronology, however, it is generally agreed that PIE *ó > Luw. ā in both open and closed syllables, e.g. CLuw. Gišt-a-a-ru- /tāru/ ‘wood’ < PIE *dōru- and CLuw. -aš-sa/i- /-āssā/i-/ < PIE -ósio (Melchert 2012a: 282). This change increased the syllable weight of many accented syllables, making them heavy if they were originally light: *ő(CV) > *ő(CV).

5.1.2. Eichner-Adiego’s consonantal lenition laws

These two laws describe a phonetic change affecting inherited PIE tenues (*p, *t, *k, *kʷ) as well as PIE *h₂ and *h₃. As mentioned in Section 1, these normally show up as fortis consonants in the various Anatolian languages. Preceded by a long accented vowel or in between two accented vowels, we find lenis reflexes instead, indicating that a lenition has taken place in these environments (Eichner 1973: 79–83, 10086; Morpurgo Davies 1982/1983).

At the turn of the century, Adiego (2001) proposed that the two environments in which this lenition occurs can be regarded as one and the same sound change. Reanalysing the long accented vowel of the ‘first lenition law’ as a combination of an accented mora + an unaccented one (V = VV = μμ), he was able to subsume both conditioning environments under the same law: pre-Proto-Anatolian fortis consonants between two unaccented morae are lenited: pre-PAnat. *V(...)VCCV > PAnat. *V(...)VCV (henceforth: ‘Eichner-Adiego’s Law’). The main effect of this sound law was that originally heavy unaccented syllables saw a decrease in syllable weight: *VCCV (heavy + unaccented) > *VCV (light + unaccented).

5.1.3. Unaccented vowel shortening (*V > V)

The applicability of this sound change for the Anatolian languages has been defended on several occasions by Eichner (1973: 79, 8615; 1986: 206–710, 1988: 13645), who has argued that it must have been completed in Proto-Anatolian, although he does not treat all of the material in full detail. A Proto-Anatolian date is also maintained by Hajnal (1995: 43, 81). Melchert, on the other hand, is more nuanced: [O]riginal unaccented long vowels are shortened in PA: (...) However, this does not apply across the board to secondary long vowels from loss of tautosyllabic laryngeal or contraction of diphthongs’ (Melchert 1994a: 76, emphasis in original).

With regard to the Luwic languages, it is difficult to assess the validity of Eichner’s unconditional shortening of all unaccented long vowels.38 Lycian is mostly uninformative in

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38 Similar shortening effects are found in Hittite (e.g. te-e-kān /tēkān/ ‘earth’ < *dēg-ām, never *te-e-ka-a-an **/ tēkān/) and Palaic (e.g. -a [nom.-acc.n.pl.] < PIE *-eh₂) supporting Eichner’s idea of an early (PAnat.) shortening. On the other hand, Kloekhorst (2008: 98) has shown that the result of PAnat. unaccented *e > pre-Hitt. *e does not undergo the weakening of PAnat. *e into Hitt. i and a (e.g. PIE *néth₁-e > Hitt. ne-(e)-piš /népis/ ‘heaven’, but PIE *h₁ēs-ēr > Hitt. e-še-er /tēser/ ‘they were’, cf. Melchert 1994a: 143). This suggests that the shortening of PAnat. *e post-dates the weakening rules we find in Hittite, and that it cannot be of Proto-Anatolian date. A general Proto-Anatolian shortening of long unaccented vowels can only be accepted if it can be demonstrated that the weakening of original PIE *e is of Proto-Anatolian date as well. It is clear that the matter deserves a full dedicated treatment.
this respect, as it does not show any sign of a vocalic quantity opposition. By contrast, the Hieroglyphic Luwian material may show plene spellings in the function of marking vocalic length, but does so only inconsistently (Vertegaal 2018). The Cuneiform Luwian material, lastly, is most often too badly attested to allow us to judge whether absence of plene writing testifies to a short vowel or is simply due to chance. Nevertheless, Cuneiform Luwian does have a few interesting forms which suggest that indeed some prehistoric shortening of unaccented long vowels has taken place:

5.1.3.1. Combinations of vowels + tautosyllabic laryngeals

These yield a long vowel if they are accented: CLuw. ma-na-a-ti /mnātī/ ‘he sees’ (3sg.pres.) < *mnēh₂-ti. In unaccented position, however, they are spelt consistently non-plene, as in the a-stem nouns and adjectives such as ku-um-ma-aš ‘holy’ (nom.sg.c.) < *-eh₂-s (cf. Norbruis forthcoming), and the nom.-acc.pl.n. ending -a in general (e.g. in CLuw. da-a-u-a /tāua/ ‘eyes’), which is traced back to PIE *-eh₂. Also worth considering are CLuw. la-a-la-ad-du / lâlattu/ ‘let him take’ (3sg.imp.act.), if this truly continues virtual *dV-doh₁-tu, and CLuw. pa-ap-pa-sa-i /pāppasai(?) ‘he swallows’, if this single attestation truly continues the reflex of PIE *-peh₁-s-. (Kloeckhorst 2008: s.v.). These suggest that the original length developing from a combination of vowel + tautosyllabic laryngeal was not retained in unaccented syllables.39

5.1.3.2. Inherited diphthongs

These likewise result in long vowels in Luwian when they bear the accent, as seen in CLuw. zi-ì-in-zì /tśintsì/ ‘theses’ (nom.pl.c.) < PIE *kòi- (Melchert 2009: 114), and CLuw. ħu-u-ḥa-ti / hōhati/ ‘grandfather’ (abl.-ins.) < PIE *h₂éuḥ₂.40 On the other hand, there is a derivative from the same stem: CLuw. ħu-ḥa-s̄-ad＞-da-al-[a] / hohattalla/ ‘grandfatherly’, whose o was presumably unaccented and short. Note however, that this word is a hapax, so that its not being spelt with plene writing may be coincidental.

5.1.3.3. Inherited long vowels

Inherited long vowels are long when accented, cf. CLuw. za-a-ar-za ‘heart’ /tsârt=sə/ < PIE *kêrd (following Hajnal 1995: 65, pace Melchert 1994a: 243) and ādduqāl ‘evil’ (nom.-acc.sg.n.) < *-ōt.41 All cases which may show the reflex of an unaccented long vowel have alternative explanations. For instance, Cuneiform Luwian ħarranni(a/i)- (oracle bird; see Section 2.1) may continue the inherited nom.sg. *h₃ēr-ōn, but since it is probably a derivation, it is more likely that it continues the oblique stem *h₃ēr-on-, which did not contain a long vowel.

The result of this shortening can be compared to that of Eichner-Adiego’s ProtoAnatolian lenition laws: both laws describe how heavy unaccented syllables are stripped of one mora, so that they become light and unaccented.

5.1.4. Proto-Luwic loss of word-final stops (*-T > *-o)

All word-final stops have been lost in both Luwian and Lycian (Melchert 1994a: 278, 323). There are only a few clear examples and each of them involves the loss of a final dental stop,

39 The attestations la-la-a-at-ti /lalātti/ (2sg.pres.act.) and la-la-a-i /lalāi/ (3sg.pres.act.) rather seem to show the accentuation of the simplex verb lā- ‘id.

40 In this respect, also Lycian yugia/ /kuxa/ ‘grandfather’ is telling; the lenis /x/ <g> continues a lenited laryngeal (PAnat. *h/), which can only be the result of Eichner-Adiego’s consonantal lenition. This indicates that the vowel preceding Lycian -g- must have been long and accented.

41 The initial syllable ʿadd-, which I interpret as ṭatt- with a glottal stop following Simon (2010), must have been analogically introduced from related forms where the accent was word-initial. This is necessary to account for the geminate, which is normally explained through Čop’s Law.
e.g. CLuw. ma-al-li /málli/ ‘honey’ (nom.-acc.sg.n.) < PIE *mélit; HLuw. za-a /tsâ/ ‘this’ < PIE *kód, HLuw. -Ca-hi (=sa) /-ahi/ (nom.-acc.sg.n.; abstr. suffix. < *-ahid), Lyc. ti ‘what’ < PIE *kʷi’d. The dearth of examples makes it difficult to determine how this rule should be dated with respect to OSL. 42 Nevertheless, it is clear that this change decreased the weight of word-final unaccented heavy syllables, turning them into unaccented light syllables.

These four independently motivated sound laws, which are phonetically easily understandable and typologically common, had a profound effect on the Proto-Anatolian and pre-Proto-Luwic distribution of syllable weight with regard to the accent. Heavy unaccented syllables were only found in pretonic position and in front of consonant clusters; in all other positions, they had been made light. Accented syllables, on the other hand, were almost always heavy. The only remaining light accented syllables in Proto-Anatolian were those continuing PIE *éCV and *-é# (including cases where *é is coloured by an adjacent laryngeal: *h₂;₃éCV and *h₂;₃é#).

Thus, we arrive at a system in which almost all inherited unaccented syllables had been made light. This indicates that the weight of a syllable had almost become predictable in accented and, to a certain degree, also in unaccented (not pretonic) syllables. The combination of Çop’s Law and the phonologisation of OSL in Proto-Luwic can be seen as a logical extension and the final chapter of these developments. In two different ways, they increased the weight of these accented light syllables (*VCV > *VCV; *VCV > *VCV) and neutralised the already marginalised weight opposition between heavy and light syllables, which carried little functional load, in accented syllables. In this way, syllable weight was tied to accentuation even more strongly and became completely predictable/allophonic in accented positions.

6. NEUTRALISATION OF CONTRASTIVE SYLLABLE WEIGHT IN PROTO-LUWIC?

A few years after Adiego’s (2001) combination of Eichner’s two lenition laws into one single Proto-Anatolian consonant lenition law (cf. Section 5.1, above), it was discovered by Kloekhorst (2006/2008) that this consonant lenition law is complementary to Çop’s Law. While intervocalic consonants which are immediately preceded by an unaccented mora were subject to lenition in Proto-Anatolian, intervocalic consonants immediately preceded by an accented mora were lengthened in accordance with Çop’s Law. The complementary effects of Eichner-Adiego and Çop’s Law on intervocalic consonants are summarised as follows (cf. Table 2).

Kloekhorst (2006/2008: 133) concludes as follows: ‘Effectively, we see that the length of a consonant has become automatic in Luwian: after an accented short vowel all consonants become long; after an accented long vowel and in between two unaccented vowels all consonants become short. […] [A]t a certain point in the (pre)history of Luwian the quantity of intervocalic consonants was fully governed by the place of the accent in the word and the quantity of the accented vowel’. 43

We can now extend Kloekhorst’s unification of Çop’s Law and Eichner-Adiego to include even more developments. More specifically, these two accent-dependent sound laws, 42 In theory, PANat. *kʷi’d ‘what?’ could provide us with an answer. If PIE *kʷi’d > *kʷi > *kʷi, then that would prove that OSL was still operative after the PLuw. loss of word-final stops. Unfortunately, CLuw. ku-i /kʷi/ ‘what’ (nom.acc.sg.n.), its regular reflex, is inconclusive regarding the length of its final vowel. On the one hand, its -i could represent /ui/, as in CLuw. da-ar-u-i-iš ‘eye’ /t̥aui/, suggesting a short vowel (Rieken 2017: 26). On the other hand, it is unclear whether long accented word-final sequence of /-ui/ would have been written differently, since we have no attestations of **-Cu-i-i to contrast it with. Therefore, CLuw. ku-i may also represent /kʷi/.

43 By way of parallel, Kloekhorst (2006/2008: 134) refers to Saami, where a similar development is thought to have taken place: in one particular dialect, consonants were weakened in certain positions but additionally strengthened in all other positions.
governing the length of intervocalic consonants, are symmetrically complemented by two accent-dependent developments governing vowel length (cf. Table 3).

Together, these four phonological developments seem to neutralise not only the Luwic contrast between long and short intervocalic consonants, but also between long and short vowels. Unaccented syllables would see the shortening of both vowels and long consonants, while either short consonants or short vowels would be lengthened in accented syllables. Purely theoretically, therefore, it seems that syllable weight itself was well on its way to becoming allophonic and predictable at some point in the (pre)history of the Luwic languages. All accented syllables were made heavy, while many unaccented syllables had been made light.

However, even theoretically, this system does not bring about a full dephonologisation of (pre-)Luwic syllable weight. Apart from cases where the inherited length of consonants and vowels has been analogically reintroduced, there are three environments which violate the accented-heavy vs. unaccented-light pattern by maintaining heavy syllables in unaccented position.

Consonant clusters such as \( *{VC}_1{C}_2{V} \) were unaffected by the PAnat. consonantal lenition law, so syllables ending in a cluster remained heavy, even if they were unaccented, e.g. -š(ša)- in CLuw. īš-ša-rī-i-/istī'/ ‘hand’ (dat.-loc.sg.c.).

Word-final consonants (not including stops, which were lost, cf. Section 5.1) ensured that unaccented syllables remained heavy by providing them a coda, e.g. -is#/ in CLuw. ma-a-āš-ša-nī-is/ ‘māssanis’/ ‘god’ (nom.sg.c.).

Pretonic consonants presumably also retained their inherited length and kept pretonic syllables long, although good examples where the geminate cannot have been restored analogically are very difficult to find. An example is CLuw. pār-ra-a-an /parrān/ ‘before’

### Table 2. Effects of Eichner-Adiego and Čop’s Law on Proto-Anatolian and Proto-Luwic (taken from Kloekhorst 2006/2008: 133)

<table>
<thead>
<tr>
<th>PAnat.</th>
<th>Luw.</th>
</tr>
</thead>
<tbody>
<tr>
<td>( *VC )</td>
<td>&gt;</td>
</tr>
<tr>
<td>( *VCCV )</td>
<td>=</td>
</tr>
<tr>
<td>( *VC )</td>
<td>&gt;</td>
</tr>
<tr>
<td>( *VCCV )</td>
<td>&gt;</td>
</tr>
<tr>
<td>( *VC )</td>
<td>=</td>
</tr>
<tr>
<td>( *VCCV )</td>
<td>&gt;</td>
</tr>
</tbody>
</table>

### Table 3. Anatolian syllable weight gradation

<table>
<thead>
<tr>
<th>Consonantism</th>
<th>Vocalism</th>
<th>Proto-Anatolian ( (\text{lenition/shortening}) )</th>
<th>Proto-Luwic ( (\text{fortition/lengthening}) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eichner-Adiego</td>
<td>Unaccented vowel shortening</td>
<td>( *VC ) ( &gt; *VC )</td>
<td>( *VCCV ) ( &gt; *VCCV )</td>
</tr>
<tr>
<td>Čop’s Law</td>
<td>OSL</td>
<td>( *VCCV ) ( &gt; *VCCV )</td>
<td>( *VCCV ) ( &gt; *VCCV )</td>
</tr>
</tbody>
</table>

An example of the analogical introduction of long vowels in unaccented syllables is CLuw. da-ai-na-a-tī ‘oil’ (abl.-ins.). The dative-locative of the same paradigm, I- /i/ and its Hittite cognate nom.- acc.sg.n. ša-a-kān /sākān/, gen. ša-ak-na-a-āš /ša-oknās/ show that the paradigm was originally mobile. In CLuw. da-ai-na-ā-tī the direct case stem /tān-/ (with a full vowel) was apparently taken over into the oblique stem. As is well known, long (syllable-closing) consonants are frequently reintroduced in the Luwian verbal endings: \( *$t\mathrm{t}$ (3sg.pres.act.), \( *$t$t\mathrm{t}$ (3sg.pret.act.) and \( *$t$tu (3sg.imp.act.). Clear examples are CLuw. ša-a-at-tā /sātā/ ‘he released’ (cf. Section 1) and CLuw. la-a-ad-du /lātā/ ‘he must take’. In both cases, the unlenited stop after a long accented vowel must be analogous.

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(preverb), whose geminate may have been reintroduced on the basis of pár-ra-an /parran/ ‘id.’ (preposition).\textsuperscript{45}

The environments described here involve a lot of data, ensuring that the point of full dephonologisation of consonant/vowel length and syllable weight was probably never reached.\textsuperscript{46} Regardless, a clear tendency towards neutralisation of these contrasts cannot be denied. After Eichner-Adiego, unaccented vowel shortening and the lengthening of PIE *ó in pre-Proto-Anatolian, there was an imbalance in the system: speakers had become used to making accented syllables almost always heavy while most unaccented syllables happened to be light. In this situation, it is easy to see why Čop’s Law and OSL, which started off as simple fortifying developments under influence of the accent, eventually became phonologised. They happened to bring the weight of *éCV and word-final *-V closer to that of the other accented syllables in the language and therefore had a greater chance of being phonologised. Thus, I hope to have shown that Čop’s Law and OSL merely represent regularisations of a pattern that was already materialising in pre-Proto-Anatolian, and that the pre-Proto-Luwic system of syllable structures provides a possible motivation for the phonologisation of Čop’s Law and OSL, revealing a greater unity behind all these sound laws on a more abstract level.

7. Conclusion

In the prehistory of Luwian (and Lycian), four sound laws recast the distribution of long and short consonants and vowels as it was inherited from Proto-Indo-European. After a wave of lenitions/shortenings in Proto-Anatolian – Eichner-Adiego’s consonantal lenition laws and the shortening of unaccented long vowels – Proto-Luwic saw two complementary fortiting developments: Čop’s Law and the lengthening of all remaining accented short vowels in open syllables.

We have seen that the two pre-Proto-Anatolian leniting developments, along with other phonetic changes, resulted in the situation in which almost all accented syllables became (super) heavy, while many unaccented syllables were rendered light. This tendency towards an ever closer connection between the accent on the one hand and segmental length and syllable weight on the other provided a motivation, or catalyst, for Čop’s Law and open syllable lengthening. The latter two simply represent generalisations of this inherited pattern and eliminated the last remaining light accented syllables from the language by making them heavy.

Together, these four sound laws ensured that not only syllable weight but also vowel and consonant length became increasingly bound to – and therefore predictable by – the presence or absence of the accent. Despite this tendency, the Proto-Luwic phonological system probably never reached full phonological neutralisation of these three factors, as consonant clusters, word-final consonants and pretonic consonants remained unaffected by the changes investigated here.

More broadly, I have claimed that sound laws are not always isolated and in general do not happen randomly (although the precise cause is often not retrievable). Wherever possible, we should try to consider sound laws not as a disjointed set of transformations, but rather as parts of a system. This enables us to understand how they follow from synchronic phonological patterns and how they induce or block further phonetic developments. In this respect, phonetic and phonological changes, like languages in general, are very much a child of their own place and time.

\textsuperscript{45} Cf. also Kloekhorst (2014: 595f.) for a treatment of the behaviour of pretonic consonants in Hittite.

\textsuperscript{46} For this reason, I do not follow Hajnal (1995: 50f.\textsuperscript{48}) and Kloekhorst (2006/2008: 133) who conclude (too strongly in my opinion) that vocalic (Hajnal) and consonantal (Kloekhorst) length had ceased to be phonologically distinctive in the prehistory of Luwian.
GLOSSARY

abl. ablative case
acc. accusative case
act. active voice
BCE before common era
c. common gender
CLuw. Cuneiform Luwian
dat. dative case
Go. Gothic
Gr. Greek
HED Hittite etymological dictionary (Puhvel 1991)
Hitt. Hittite
HLuw. Hieroglyphic Luwian
HW² Johannes Friedrich et al., Hethitisches Wörterbuch, 2nd edition
imp. imperative mood
inf. infinitive
ins. instrumental case
KBo Keilschrifttexte aus Boghazkoi
KUB Keilschrifturkunden aus Boghazkoi
Lat. Latin
loc. locative case
Lyc. Lycian
n. neuter gender
nom. nominative case
orthot. orthotonic
OS Old Script
OSL Open Syllable Lengthening
Pal. Palaic
PAnat. Proto-Anatolian
PIE Proto-Indo-European
pl. plural number
PLuw. Proto-Luwic
pres. present tense
pret. preterite tense
ptc. participle
sg. singular number
Skt. Sanskrit
ToB Tocharian B

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In Section 3, we only looked at the results of open syllable lengthening in Luwian, while actually, Melchert (1994a: 131, 215ff., 261) reports similar effects in Hittite and Palaic. Nevertheless, Melchert (1994a: 132) argued at the same time that OSL cannot have taken place in Proto-Anatolian, but must have taken place in each of these daughter languages independently, for reasons we will see below.

Recent research has now brought to light even more evidence for an accent-based lengthening of short vowels in open syllables, following new studies of plene writing in Hittite (Kloeckhorst 2014: 218, 385, 483, 519) and Hieroglyphic Luwian (Vertegaal 2018). This puts some strain on Melchert’s analysis of OSL in terms of independent lengthening developments, and makes it more attractive to think about one pre-Proto-Anatolian lengthening after all. This possibility will be explored in this excursus. I will briefly go over the most important evidence for all languages, paying attention to the scope and conditioning of OSL in Hittite, Palaic and Luwian, before returning to the question whether we can actually reconstruct (some form of) OSL in Proto-Anatolian.

Hittite

The idea that accented short vowels were lengthened at some point in the (pre)history of Hittite is far from new, going back to the earliest days of Hittitology (cf. Hrozný 1917: 1861;
‘Tondehnung’, who based himself on Hitt. antuḫšatar < *∅). The scope and dating of this phenomenon, however, has been a matter of considerable debate.\footnote{In the cuneiform languages under scrutiny here (Hittite, Cuneiform Luwian, Palaic), a long vowel is indicated by the use of an extra vowel sign (\textit{plene writing}), e.g. <CV-V> or <V-VC> instead of <CV> or <VC>. Although the function of plene writing has been debated for many decades, the current \textit{commenis opinio} seems to favour the idea that its main function was to mark vocalic length (cf. Melchert 1994a: 27; Kimball 1986: 84).}

According to Melchert (1994a: 107), lengthening in open syllables was a synchronically active rule in Hittite, as is visible from, e.g., \textit{ku-it-ma-a-na-aš} /kʰiṭtmaan-as/ ‘while’, where the addition of the enclitic nom.sg.c. pronoun =aš seems to have triggered an accent shift to the syllable -ma-, followed by lengthening of the vowel in an open syllable. Because the lengthening was still synchronically active in Hittite, Melchert (1994a: 131) has argued that the result of this lengthening was only phonetic. Phonologically, accented vowels in open syllables remained short. Also Kloekhorst (2012b, 2014) believes that the lengthening of vowels due to OSL was subphonemic, although his approach is very different from that of Melchert. Kloekhorst (2012b) argues that the phonetic lengthening due to OSL can be observed directly in the spelling: etymologically short accent vowels in open syllables are spelled with plene writing approximately half of the time, e.g. Hitt. pé-e-ra-an (53x OS) ~ pé-ra-an (52x OS) ‘before’ < PIE **pérom. In this sense, they are different from etymologically long accented vowels (near-consistent plene writing, e.g. pé-e-da- (54x OS) ~ pé-da- (4x OS) ‘to carry’ < PIE *(h₁)poî-) and etymologically unaccented vowels (usually never plene spelled, e.g. the \textipa{i} in \textipa{ne-e-pi-iš} ‘heaven’). The systematic contrast in spelling between especially the first two groups, Kloekhorst argues, indicates that accented short vowels in open syllables (group 1) were phonetically half-long ([pe:ran]), not quite as long as the fully long vowels in group 2: [pe:ta:]. In other words, short accented vowels in open syllables were lengthened due to OSL, but not to the extent that they merged with the inherited long accented vowels.

We find examples of OSL in Hittite affecting /á/ (\textit{pa-ad-da-(a-)}ni \[pat’:a:n\])\footnote{For the idea that Hittite DA-spellings represent postglottalised or ejective stops, cf. Kloekhorst 2013: 128f.} ‘basket’ [dat.-loc.sg.] < PIE *peth₂-en-i; Kloekhorst 2014: 348f.] as well as /ɛ/ (\textit{ge-e-mu} [ke nu] ‘knee’ < PIE *gēnu-; Kimball 1983: 333), /[i]/ (\textit{si-hiya-tw-}r³ [si’wat-] ‘day’ < PAnat. *d́iut- [Melchert 1994a: 131] or *d́iut⁴ [Kloekhorst 2014: 477f.]) and /u/ (Hitt. -uLV- found in, e.g., aš-su-(u-)li /as:u:li/ ‘favour’ [dat.-loc.sg.]; Kloekhorst 2014: 516). Thus far, no examples of phonetically lengthened /ó/ have surfaced, but this vowel was quite rare in Hittite anyway. It is very likely, therefore, that in principle all Hittite vowels were lengthened by OSL.

\textbf{Luwian}

The Luwian evidence has been treated in Section 3. The effects of OSL are found in both the Cuneiform Luwian and Hieroglyphic Luwian text corpora. We find evidence of its effects on nearly all short accented vowels: Proto-Anatolian *é (CLuw. náya ‘not’ < PIE *nē), presumably also *i (HLuw. ti-i-wa/i-t³ /tıu₃/ ‘Sun-god’ < *д₃uod-, cf. Melchert 1994a: 131) and *ũ (CLuw. túa- ‘to put’), as well as *∅, if CLuw. ḫāyi- does in fact continue PIE *ḫṣeu₃.

We have also seen, however, that OSL was significantly bled by another sound law: Čop’s Law, which closed open syllables with a short accented vowel before OSL could take effect: PAnat. *mēlid- developed into PLuw. *mélid₃- (Čop’s Law) before the ē could be lengthened in an open syllable to **mélid₃- > Luw. **m̀li-.\footnote{For an alternative explanation for forms involving glides, cf. Section 4.1.} For this reason, the only plausible cases of OSL in Luwian are found in front of the glides [j] and [w], and in word-final position.
Palaic

The Palaic data is expectedly meagre but nonetheless, a few cases of OSL have been proposed for this language as well.\(^{50}\)

Pal. pí-i-ša /pisa/ ‘give’ (2sg.imp.act.) is interpreted as the stem pí- ‘give’, enlarged by an imperfective suffix -ša- (~ Hitt. -šša-), as attested with the same root in CLuw. pí-pí-šša /pípissa/ ‘give’ (2sg.imp.act.) and HLuw. pí-\*-pa-ša- /pípissa/\(^{?}\). Notably, the Palaic plene spelling could show the result of an accent retraction similar to that of CLuw. piša- and Hitt. pišen(i), see above and Melchert (1994a: 200). Another example is Pal. su-ú-na-at /súna/ ‘fill’ (3sg.pret.act.); su-ú-na /súna/ ‘id.’ (2sg.imp.act.), cf. Melchert (1994a: 202). The plene spellings in the root can be compared to that of CLuw. su-\*ya-ya- ‘id.’, perhaps with a similar accent shift from *su-nóH- to *sú-noH-, cf. Melchert (1994a: 89). Two final examples are Pal. tu-ú /tú/ ‘you’ (acc.-dat.sg.), the cognate of HLuw. tú-u ‘id.’ < PAnat. *tú (treated in Section 3), and Pal. nu-ú /nu/ ‘now’, meaning ‘now’ (< PIE *né, cf. Melchert 1994a: 202). In both of these forms, however, we may also be dealing with lengthening of accented monosyllables.\(^{51}\)

We have examples of OSL affecting at least the vowels /i/ and /u/ in Palaic, but I see no reason not to assume, with Melchert (1994a: 204), that in principle all vowels could be lengthened by this development.

Proto-Anatolian OSL

With all this in mind, we turn to the dating of OSL within Anatolian. Melchert (1994a: 132) has argued that open syllable lengthening must be a post-Proto-Anatolian rule. His reason for assuming this involves Hitt. tuk ‘you’ (acc.-dat.sg.), which shows a short vowel and the added element -\*k with regard to its Pal./HLuw. cognate tú ‘id.’ < PAnat. *tú. Melchert correctly observed that a full phonologisation of OSL cannot have taken place in Proto-Anatolian already, since its expected result **tú would have developed into Hitt. **tük after the specifically Hittite addition of -\*k. In addition, I suggest that another argument to take the phonologisation of OSL as a post-PAnat. rule comes from Luwian. If Proto-Luwic had already undergone a general lengthening of all instances of *\*CV to *\*CV, there would have been no input for Çop’s Law, which takes the same input. For instance, if the é in PAnat. *pérom ‘before’ had been phonologically lengthened to *\*ě in Proto-Anatolian, then resulting *\*pérom would never have yielded attested Luw. parran through Çop’s Law.

Nevertheless, the fact that we find the effects of OSL in each of the four Anatolian languages in which we can identify signs of vowel length makes it quite uneconomical to assume three independent instances of the same phonetic development: pre-Hittite, pre-Palaic and pre-Proto-Luwic. Rather, I believe we can account for the lengthening effects in all four languages by assuming that pre-Proto-Anatolian did undergo open syllable lengthening, but only on a phonetic level. In open syllables, short vowels were pronounced slightly longer than in closed syllables: accordingly, /é/ = [e] in closed syllables, [e] in open syllables.

This situation seems to have remained unchanged in Hittite, where OSL did not bring about any phonological change. Thus, when pre-Hittite added -\*k to inherited */tú/ [tu] (< PAnat. tú), the vowel was automatically shortened: [tu]. The phonetic length remained tied to the accent and the syllable structure, and did not become phonological in Hittite.

\(^{50}\) As long as plene writing in Palaic has not been investigated in full detail, we cannot know for certain that it marks vocalic length, as in Hittite and Cuneiform Luwian. It is not to be expected, however, that plene writing has a dramatically different function in Palaic compared to Hittite and Luwian, as the Palaic texts we have were presumably composed by the same scribes who also wrote the Hittite and Cuneiform Luwian texts.

In Luwian, OSL must have remained subphonemic until after the completion of Čop’s Law in Proto-Luwic (*\(\hat{V}CV > *\hat{V}CCV\)). Taking the same example as above, I assume that PANat. \(\star\)pērom developed a half-long allophone in its initial open syllable: *[pe̞rm], which remained phonologically short. When Čop’s Law closed the syllable (pre-PLuw. */pērom/ > PLuw. */pārrom/), the half-long vowel automatically reverted to short: [\(\hat{o}\)] > [a], leaving no trace of its original phonetic length. The remaining phonetically half-long vowels which did not undergo Čop’s Law eventually merged with their long counterparts (e.g. nāya ‘not’ and HLuw. tū ‘you’). It is difficult to say when exactly this merger took place. Lycian seems to have lost vowel length oppositions, while the Lydian script does not seem to mark it in a consistent way (cf. Gérard 2005: 37; Kloekhorst 2018). It is possible, therefore, that the phonologisation of open syllable lengthening was completed in Proto-Luwic already.

The same is – as far as we can see – true for Palaic: also in this language, the vowels which were lengthened through OSL eventually merged with their inherited long counterparts. A schematic representation of these developments is given in Figures 2 and 3.

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**Figure 2. OSL in Hittite**

**Figure 3. OSL in Luwian and Palaic**

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Conclusion

With regard to the conditioning and scope of Open Syllable Lengthening, the Hittite (and Palaic) data show very little restrictions to its application, as we find traces of OSL on all short vowels, either word-final or immediately preceding (lenis) stops and resonants – semivowels included – whenever they stood in open syllables and were accented. In Luwian, on the other hand, the effects of OSL appear to have been decidedly more modest. We only find cases of OSL before glides ([j] and [w]) and in word-final position. These restrictions seem to be secondary, however, as they have an inner-Luwic explanation, and I therefore conclude that in Proto-Anatolian, OSL in principle affected all cases of *-\textit{V}# and *-\textit{VCV}-. I agree with Melchert that the effects of OSL cannot have been phonologised in Proto-Anatolian already. Not only his analysis of Hitt. \textit{tuk} but also the synchronic phonetic half-length in Hittite as well as the relative chronology of OSL and Ėop’s Law attest to this. Nevertheless, I have argued that we can still find a common origin for the lengthening effects in Hittite, Luwian and Palaic if we assume that an accent-based lengthening of accented short vowels in open syllables existed in Proto-Anatolian on a phonetic level.