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Ejective stops in Hittite: evidence for a phonemic length distinction

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Abstract
In this article, it is argued that Hittite did not only possess a series of long ejective stops, as has previously been proposed, but that it also knew a series of short ejective stops. In this way, the Hittite stop system can be analysed as consisting of two types of stops, plain and ejective ones, with both types showing a length opposition: plain short /t/ vs. plain long /t꞉/, and ejective short /t'/ vs. ejective long /t'꞉/.
Keywords: Hittite phonology, Cuneiform script, Ejectives, Consonantal length, Anatolian languages

1. Introduction

In several previous publications,[1] I have argued that Hittite knows in its synchronic stop system a series of ejective stops (/t'꞉/, etc.),[2] which etymologically go back to earlier clusters of stops + laryngeals.[3] These ejective stops form a third series next to the two series that are traditionally called "fortis" and "lenis", and which can be phonologically interpreted as plain long stops (/t꞉/, etc.) and plain short stops (/t/, etc.), respectively.[4] My postulation of a series

1 Kloekhorst 2010: 202–7; Kloekhorst 2013: 127–31; Kloekhorst 2020.
2 In these articles I noted down this consonant as /t꞉ˀ/, but in this article I will refer to it as /t'꞉/, which is in line with other phonological literature on long (geminate) ejectives.
3 At the relevant moment, these laryngeals had developed into a glottal stop /ʔ/. Cross-linguistically, the rise of ejectives through the fusion of clusters of a stop + glottal stop is commonplace, cf. Fallon 1998: 410–45. An anonymous reviewer remarks that clusters of stops + laryngeals could in principle also have yielded other types of stops, and (s)he therefore asks: "How can we prove that the Hittite ejective stops were indeed ejective and not, for instance, aspirated or pharyngealized [. . .]?" Here, the following two language universals are relevant: (1) "if [in a given language] there are aspirated stops, then there is /h/" (Hyman 2008: 114, with reference to Hagège 1982: 936); and (2) "pharyngealization is only noted in languages in which primary pharyngeal consonants occur" (Maddieson 2009). Since Hittite knows neither /h/ nor pharyngeal consonants (note that the phonemes spelled -*ḫḫ*- and -*ḫ*- are now commonly regarded as uvular fricatives, cf. Kümmel 2007: 331; Simon 2014; Weiss 2016; Kloekhorst 2018), we can rule out the possibility that the stops that I interpret as ejectives were aspirated or pharyngealized.
4 For the postulation of a synchronic phonological length difference between the fortis and lenis series, see Melchert 1994: 14–21 (*in nuce*); Kloekhorst 2008: 21–5; 2014: 546–7;

of ejectives is primarily based on the fact that in the spelling of dental stops before the vowel *a*, in some environments three different orthographic practices can be discerned. In these cases, two of the three spelling patterns can be analysed as denoting the fortis and lenis stops, respectively, whereas the third orthographic pattern, which always involves spellings with the sign DA, correlate with the etymological presence of a cluster of dental stop + laryngeal, **TH*. Since in the Old Babylonian version of the cuneiform script, which forms the source of the Hittite ductus, the sign DA can be used to designate the ejective stop [t'], I have proposed that in Hittite, too, these spellings with DA indicate the presence of ejective stops.[5]

My proposal concerns the following three environments. First, in word-initial position, the dental ejective is marked by virtually consistent spelling with the sign DA (e.g. *da-an-zi* "they take" = [t'antsi] < **dh₃enti*). This spelling contrasts with consistent spelling with the sign TA, which marks the presence of [t] = fortis /tː/, and with alternating spelling of TA and DA, which marks the presence of [d] = lenis /t/.[6] Second, in intervocalic position, the dental ejective is predominantly indicated by geminate spelling with the sign DA (e.g. *ud-da-a-ar* "words" = [ut'ːaːr] < **uth₂ōr*).[7] This contrasts with consistent geminate spelling with the

2016: 213–17; Yates 2019. This interpretation challenges the traditional view that the phonological distinction between the fortis and lenis series was voice (/t/ vs. /d/, etc.), a concept that in many recent treatments of Hittite is still mentioned as the default interpretation: e.g. Luraghi 1997: 3–4; Kimball 1999: 54; Watkins 2004: 556; Vanséveren 2006: 39–40; Weiss 2009: 90; van den Hout 2011: 64; Francia and Pisaniello 2019: 19; but note the remarks by Hoffner and Melchert 2008: 35 ("For the sake of simplicity we here describe the contrast in stops as one of voicing, but we do not mean thereby to take a definitive stance on this issue") and Rieken 2011: 39 ("Es ist aber nicht klar, ob es sich bei der genannten phonemischen Distinktion tatsächlich auch phonetisch um einen Kontrast zwischen stimmhaft und stimmlos handelt [. . .]. Der Konvention entsprechend ist im Folgenden stets von stimmhaften und stimmlosen Plosiven die Rede"). Recently, Simon (2020) has argued specifically in favour of the traditional idea that the distinction between the fortis and lenis series was voice but does so on false grounds (cf. my discussion of Simon 2020 in Kloekhorst 2021). According to Patri (2019: 275; see also Patri 2009), the fortis series was aspirated (/t^{h}/ etc.), and the lenis series voiced (/d/, etc.), which is an interpretation that does not match the language universal cited in the previous footnote (cf. also Kloekhorst 2021: 343–9).

5 My postulation of ejective stops is not only based on spelling patterns concerning the signs TA and DA. In Kloekhorst 2010: 216–17, I argued that we find a similar case for the signs KI and GI in word-initial position: alternating spelling of KI and GI denote the presence of an ejective stop [k'] (*kinu-^{zi}*, *ginu-^{zi}* "to open up" = [k'inu-] < PIE **ǵ^{h}h₂i-neu-*), which contrasts with consistent spelling with the sign KI, which marks the presence of [k] = fortis /kː/, and with consistent spelling with GI, which marks the presence of [g] = lenis /k/.

6 See Kloekhorst 2010: 202–7; 2020: 165–8 for details. Note that next to the two examples of word-initial ejective stops discussed there (*dā-^{i} / d-* "to take" and *dai-^{i} / ti-* "to put"), Lubotsky (2019: 153–4) has in the meantime found a third example: Hitt. *daššu-* "strong; heavy; difficult". As Lubotsky cogently argues, this word, which is virtually consistently spelled with the sign DA (cf. Kloekhorst 2008: 853–4), can be etymologized as **dh₁ens-u-*, with an initial cluster **TH-*. Both facts would perfectly fit a synchronic interpretation with an initial ejective stop: [t'asːu-].

7 Note that in this word geminate spelling with TA occasionally occurs as well, *ut-ta-a-ar*. However, since the relative numbers of *(-)Vt-ta(-)* spellings of the relevant words is so

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sign TA, which marks the presence of [tː] = fortis /tː/, and alternating single spelling with TA and DA, which marks the presence of [d] = lenis /t/.[8] And, finally, in post-consonantal position, the dental ejective is indicated by virtually consistent spelling with the sign DA (e.g. *an-da* "into" = [ənt'a][9] < **h*$_1$*nd*^{h}*h*$_2$*e*). This contrasts with consistent spelling with the sign TA, which marks the presence of [t] = fortis /tː/, and alternating spelling of TA and DA, which marks the presence of [d] = lenis /t/.[10]

Some colleagues have indicated to find my analysis of these spellings difficult to accept.[11] For instance, Kim (2019: 298[7]) states that he is "not convinced" of my postulation of a three-way contrast in the Hittite stop system, but does not specify his problems with my analysis, and does not treat the data on which this analysis is based. In the same vein, Patri (2019: 100[5]) formulates some problems with my 2010 paper,[12] but does not mention my 2013 paper. Lastly, Melchert (2020) does not specifically mention my postulation of ejective stops in Hittite, but he does list my 2010 and 2013 articles as examples of phonological studies that are based on "the widespread pernicious false premise that *all* non-random orthographic patterns *must* at all costs reflect linguistically real contrasts" (emphasis his), whereas to his mind such patterns may rather be due to "established norms, aesthetic considerations, and pure convention" (Melchert 2020: 259). I fundamentally disagree with this latter view: it is the task of historical linguists to explain the rationale behind specific spelling peculiarities. Especially when synchronic, statistically significant orthographic patterns correlate with a specific etymological phonological sequence (in this case, for instance, the fact that synchronic spellings of the type *(-)Vd-da(-)* correlate with Proto-Indo-European (PIE) clusters of the type **-TH-*, whereas consistent spelling of the type *(-)Vt-ta(-)* corresponds to PIE **-t-*), and one can make likely that this orthography could represent a synchronic phonation that would fit its etymological origins (in this case, in Old Babylonian the spelling *(-)Vd-da(-)* is used to write the ejective stop [t'ː], whereas *(-)Vt-ta(-)* in principle denotes

low (ranging from 14% TA vs. 86% DA to 0% TA vs. 100% DA, cf. Kloekhorst 2020: 150–1), I will from now on cite them with their *(-)Vd-da(-)* spelling only.

8 See Kloekhorst 2013: 127–31; 2020: 148–55 for details.

9 For the postulation of an initial /ə/ in words spelled *aC-*, cf. Kloekhorst 2014: 337–41.

10 See Kloekhorst 2013: 131–9; 2020: 155–65 for details.

11 Note that in the recent papers of Yates (2019) and Simon (2020), who both offer critical discussions of some aspects of my analysis of the Hittite stop system, my postulation of ejective stops is not commented on.

12 Patri's main problem with my 2010 paper seems to be the analogy I assume for the verb *dā-*^{i} "to take" (for which see section 4.1 below), and the fact that the Old Hittite 3pl.pres. form *ta-an-zi* "they take" (KBo 17.36+ i 7 (OS)) is spelled with TA, whereas it reflects **dh*$_3$*enti* and thus, according to my theory, should have yielded /t'antsi/, spelled *da-an-zi*, with DA. He does not discuss the fact, however, that this is the *only* Old Hittite attestation of this word spelled with TA, and that in *all* 26 other Old Hittite attestations this word is indeed spelled *da-an-zi*, with DA. Moreover, the same situation is found in MS and NS texts, where according to my files more than 300 attestations of *da-an-zi*, with DA, can be found vs. only two attestations *ta-an-zi*, with TA (KUB 15.34 iv 42 (MH/MS), KUB 41.28 ii 11 (NS)). The forms spelled *ta-an-zi* should therefore not be used as an argument.

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plain [tː]), Occam's Razor demands that we should postulate this phonation for the synchronic stage of the language in question (in this case that Hitt. *(-)Vd-da(-)* represents [t'ː], which contrasts with *(-)Vt-ta(-)* = [tː]).[13] Assuming that such patterns are based on "established norms" or "convention", as Melchert is implying, without explaining why these norms arose, is nothing more than saying that one has not been able to find a linguistic rationale, and therefore does not constitute an explanation at all.

As long as no alternative explanation is offered to explain the correlation between synchronic DA-spellings and etymological clusters of dental stops + laryngeals, I see no reason to abandon my postulation of ejective stops in Hittite.

2. The problem: a single long ejective series

The geminate spelling *(-)Vd-da(-)* that is used to denote the intervocalic ejective stops in e.g. *uddār* "words", *padda-*^{i} "to dig", etc., indicates that they were long consonants. This is not only the case when they etymologically go back to a PIE voiceless stop + laryngeal (e.g. *uth*$_2$*ōr* > *uddār* [ut'ːaːr] "words"), but also when they reflect a cluster of a PIE voiced (aspirated) stop + laryngeal (e.g. **b*^{h}*od*^{h}*h*$_2$*V*° > *padda-*^{i} "to dig" [pat'ːa-]). I have therefore argued that in the latter case, the original lenis (short) outcome of PIE **d*$^{(h)}$ underwent fortition (lengthening) before the laryngeal, which by that time had developed into a glottal stop, after which the fusion of the cluster of fortis (long) stop + glottal stop yielded a long ejective stop: e.g. PIE **b*^{h}*od*^{h}*h*$_2$*V*° > pre-Hitt. [potʔV-], which underwent fortition to *[potːʔV-], resulting into Hitt. [pat'ːV-], spelled *pád-da-* "to dig" (Kloekhorst 2013: 130–1). In the case of word-initial and post-consonantal ejective stops, there is no indication in spelling that these consonants were long, however, and it is therefore best to assume that they were phonetically short, [t']. In Kloekhorst 2020: 173, I argued that intervocalic long [t'ː] and word-initial and post-consonantal short [t'] may phonologically be regarded as allophones of a single ejective phoneme, for which I assumed the basic shape /t'ː/.[14] This allophony would thus be similar to the one found in the case of the plain fortis stop /tː/, which is realized as a long stop [tː] in intervocalic position, but as short [t] in word-initial and post-consonantal position. I did note a problematic aspect of this analysis, however, namely that "[o]ne could argue [. . .] that in this way [the phoneme /t'ː/] is redundantly marked vis-à-vis the fortis and the lenis stops (/tː/ and /t/, respectively)" and that, when it comes to segmental features, it would be more economic to interpret this phoneme as an underlying short ejective stop /t'/. However, "since in intervocalic position the consonantal length is relevant for whether the preceding vowel stands in an open or closed syllable, I rather keep the long character of the ejective stop expressed in my phonemic representation of it" (Kloekhorst 2020: 173).

Nevertheless, I kept feeling uneasy about this situation: long ejective stops are cross-linguistically rare, and, as far as I am aware, only occur in phoneme

13 See e.g. Rieken 2008 and 2010 for other illuminating and successful applications of this method.

14 In the original publication: /tːʔ/.

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inventories in which they contrast with a series of short ejective stops.[15] In the following paragraphs I will present a solution to this problem: I will argue that Hittite also knew a series of short ejective stops.

3. Intervocalic short ejective stops?

The Hittite verbs *pēda-^{i} / pēd-* "to bring (away)" and *uda-^{i} / ud-* "to bring (here)" are transparent univerbations of the verb *dā-^{i} / d-* "to take" with the preverbs *pē-* "thither" and *u-* "hither", respectively. Both verbs contain an intervocalic single spelled dental stop, and in the case of *uda-^{i}*, the spelling of this stop is remarkable.

Normally, in Old Script (OS) texts, intervocalic single spelled dental stops always show interchange between spellings with DA and with TA (e.g. *a-da-an-zi / a-ta-an-zi* "they eat"), which, as I have argued, denotes the presence of a voiced stop [d], the intervocalic allophone of lenis /t/ < PIE *$d^{(h)}$.[16] However, as noted in Kloekhorst 2013: 139[60], in the case of *uda-^{i}* we find in OS texts consistent spelling with the sign DA (31x *ú-da-*), but no spelling with the sign TA (never **ú-ta-*). In this way, this verb deviates in spelling from the words that contain an intervocalic [d] = /t/. However, since the corresponding verb *pēda-^{i}* does show in OS texts an interchange between spellings with DA (30x *pé(-e)-da(-)*) and with TA (14x *pé(-e)-ta(-)*), which does more or less match the spelling practices of intervocalic [d], I decided to brush aside the consistent spelling of *uda-^{i}* as *ú-da-*, and assumed for both verbs the presence of an intervocalic [d]. I did remark, however, that "I do not want to exclude the possibility [...] that in these words the use of the sign DA in the sequence °*V-da*(-) represents the presence of a short glottalized stop, [-Vt^{ʔ}a-], which then must have been taken over from the base verb *dā-^{i}/d-* "to take", which had the shape [t^{ʔ}(ā)-]" (Kloekhorst 2013: 139[60]).

In the meantime I have come to the conclusion that this latter interpretation is the more likely one. This is based on the fact that it is very difficult to envisage a historical scenario that would account for the presence of a lenis stop /t/ = [d] in *pēda-^{i}* and *uda-^{i}*.

4. The prehistory of *pēda-^{i}* and *uda-^{i}*

In the older literature, it is assumed that the initial consonant of *dā-^{i} / d-*, which reflects PIE *d- (from the root *deh_3-), for a long time during the prehistory of Hittite had the value of a lenis stop. Only in recent pre-Hittite times (after the assibilation of *$t\underset{\frown}{i}$- > [ts-] and *$d^{(h)}\underset{\frown}{i}$- > [s-] had taken place), word-initial fortis and lenis dental stops merged into a single, short voiceless stop [t-], which phonologically can be viewed as a fortis consonant. Within this framework, it was easy to account for a lenis /t/ in *pēda-^{i}* and *uda-^{i}*: one would just have to

15 See also fn. 27.
16 Kloekhorst 2013: 139–40.

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Table 1. The two possible pathways of developments of PIE *deh_3- / *dh_3- in pre-Proto-Anatolian.

	I	II	
PIE	*deh_3- / *dh_3-	*deh_3- / *dh_3-	
Proto-Anatolian	↓	↓	PIE *d > PAnat. lenis */t/, PIE *eh_3 > PAnat. */ō/
	*[tō-, tʔ-]	*[tō-, tʔ-]	
	|	↓	fortition of lenis stops preceding laryngeals (only in II)
	|	*[tō-, tːʔ-]	
	↓	↓	fusion of stop + laryngeal into ejective stops
	*[tō-, t'-]	*[tō-, t'ː-]	
	↓	↓	paradigmatic levelling
	*[t'ō-, t'-]	*[t'ːō-, t'ː-]	

assume that the univerbation of *pē-* and *u-* + *dā-*^{i} took place when its initial stop was still lenis.[17]

However, with the recognition that, because of its consistent spelling with the sign DA (e.g. 1sg.pres. *da-a-aḫ-ḫi*, 3sg.pres. *da-a-i*, 3pl.pres. *da-an-zi*, etc.), the verb *dā-*^{i} */ d-* must have had an initial ejective stop, [t'ā-, t'-], this scenario can no longer be upheld.

4.1. The prehistory of *dā-*^{i} */ d-*

As mentioned above, the Hittite ejective stops are the result of a fusion of original clusters of stop + laryngeal, in this case *dh_3-. It should be noted that in the verb *deh_3- / *dh_3- this cluster was originally only present in the weak stem *dh_3-, which implies that at some moment in time a paradigmatic levelling has taken place. As Norbruis (2021: 423, fn. 2) argues on the basis of Luwian evidence,[18] both the fusion of *dh_3- to a monophonemic stop and its levelling throughout the paradigm must have taken place in pre-Proto-Anatolian times. Moreover, there is another relevant pre-Proto-Anatolian development that needs to be taken into account, namely the contact-induced fortition of lenis stops when standing before laryngeals, which in intervocalic position is attested

17 In theory, a later univerbation may also be possible, if one would assume that the long accented vowels of the preverbs *pē-* and *u-* (which are /pḗ/ < *h_1*pói* and /ʔṹ/ < *h_2*óu*, respectively, cf. Kloekhorst 2008: 660–1, 909–10; 2014: 505) at that moment in time were still able to lenite a following fortis consonant. This depends, however, on the question of how long in the prehistory of Hittite the Proto-Anatolian lenition rules were still productive, which is not easy to answer.

18 His argument starts with the observation that the Luwian verb *lā-*^{i} */ l-* "to take", which is generally seen as the direct cognate to Hitt. *dā-*^{i} */ d-*, has an initial *l-* that thus far is unexplained from PIE *deh_3- / *dh_3-. After noting that "Hittite evidence points to a generalization of a monophonemic outcome of *dH- throughout the paradigm", Norbruis (2021: 243, fn. 2) states that "the rather unexpected Luwian outcome *l-* may be explained by the same development, which suggests that it had already happened by Proto-Anatolian".

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both in Hittite (e.g. *mekki-* "much, many" < **meǵh₂-i-*) and in Luwian (CLuw. 2pl.midd. *-dduu̯ar* < PIE **-dʰh₂uo°*). Since this development must have taken place when the laryngeal was still an independent phoneme, it follows that it must have preceded the fusion of such clusters into ejective consonants. Although it cannot be excluded that this fortition only took place in word-internal, postvocalic position, it is possible that it also affected word-initial clusters.[19] All in all, we may envisage two possible pathways of developments of PIE **deh₃-* / **dh₃-* in pre-Proto-Anatolian (see Table 1): pathway I (without fortition of **[tʔ-] > **[tːʔ-]*), which would yield PAnat. **[t'ō-, t'-]*; and pathway II (with fortition of **[tʔ-] > **[tːʔ-]*), which would yield PAnat. **[t'ːō-, t'ː-]*.

As was mentioned earlier, in the prehistory of Hittite the plain dental stops, fortis **[tː-]* and lenis **[t-]*, merged in word-initial position into a single short voiceless [t-]. Although this [t-] phonologically should be regarded as a fortis stop (Kloekhorst 2020: 166), phonetically the merger is caused by the shortening of fortis **[tː-]* to [t-]. We may thus assume that such a shortening would have affected PAnat. word-initial **[t'ː-]* as well, yielding [t'-]. So in the case of pathway II, in which the PAnat. shape of this verb is **[t'ːō-, t'ː-]*, with long ejectives, we may now add another, specifically pre-Hittite development: **[t'ːō-, t'ː-] > *[t'ō-, t'-]* (shortening of **[t'ː-]* to [t'-]). Together with the specifically pre-Hittite colouring of PAnat. */ō/* to Hitt. /ā/, we end up with Hitt. [t'ā-, t'-]. In the case of pathway I, in which the PAnat. shape of this verb is **[t'ō-, t'-]*, no shortening needs to be assumed, only the colouring of the vowel of the strong stem, after which the result is Hitt. [t'ā-, t'-]. In this way, the outcome of both pathways is the same, Hitt. [t'ā-, t'-], which is spelled *dā-^{i} / d-*.

4.2. The creation of *pēda-^{i}* and *uda-^{i}*

As said above, the verbs *pēda-^{i} / pēd-* and *uda-^{i} / ud-* are the result of a univerbation of the verb *dā-^{i} / d-* with the preverbs *pē-* and *u-*, which phonetically were [pé] and [ʔú], respectively.[20] The exact moment of univerbation is not fully clear, but there are no indications that point to a Proto-Anatolian origin of these verbs.[21] It is therefore best to assume that they are specifically Hittite formations. Within pathway I, this means that at the moment of univerbation their

19 An argument against this idea may be the following. If in all positions in the word lenis stops before a laryngeal would undergo fortition, it follows that when the fusion of such clusters took place, the result would be that all ejectives stops were long. There would thus be only a single series of ejective stops, and we may assume that, with its length being non-contrastive, this would soon be given up, yielding a single short ejective series /t'/, etc. It may therefore be best to assume that in word-initial position no lengthening of stops before laryngeals took place, and that, after the fusion of stops + laryngeals into ejective stops, in word-initial position a phonemic distinction between long ejective stops, /t'ː/, etc., and short ejective stops, /t'/, etc., existed, which later was extended to the word-internal position as well. When, later on, the distinction between word-initial plain fortis and lenis stops was lost, we may then assume that also the long and short ejective stops merged into a single series, which was short. Note that in the sections to follow, which discuss the possible prehistories of *pēda-^{i}* and *uda-^{i}*, there is nothing that would speak against such a scenario.

20 See fn. 17.

21 The idea that Hitt. *pēda-^{i}* "to bring" has a cognate in CLuw. "*padda-*", allegedly "to carry" (thus Melchert 1994: 34), has to be given up, cf. Kloekhorst 2014: 575–7.

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base verb had the shape *[t'ā-, t'-]. Within pathway II, there are two stages: before the shortening of word-initial *[t':-] to [t'-], which means that at that moment in time the base verb had the shape *[t'ːō-. t'ː-]; or after the shortening, which is equal to pathway I.

Within pathway II, if the univerbation took place in its initial stage, i.e. before the shortening of *[t':-] to [t'-], we would expect the outcomes of the univerbations to have been [pét'ːa-, pét'ː-] and [ʔút'ːa-, ʔút'ː-], respectively.[22] According to the spelling rules of Hittite, these verbs would then have been spelled with geminate spelling: ***pé-e-ed-da-* and ***ú-ud-da-*, respectively. Since these spellings do not occur, we can safely rule out this scenario.[23]

If these verbs were formed with the base verb [t'ā-, t'-] (within pathway I, and during the second stage of pathway II), the expected outcomes would be [pét'a-, pét'-] and [ʔút'a-, ʔút'-], respectively. We would expect that the short ejective consonant in these forms would be spelled with single spelling, °*V-Ca(-)*. In the case of the long ejective stop /t'ː/, we have seen that it is predominantly spelled with geminate spelling with the sign DA, *(-)Vd-da(-)*, although spellings with the sign TA, *(-)Vt-ta(-)*, do occasionally occur as well.[24] This would predict that a short ejective stop would be predominantly spelled with the sign DA as well, °*V-da(-)*, next to some spellings with the sign TA, °*V-ta(-)*. These predictions are a perfect match with the way *pēda-*^{i} and *uda-*^{i} are spelled. Both show single spelling of their dental stop, and both show predominant spellings with the sign DA. In the case of *pēda-*^{i}, CHD (P: 345–6) lists 171 attestations with the sign DA, vs. 30 with the sign TA (a ratio of 85.1% DA vs. 14.9% TA). In the case of *uda-*^{i}, I have found in my files over 470 attestations with the sign DA, vs. only one[25] with the sign TA (a ratio of 99.8% DA vs. 0.2% TA). These ratios correspond almost exactly to the ratios between DA and TA spellings that are found in the lexemes that contain a long ejective stop [t'ː] (which ranged from 100% DA vs. 0% TA (*padda-*^{i} "to dig") to 94.6% DA

22 One could theoretically argue that the long accented vowels of the preverbs may have caused a lenition of the following consonant. However, we know that in other forms, original clusters of consonants + laryngeals have not been subject to lenition, e.g. *šākki* < **sókh$_1$ei*. It should be noted that in the discussion of this latter verb (Kloekhorst 2014: 555–6) I explained the lack of lenition by the assumption that the cluster *-*kH*- was still present as such in Proto-Anatolian times because "the assimilation of laryngeals to preceding stops was a post-Proto-Anatolian, specific Hittite development". Since we have now seen that the fusion of stop + laryngeal was in fact a pre-Proto-Anatolian process, this idea needs to be adapted. In order to explain the absence of lenition in e.g. *šākki* < **sókh$_1$ei*, we would now have to assume that fortis ejective stops were not subject to lenition.

23 Another theoretically possible way to explain the absence of geminate spelling in these verbs is to assume that it is caused by a wish to retain the original spelling of the forms of the base verb (e.g. 3pl.pres. *da-an-zi*) in the univerbated verbs (hence *pé-e-da-an-zi* and *ú-da-an-zi*). However, in other univerbated verbs with *pē-* and *u-* geminate spellings are tolerated: compare e.g. *pé-en-na-i* "he drives (there)" and *u-un-na-i* "he drives / sends (here)", with geminate spelling *-nn-*, next to the base verb *nāi* "he turns, sends".

24 See fn. 7.

25 2pl.imp.act. *ú-ta-a*[*t-tén*] (KUB 15.34 ii 7 (MH/MS)). It is interesting that this tablet also contains one of the attestations of 3pl.pres. *ta-an-zi* "they take" with TA, cf. fn. 12. This strengthens the idea that both attestations are exceptions that do not reflect normal spelling practices.

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vs. 5.4% TA (*uddar / uddan-* "word, thing"), 91.4% DA vs. 8.6% TA (*paddar / paddan* "basket"), 89.3% DA vs. 10.7% TA (*apadda(n)* "there, thither"), and 86.1% DA vs. 13.9% TA (*piddae-^{zi}* "to flee"), cf. Kloekhorst 2020: 150–3).

For the sake of argument, we may also discuss the possibility that the univerbations of *pē-* and *u-* with the base verb *dā-^{i} / d-* took place in pre-Proto-Anatolian times, that is, before the spread of the initial consonant of the weak stem *[t'-] (in pathway I) or *[t':-] (in pathway II) throughout the paradigm. The phonologically regular outcome of the strong stem, [pḗ] / [ʔṹ] + *[tō-], would then be [pḗda-] and [ʔṹda-], respectively, with a lenis dental [d]. In the weak stem, however, we would expect an outcome [pḗt'-] and [ʔṹt'-], with a short ejective stop [t'] (according to pathway I), or [pḗt':-] and [ʔṹt':-], with a long ejective stop [t':][26] (according to pathway II). The result would be paradigms with consonantal alternation between strong and weak stem: [pḗda-, pḗt'(:)-] and [ʔṹda-, ʔṹt'(:)-]. In other verbs for which we can reconstruct a similar consonantal alternation between a strong and a weak stem, it is always the weak stem that is generalized. For instance, PIE **ti-ne-h$_1$-ti / *ti-nh$_1$-énti* should regularly have yielded Hitt. ***zinizzi / zinnanzi* ([tsini-, tsin:-]), with lenis *-n-* in the strong stem and fortis *-nn-* in the weak stem, but in the prehistory of Hittite this has been levelled out to *zinnizzi / zinnanzi*, with generalization of the fortis *-nn-* of the weak stem. On the basis of this and many other examples, we would have to assume that the original paradigms **[pḗda-, pḗt'(:)-] and **[ʔṹda-, ʔṹt'(:)-] would have been levelled out either to [pḗt'a-, pḗt'-] and [ʔṹt'a-, ʔṹt'-] (according to pathway I), or to [pḗt':a-, pḗt':-] and [ʔṹt':a-, ʔṹt':-] (according to pathway II), in both cases with the ejective stop of the weak stem being generalized throughout the paradigm. As we have seen above, the outcomes with a long ejective stop (according to pathway II), should in Hittite have been spelled ***pé-e-ed-da-* and ***ú-ud-da-*, respectively, which is not what we find. The outcomes with a lenis ejective stop (according to pathway I) would formally be identical to the outcomes of the pre-Hittite univerbations of pathway I (and the second stage of pathway II), for which the spellings *pé-e-da-* and *ú-da-* are a perfect match.

4.3. The synchronic interpretation of *pēda-^{i}* and *uda-^{i}*

All in all, we can conclude that the only way to combine the fact that *pēda-^{i}* and *uda-^{i}* show single spelling of their dental stop with the recognition that their base verb, *dā-^{i} / d-* contained an ejective stop, is by assuming that the dental stop of *pēda-^{i}* and *uda-^{i}* was a short ejective stop [t']: [pḗt'a-] and [ʔṹt'a-]. This is the only possible outcome of these univerbations, whether they were created in pre-Hittite times (pathway I or during the second stage of pathway II) or in pre-Proto-Anatolian times (pathway I). There simply is no scenario by which the dental stop of *pēda-^{i}* and *uda-^{i}* could be a plain lenis dental stop [d] = /t/, and I therefore regard the presence of a short ejective stop [t'] in these verbs as certain.

26 Clusters of stops + laryngeals and their outcomes are not subject to lenition, cf. fn. 22.

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5. A revision of the Hittite stop system: two series of ejective stops

Since the intervocalic ejective [t'] of *pēda-^{i}* and *uda-^{i}* is in spelling consistently distinguished from its long counterpart [t'ː] (e.g. *ud-da-a-ar* [ut'ːaːr] "words", *pád-da-* [pat'ːa-] "to dig"), we must assume that they were two different phonemes, /t'/ and /t'ː/, respectively. As a consequence, we should enlarge the Hittite phoneme inventory – at least for the dental place of articulation – with a series of short ejective stops, which contrast with their long counterparts.[27]

A major advantage of this analysis, and in fact an extra argument in favour of it, is that in this way we solve the problem that was formulated in section 2: the length of the intervocalic ejective stops of words like *uddār*, *padda-^{i}*, etc., which originally seemed phonologically redundant, can now be seen as a distinctive feature that contrasts with the absence of length in the newly discovered ejective stops of *pēda-^{i}* and *uda-^{i}*.

The distinction between the dental short and long ejective stops seems to have been made in intervocalic position only: *pēda-^{i}* "to bring away" = /pé̋t'a-/, *uda-^{i}* "to bring here" = /ʔú̋t'a-/ vs. *uddār* "words" = /ut'ːá̋r/, *padda-^{i}* "to dig" = /pat'ːa-/, etc. As far as I am aware, in word-initial position and post-consonantal position, no contrast between long and short ejective stops can be discerned, and given the fact that in these positions the ejective stops phonetically are probably short, it is best to phonemically interpret them as short as well: *dā-^{i} / d-* "to take" = /t'ā-, t'-/ , *dai-^{i} / ti-* "to put" = /t'ai-, t'i-/, *daššu-* "dense" = /t'asːu-/; *anda* "into" = /ənt'a/, *andan* "inside" = /ənt'an/.[28]

As argued in Kloekhorst 2010: 216–17, also for the velar place of articulation there is direct evidence for ejective stops, namely in the verb *kinu-^{zi}*, *ginu-^{zi}* "to open up" = [k'inu-][29] < PIE *$\acute{g}^{h}h_2i$-neu-*. Etymologically, we would expect the presence of intervocalic long ejective velar stops as well, for instance in *mekki-* "much, many", which reflects PIE *$me\acute{g}h_2$-i-* and therefore synchronically probably was [mek'ːi-].[30] Thus far, however, no specific spelling practice has been identified with which these sounds can be distinguished from plain fortis stops, so their existence must, for the time being, remain hypothetical.

27 Although the number of languages that have a phonemic opposition between short and long ejective stops is small, they certainly exist: PHOIBLE 2.0 lists the following 16 languages (out of a total of 2,186): the Cushitic languages Alaba-K'abeena, Arbore, Eastern Oromo, Hadiyya, Kambaata and Tsamai (all from Ethiopia), the Omotic languages Anfillo, Dime, Koorete and Wolayta (all from Ethiopia), the Semitic languages Amharic and Silt'e (from Ethiopia) and Tigre (from Eritrea), the North-East Caucasian languages Andi and Hunzib (both from Dagestan), and the language isolate Zuni (from New Mexico, USA). To these can be added the North-East Caucasian languages Avar (/k/ vs. /kː/ vs. /k'/ vs. /k'ː/), spoken in Dagestan (e.g. Forker forthcoming), and Tsova-Tush (Batsbi), spoken in Georgia (cf. Hauk and Hakim 2019). Another relevant language that knew this opposition is Akkadian: its so-called "emphatic" stops, which in fact were ejectives (cf. Kouwenberg 2003: 81–2), know a phonemic distinction between short and long (geminate) variants, a distinction that is found for all consonants of Akkadian.

28 Cf. fn. 9 for the postulation of /ə/ in the latter two words.

29 In the original publication the initial consonant was noted down as "[g^{ʔ}-]".

30 The fact that PIE *$\acute{g}$ underwent fortition indicates that the laryngeal was still present at the relevant moment, which enhances the chance that it, too, was reinterpreted as a glottalic element of the preceding stop.

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Nevertheless, in analogy to the situation in the dental series, I regard it likely that also in the velar series the word-initial short ejective [k'-] can now be interpreted as a separate phoneme vis-à-vis the long ejective [k'ː] that probably was present in words like *mekki-*.

Unfortunately, for the labial and labiovelar place of articulation we have at the moment no secure evidence for any ejective stops, so here it is best to remain agnostic.

All in all, an updated overview of the Hittite stop system should look as follows:

		labial	dental	velar	labiovelar	glottal[31]
plain	short	/p/	/t/	/k/	/k^w/	/ʔ/
	long	/pː/	/tː/	/kː/	/k^wː/	
ejective	short	?	/t'/	/k'/	?	
	long	?	/t'ː/	(/k'ː/)	?	

I also present here an updated version of the table of the phonetic realizations of the dental stop phonemes in different environments as presented in Kloekhorst 2020: 172 (originally given with only three phonemes, but here with four, and with different ordering; moreover, I have added the environment -TS-, based on the outcome of Kloekhorst 2019).

31 The postulation of a glottal stop is controversial, but to my mind justified: see the discussion in Kloekhorst forthcoming.

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phonological value			phonetic realizations per environment									
			#TV-	-VTV-	-nTV-	-r/lTV-	-CTV-	-TR-	-TC-	-TS-	-RT#	-VT#
plain	short	/t/	[d]	[d]	[d]	[d]	[t]	[d]	[t]	[t]	[d]	[t]
	long	/tː/	[t]	[tː]	[t]	[t]	[tː]	[tː]	--	[tː]	[t]	[tː]
ejective	short	/t’/	[t’]	[t’]	[t’]	--	--	--	--	--	--	--
	long	/t’ː/	--	[t’ː]	--	--	--	--	--	--	--	--

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References

CHD = Güterbock, Hans G., Harry A. Hoffner and Theo P.J. van den Hout (eds). 1983–. *The Hittite Dictionary of the Oriental Institute of the University of Chicago*. Chicago: The Oriental Institute.

PHOIBLE 2.0 = Moran, Steven and Daniel McCloy (eds). 2019. *PHOIBLE 2.0*. Jena: Max Planck Institute for the Science of Human History. http://phoible.org (accessed 14 January 2020).

Fallon, Paul D. 1998. *The Synchronic and Diachronic Phonology of Ejectives*. PhD diss., Ohio State University.

Forker, Diana. Forthcoming. "Avar", to appear in Maria Polinsky (ed.), *The Oxford Handbook of Languages of the Caucasus*. Oxford: Oxford University Press.

Francia, Rita and Valerio Pisaniello. 2019. *La Lingua degli Ittiti*. Milano: Hoepli.

Hagège, Claude. 1982. "Linguistic universals as general tendencies", in Shirô Hattori and Kazuko Inoue (eds), *Proceedings of the XIIIth International Congress of Linguists, August 29th–September 4th 1982, Tokyo*, 936–40. Tokyo: Tokyo Press.

Hauk, Bryn and Jakob Hakim. 2019. "Acoustic properties of singleton and geminate ejectives in Tsova-Tush", in Sasha Calhoun, Paola Esudero, Marija Tabain and Paul Warren (eds), *Proceedings of the 19th International Congress of Phonetic Sciences, Melbourne, Australia 2019*, 3483–7. Canberra, Australia: Australasian Speech Science and Technology Association Inc.

Hoffner, Harry A. and H. Craig Melchert. 2008. *A Grammar of the Hittite Language*. 2 vols. Winona Lake: Eisenbrauns.

van den Hout, Theo P.J. 2011. *The Elements of Hittite*. Cambridge: Cambridge University Press.

Hyman, Larry M. 2008. "Universals in phonology", *The Linguistic Review* 25, 81–135.

Kim, Ronald I. 2019. "The 2pl. middle ending in Proto-Indo-European", in Natalia Bolatti Guzzo and Piotr Taracha (eds), "*And I Knew Twelve Languages*"*: A Tribute to Massimo Poetto on the Occasion of His 70th Birthday*, 295–314. Warsaw: Agade.

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

Kloekhorst, Alwin. 2008. *Etymological Dictionary of the Hittite Inherited Lexicon*. Leiden Indo-European Etymological Dictionary Series, vol. 5. Leiden: Brill.

Kloekhorst, Alwin. 2010. "Initial stops in Hittite (with an excursus on the spelling of stops in Alalaḫ Akkadian)", *Zeitschrift für Assyriologie* 100, 197–241.

Kloekhorst, Alwin. 2013. "The signs TA and DA in Old Hittite: evidence for a phonetic difference", *Altorientalische Forschungen* 40, 125–41.

Kloekhorst, Alwin. 2014. *Accent in Hittite: A Study in Plene Spelling, Consonant Gradation, Clitics, and Metrics*. Studien zu den Boğazköy-Texten, vol. 56. Wiesbaden: Harrassowitz.

Kloekhorst, Alwin. 2016. "The Anatolian stop system and the Indo-Hittite hypothesis", *Indogermanische Forschungen* 121, 213–47.

Kloekhorst, Alwin. 2018. "Anatolian evidence suggests that the Indo-European laryngeals $*h_2$ and $*h_3$ were uvular stops", *Indo-European Linguistics* 6, 69–94.

Kloekhorst, Alwin. 2019. "The spelling of clusters of dental stop + sibilant in Hittite", *Münchener Studien zur Sprachwissenschaft* 73, 55–72.

Kloekhorst, Alwin. 2020. "The phonetics and phonology of the Hittite dental stops", in Ronald I. Kim, Jana Mynářová and Peter Pavúk (eds), *Hrozný and Hittite: The First Hundred Years. Proceedings of the International Conference Held at Charles University, Prague, 11–14 November 2015*. (Culture and History of the Ancient Near East, vol. 107), 147–75. Leiden: Brill.

Kloekhorst, Alwin. 2021. "The phonetics and phonology of Hittite intervocalic fortis and lenis stops", *Bibliotheca Orientalis* 78, 327–52.

Kloekhorst, Alwin. Forthcoming. "Evidence for a phonemic glottal stop in Hittite: a reassessment", (unpublished manuscript).

Kouwenberg, Norbert J.C. 2003. "Evidence for post-glottalized consonants in Assyrian", *Journal of Cuneiform Studies* 55, 75–86.

Kümmel, Martin J. 2007. *Konsonantenwandel*. Wiesbaden: Reichert.

Lubotsky, Alexander. 2019. "The Indo-European suffix *-ens- and its Indo-Uralic origin", in Alwin Kloekhorst and Tijmen Pronk, *The Precursors of Proto-Indo-European: The Indo-Anatolian and Indo-Uralic hypotheses*. (Leiden Studies in Indo-European, vol. 21), 151–62. Leiden: Brill/Rodopi.

Luraghi, Silvia. 1997. *Hittite*. Munich: Lincom Europa.

Maddieson, Ian. 2009. "Typology and occurrence of pharyngeals and pharyngealization around the world". Abstract for a paper presented at the *International Workshop on Pharyngeals and Pharyngealisation*, March 26–7, Newcastle University. Available online at https://web.archive.org/web/20110617064432/http://www.ncl.ac.uk/linguistics/assets/documents/PharyngealsMaddieson.pdf.

Melchert, H. Craig. 1994. *Anatolian Historical Phonology*. (Leiden Studies in Indo-European, vol. 3.) Amsterdam: Rodopi.

Melchert, H. Craig. 2020. "Hittite historical phonology after 100 years (and after 20 years)", in Ronald I. Kim, Jana Mynářová and Peter Pavúk (eds), *Hrozný and Hittite: The First Hundred Years. Proceedings of the International Conference Held at Charles University, Prague, 11–14 November 2015*. (Culture and History of the Ancient Near East, vol. 107), 258–76. Leiden: Brill.

Norbruis, Stefan. 2021. *Indo-European Origins of Anatolian Morphology and Semantics. Innovations and Archaisms in Hittite, Luwian and Lycian*. Amsterdam: LOT.

Patri, Sylvain. 2009. "L'adaptation des consonnes hittites dans certaines langues du XIII^{e} siècle", *Zeitschrift für Assyriologie* 99, 87–126.

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

Rieken, Elisabeth. 2008. "Die Zeichen <*ta*>, <*tá*> und <*tà*> in den hieroglyphen-luwischen Inschriften der Nachgroßreichszeit", in Alfonso Archi and Rita Francia (eds), *VI Congresso Internazionale di Ittitologia, Roma, 5-9 settembre 2005, Parte II*. Studi Micenei ed Egeo-Anatolici, vol. 50, 637–48.

Rieken, Elisabeth. 2010. "Das Zeichen <*tá*> im Hieroglyphen-Luwischen", in Yoram Cohen, Amir Gilan and Jared L. Miller (eds), *Pax Hethitica. Studies on the Hittites and Their Neighbours in Honour of Itamar Singer*. (Studien zu den Boğazköy-Texten, vol. 51), 301–10. Wiesbaden: Harrassowitz.

Rieken, Elisabeth. 2011. *Einführung in die hethitische Sprache und Schrift*. Münster: Ugarit Verlag.

Simon, Zsolt. 2014. "Der phonetische Wert der luwischen Laryngale", in Piotr Taracha (ed.), *Proceedings of the Eighth International Congress of Hittitology. Warsaw, 5–9 September 2011*, 873–95. Warsaw: Agade.

Simon, Zsolt. 2020. "The Anatolian stop system and the Indo-Hittite hypothesis – revisited", in Matilde Serangeli and Thomas Olander (eds), *Dispersals and*

Diversification. Linguistic and Archaeological Perspectives on the Early Stages of Indo-European, 236–50. Leiden: Brill.

Vanséveren, Sylvie. 2006. *Nisili. Manuel de Langue Hittite. Vol. I*. Leuven: Peeters.

Watkins, Calvert. 2004. "Hittite", in Roger D. Woodard (ed.), *The Cambridge Encyclopaedia of the World's Ancient Languages*, 551–75. Cambridge: Cambridge University Press.

Weiss, Michael. 2009. *Outline of the Historical and Comparative Grammar of Latin*. Ann Arbor: Beech Stave.

Weiss, Michael. 2016. "The Proto-Indo-European laryngeals and the name of Cilicia in the Iron Age", in Andrew M. Byrd, Jessica DeLisi and Mark Wenthe (eds), *Tavet Tat Satyam. Studies in Honor of Jared S. Klein on the Occasion of His Seventieth Birthday*, 331–40. Ann Arbor: BeechStave.

Yates, Anthony. 2019. "The phonology, phonetics, and diachrony of Sturtevant's Law", *Indo-European Linguistics* 7, 241–307.