

The spelling of clusters of dental stop + sibilant in Hittite¹

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Abstract

In this article it is argued that the Hittite *ts*-sound spelled by *z*-signs was not a monophonemic affricate /tʰ/, as is often assumed, but that Hittite instead contained several clusters of dental stop + sibilant. We can distinguish four of such clusters in intervocalic position: (1) lenis /t/ + lenis /s/, which is spelled *Vz-zV*; (2) lenis /t/ + fortis /s:/, which is spelled *Vz-šV*; (3) fortis /t:/ + lenis /s/, which is spelled *Vz-zV*; and (4) fortis /t:/ + fortis /s:/, which is spelled *Vt-šV*.

Key words: Hittite phonology, affricates, dental stops, cuneiform script.

1. Introduction

It is generally assumed that the Hittite grapheme *z* (i.e., the consonantal part of *zV* and *Vz*-signs) represents a *ts*-sound.² For instance, in common gender nouns ending in a dental stop, like *šiyatt*-‘day’, the nom.sg. form is spelled *šiyaz*, in which *-z* spells the outcome of stem-final **-t-* and the nominative ending **-s*: *šiyaz* < **diéyot-s*. This value of *z* in Hittite matches the fact that in the older stages of Akkadian the phonemes that are traditionally noted down as /s/, /z/, and /š/ were in fact dental affricates, [tʰs], [dʰz] and [tʰsʰ], respectively (Kogan 2011: 66-7).³ This situation must have been present as such also in the Old Babylonian dialect from the speakers of which the Hittites adopted their way of writing.⁴ It must be remarked, however, that in standard Old Babylonian, the *z*-signs represented the phonemes /z/ = [dʰz] and /š/ = [tʰsʰ], but not /s/ = [tʰs], which was spelled with a different set of signs, the *s*-signs. One may therefore wonder why in Hittite the last part of a word like *šiyaz* < **diéyot-s*, which from an etymological point of view must have contained a voiceless *ts*-sound, in fact was spelled with a *z*-sign, which in Old Babylonian represents either a voiced [dʰz] or an emphatic (= glottalized) [tʰsʰ]. The answer probably lies in the fact that in the Northern Syrian version of the Old Babylonian cuneiform script, which generally is seen as the ancestor to the Hittite ductus,⁵ the voiceless affricate /s/ = [tʰs] was spelled by *z*-signs as well. A preliminary research into the way the phoneme /s/ is spelled in late Old Babylonian texts from Alalah (level VII)⁶ shows that in personal names it is usually spelled with *s*-signs, but that in other lexemes it is spelled with *z*-signs. This indicates that the use of *s*-signs for spelling /s/ in personal names can be regarded as semi-logographic spellings, whereas the normal way of spelling /s/ = [tʰs] was with *z*-signs. We may therefore safely assume that this practice of using *z*-signs for denoting a voiceless *ts*-sound was then taken over by the Hittites.

2. Phonetics and phonology of *ts*-sounds in intervocalic position

In most recent handbooks that treat Hittite phonology it is assumed that the *ts*-sound denoted by *z*-signs should be regarded as a monophonemic dental affricate /tʰ/ (Melchert 1994: 96; Vanséveren 2006: 45-6; Hoffner & Melchert 2008: 37-8; Rieken 2011: 39 (with “?”); Kimball 2017: 254-5). This

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² It is sometimes claimed that *z* can in some cases also indicate a voiced sibilant [z] (Kimball 1999: 107; Hoffner & Melchert 2008: 47), but this view should be regarded obsolete (e.g. Kloekhorst 2008: 26³⁸).

³ Whereas the phoneme /š/ was in fact the dental sibilant [ʃ].

⁴ Only in the younger stages of the Akkadian dialects, the affricates were de-affricated, yielding [s], [z] and [sʰ], respectively, whereas the sibilant /š/ = [ʃ] shifted to a more palatal place of articulation, yielding [ʃ]. This means that the transliteration practices of *s*-, *z*-, *š*- and *š*-signs that we use in Hittite and the older stages of Akkadian reflect the pronunciation of these signs in language stages that were spoken centuries later.

⁵ E.g. Rüter & Neu 1989: 15.

⁶ As gathered by Dietrich & Loretz 2004a, 2004b, 2005, 2006.

view was shared by myself as well, e.g. in Kloekhorst 2008: 26; 2014: 22. There are several reasons for postulating a monophoneme /tʰ/. First, just as other CV and VC-signs write a combination of a monophonemic consonant + vowel (e.g. *nV* = /nV/, *Vk* = /Vk/), it stands to reason that the consonantal part of the *zV* and *Vz*-signs is monophonemic as well, just as it is in Akkadian. Second, in e.g. the 3sg.pres.act. ending *-zi*, which reflects PIE **-ti*, the *z* represents the sound that is the outcome of the assibilation of an original monophonemic **t*. It thus would be likely that the sound written by *z* was monophonemic as well: e.g. *e-eš-zi* ‘he is’ /ʔésti/ < **h₁esti*.⁷

Nowadays I have changed my opinion, however. I no longer believe that Hittite possessed a monophonemic affricate /tʰ/. Instead, I think that *z* in all its occurrences represents a consonantal cluster of dental stop + sibilant. In the paragraphs to follow, I will make explicit why I think this by discussing the spelling of *ts*-sounds in intervocalic position. We will see that there seem to have been several ways in which a cluster of dental stop + sibilant could be formed, which is reflected in the different ways that *ts*-sounds are spelled (*Vz-zV* vs. *Vz-šV* vs. *Vt-šV*).

3. Preliminaries: the Hittite consonant system

It is well known that in its phonological system, Hittite knows two types of consonants: fortis ones (which are spelled geminate in intervocalic positions, *VC-CV*) and lenis ones (which are spelled single in intervocalic positions, *V-CV*). In the case of stops, it is often assumed that the difference between the fortis and lenis series was one in voice: fortis stops are then thought to be voiceless (e.g. *Vt-tV* = /t/), whereas lenis stops are thought to be voiced (e.g. *V-tV* = /d/), reflecting their etymological origins: *VttV* < PIE **t* vs. *VtV* < PIE **d^(h)*.⁸ Elsewhere, I have extensively argued that this view cannot be maintained: the difference between fortis and lenis stops is in fact length: fortis stops are long (e.g. *Vt-tV* = /t:/), whereas lenis stops are short (e.g. *V-tV* = /t/).⁹ It is true that lenis stops in intervocalic position probably are voiced (*V-tV* is also spelled *V-dV* = [d]), but this voice is merely allophonic:¹⁰ the underlying phonemic difference is length only. In this way, the spelling rules of stops match those of the other consonants, for which the difference between geminate and single spelling indicates a distinction in length as well: e.g. *Vn-nV* = /n:/ vs. *V-nV* = /n/; *Vš-šV* = /s:/ vs. *V-šV* = /s/. Moreover, the spelling rules of the Hittite stops are thus equal to the rules of Akkadian, where geminate spelling of stops indicates length as well.¹¹

Moreover, it has in the meantime become clear that fortis (long) consonants have the same status as consonant clusters in the sense that in intervocalic position they close the preceding syllable.¹²

4. Interpreting the spelling *Vz-zV*

First I will focus on the interpretation of the spelling *Vz-zV*, as for instance present in the 3sg.pres.act. forms of imperfectives in *-ške/a-*, which are spelled *°š-ke-ez-zi* (occasionally *°š-ke-zi* as well). As we have seen above, in most handbooks it is assumed that in cases like these the spelling *Vz-zV* represents the presence of a monophonemic dental affricate /tʰ/, which means that *°š-ke-ez-zi* would be /°skétʰi/ (as I stated myself as well in e.g. Kloekhorst 2014: 116).

To my mind, this interpretation cannot be upheld anymore. Consider the spellings of the pres.sg. forms of the imperfectives in *-ške/a-*:

- 1sg. *°š-ke(-e)-mi*
- 2sg. *°š-ke(-e)-ši*
- 3sg. *°š-ke-ez-zi* (also *°š-ke-zi*)

As we see, in the 1sg. and 2sg. forms, the vowel of the suffix is sometimes spelled plene.¹³ This represents the fact that this vowel reflects a PIE accented **é*, which is phonetically lengthened when

⁷ In fact, the regular outcome of **h₁esti* was *e-eš-za*, /ʔésta/, to which later on an *-i* was added. For the present argument this is irrelevant, however.

⁸ E.g. Luraghi 1997: 3-4; Kimball 1999: 54; Watkins 2004: 556; Vanséveren 2006: 39-40; Hoffner & Melchert 2008: 35; Weiss 2009: 90; van den Hout 2011: 64; Rieken 2011: 39; Kimball 2017: 252-3.

⁹ Kloekhorst 2008: 21-5; 2014: 544-7; 2016: 214-7.

¹⁰ Kloekhorst 2016: 139-40.

¹¹ Cf. Kloekhorst 2016: 215-6.

¹² Kloekhorst 2014: 21-2, 544-6.

standing in an open syllable:¹⁴ **-ské-mi* > Hitt. [-ské'mi], spelled *°š-ke(-e)-mi*; and **-ské-si* > Hitt. [-ské'si], spelled *°š-ke(-e)-ši*. In the case of the corresponding 3sg. form, *°š-ke-ez-zi* (also *°š-ke-zi*), we never find plene spelling (never ***°-š-ke-e-ez-zi* or ***°š-ke-e-zi*),¹⁵ which means that its vowel is short, [é]. The fact that in this form the accented **é* did not undergo lengthening means that it stood in a closed syllable.¹⁶ This indicates that the spelling *Vz-zV* represents a sound that closes the syllable.

In principle we could therefore assume that the affricate represented by *-zz-* was a fortis, i.e. long consonant: *°š-ke-ez-zi* = /°skét^s:i/.¹⁷ As was mentioned in the preceding section, fortis consonants behave as consonant clusters in the sense that they close a preceding syllable. Moreover, since PIE **t* in principle in intervocalic position yields a fortis consonant, **VtV* > Hitt. *VttV* = /Vt:V/, it makes sense to assume that when it is assimilated by a following **i*, it yields a fortis consonant, too: **-ské-ti* > /°skét^s:i/.

The postulation of a fortis affricate /t^s:/ raises another question, however. All other consonants of Hittite come in pairs: they always show a fortis next to a lenis variant. In the case of fortis /t^s:/ we may therefore ask ourselves to what extent there also was a lenis variant of it, i.e. a short /t^s/.

4a. Fortis *VzzV* vs. lenis *VzV*?

In fact, Yoshida (1998, 2001) has argued that Hittite knew both a fortis and a lenis dental affricate. To his mind, in Old Hittite manuscripts there are indications for a distinction between an original fortis affricate spelled *Vz-zV* and its lenis counterpart spelled *V-zV*. It must be noted, however, that Yoshida assumes that the difference between fortis and lenis consonants is one in voice, so for him fortis *VzzV* represents voiceless /t^s/, whereas lenis *VzV* is voiced /d^z/.

According to Yoshida, the lenis affricate *VzV* is the result of assibilation of an original PIE **t* that stood in a leniting position, i.e. was subject to one of the two following Anatolian lenition rules:¹⁸ (1) it stood after a long accented vowel; or (2) it stood inbetween two unaccented vowels. As examples he mentions the following cases:

<i>*h₁iéh₁-ti</i>	>	<i>*iédi</i>	>	<i>i-e-zi</i>	/-d ^z i/	‘he does’
<i>*uém-je-ti</i>	>	<i>*uémiedi</i>	>	<i>ú-e-mi-zi</i>	/-d ^z i/	‘he finds’
<i>*pói-h₂u-d^heh₁-ti</i>	>	<i>*péhuedi</i>	>	<i>pé-ḫu-te-zi</i>	/-d ^z i/	‘he brings’

There are, to my mind, two problems with this proposal.

First, in word-initial position we see that the assibilation of a lenis dental stop (reflecting PIE **d^(h)*) yields *š-*, not *z-*: e.g. **djéuot-* > Hitt. *šiuat-* ‘day’, **dieu-* > Hitt. *šiu-* ‘god’. This raises the question why a preform like **iédi* did not develop into ***ieši* instead.

Second, and more importantly, Yoshida’s examples of lenis affricates are in fact all occasional spellings.¹⁹ For instance, ‘he does’ is in Old Hittite manuscripts indeed once spelled *i-e-zi* (KBo 6.2 i 60 (OS)), with single spelling of *z*, but the form *i(-e)ez-zi*, with geminate spelling, occurs seven

¹³ Cf. Kloekhorst 2014: 197-8.

¹⁴ Kloekhorst 2014: 26-223.

¹⁵ Cf. Kloekhorst 2014: 107-16.

¹⁶ An anonymous reviewer suggests that the absence of plene spelling in *°š-ke-ez-zi* may be caused by the fact that the syllable was graphically closed, causing the avoidance of plene writing, and that it therefore need not indicate that this syllable contained a short vowel that would point to a phonologically closed syllable. However, the Hittite scribal practice shows no orthographic constraint against plene spelling in closed syllables, especially in OS texts, where we find numerous attestations of e.g. *te-e-ez-zi*, *pé-e-eh-ḫi*, *ke-e-et*, etc. The total absence of plene spelling in *°š-ke-ez-zi* (and in *°š-ke-zi*, for which this alleged orthographic constraint cannot be invoked anyway), not only in OS texts (ca. 20 attestations), but also in MS and NS texts (combined over 550 attestations) (cf. Kloekhorst 2014a: 107-16), can to my mind only be explained by assuming that the vowel of this syllable was short, which in turn can only be explained by its presence in a phonologically closed syllable.

¹⁷ Thus in Kloekhorst 2014: 22.

¹⁸ First formulated by Eichner 1973: 79, 100⁸⁶ and Morpurgo Davies 1982/1983. See Kloekhorst 2014: 547–66 for a detailed treatment of these lenition rules.

¹⁹ See already Kloekhorst 2014: 564²¹⁰⁴ for this criticism.

times,²⁰ and therefore can be regarded as the normal spelling. The word ‘he finds’ is spelled *ú-e-mi-zi*, with single spelling of *z*, once (KBo 6.2 iv 12 (OS)), whereas *ú-e-mi-ez-zi*, with geminate spelling, is attested ten times.²¹ Moreover, we find occasional single spellings of *z* also in words where on the basis of etymology we would expect a fortis consonant. For instance, in imperfectives ending in **-skéti* the **t* does not stand in a leniting position, and we therefore would not expect a lenited outcome here. Nevertheless, next to the sixteen OS attestations with geminate spelling *°š-ke-ez-zi*,²² we once do find *ak-ku-uš-ke-zi* ‘he is drinking’ < **h₁g^{wh}-ské-ti*, with single spelling of its *z* (StBoT 12 iv 26 (OS)).

It is clear that the Old Hittite material does not attest to a systematic difference between geminate spelling *Vz-zV* and single spelling *V-zV*. All cases of single spelling can in principle be viewed as simplified spelling (*i-e-zi* vs. normal *i-e-ez-zi*; *ak-ku-uš-ke-zi* vs. normal *°š-ke-ez-zi*, etc.).²³

We can thus conclude that there is no indication for the presence of a lenis version /t^h/ (or in Yoshida’s terminology, “/d^l/”) besides the fortis /t^s/ that seems to be present in *°š-ke-ez-zi* = /^oskét^s:i/. I am therefore hesitant in postulating the presence of a fortis /t^s/ at all.

4b. A different solution: *VzzV* = /ts/

If we refute the idea of a fortis affricate /t^s/, we still have to explain why accented **é* was not lengthened in **-ské-ti* > *°š-ke-ez-zi* (never spelled ***°š-ke-e-ez-zi* or ***°š-ke-e-zi*). As was mentioned above, the absence of length in *°š-ke-ez-zi* implies that the syllable containing the *e* was closed. Since closing factors are either the presence of a fortis consonant, or the presence of a consonant cluster, I propose that the sequence *Vz-zV* in *°š-ke-ez-zi* (also *V-zV* in *°š-ke-zi*) spells the presence of a cluster /ts/, i.e. a biphonemic combination of the dental stop /t/ and the sibilant /s/.²⁴

5. Interpreting the spelling *Vz-šV*

At first sight, the interpretation of the spelling *Vz-zV* (and *V-zV*) as representing a cluster /ts/, i.e. /t/ + /s/, may seem contradictive, however, to the spelling of the form *e-ez-ši* ‘you eat’ (KBo 22.1 rev. 28 (OS)), where we find *Vz-šV*. Etymologically, *e-ez-ši* unambiguously reflects PIE **h₁éd-si*. Since PIE **d* regularly yields Hitt. lenis /t/, and PIE **s* in principle yields Hitt. /s/, we would *a priori* expect PIE **h₁éd-si* to have yielded Hitt. /^ošétsi/,²⁵ with a cluster /ts/, i.e. /t/ + /s/. The question now arises: if *°š-ke-ez-zi* really represents /^oskétsi/ with a cluster of /t/ + /s/, why is ‘you eat’ spelled *e-ez-ši* and not ***e-ez-zi*?

To my mind, the key to explaining the difference in spelling between *e-ez-ši* and *°š-ke-ez-zi* is formed by another attestation of the word ‘you eat’, namely [*e-za-*]aš-ši (KUB 1.16 iii 29 (OH/NS)). Although the initial part of this form is unfortunately broken, we do see that its latter part shows geminate spelling of the *š*. This implies that the sibilant of the verbal ending in this form was not lenis, but in fact fortis: /-s:i/. This geminate spelling of the *š* of the 2sg.pres.act. ending is also found in the form *e-ku-uš-ši* ‘you drink’ (KUB 1.16 iii 29 (OH/NS)), which unambiguously points to an underlying form /^ošék^w:s:i/, with a fortis /s:/, as well. On the basis of [*ez*]ašši and *ekušši* it is clear that in post-consonantal position²⁶ the 2sg.pres.act. ending was -šši = /-s:i/, with fortis /s:/.²⁷ This means that the

²⁰ *i-e-ez-zi* (KBo 17.43 i 15 (OS), KBo 25.96, 5 (fr.) (OS), KUB 29.29 obv. 10 (OS), KUB 36.107, 8, 9 (OS)), *i-ez-zi* (KBo 6.2 ii 50, 51 (OS)).

²¹ *ú-e-mi-ez-zi* (KBo 6.2 ii 36 (fr.), iii 35 (fr.) 38, 49, 58, 59, iv 11, 49 (OS), KBo 19.2 iii 7 (fr.) (OS), KUB 36.104 obv. 10 (OS)).

²² Cf. the attestations gathered in Kloekhorst 2014: 107-8.

²³ In the case of *ú-e-mi-zi* it seems clear that we are dealing with a real scribal error for *ú-e-mi<-ez>-zi*: otherwise the vowel *e* of the suffix *-ie-* would be absent in spelling.

²⁴ Cf. Kloekhorst 2016: 219-20 for my views on the exact phonetics behind the assibilation of **t* by **i*: PIE **ti* first yielded **[t:i]*, which through **[t:ʃ]* = **[tʃ]* yielded [ts]. This contrasts with the assibilation of **d*: PIE **di* first yielded **[ti]*, which through **[tʃ]* yielded [s].

²⁵ The postulation of a long /ē/ in this word is based on the fact that the PIE form contains a **d*, which caused lengthening of a preceding vowel (cf. Kloekhorst 2012: 258-9; 2014: 230-5, 405-14).

²⁶ Note that the *u* of *ekušši* is not a vowel, but spells the labial feature of the labiovelar that is present in the verbal stem ‘to drink’, /^ošék^w-. This is clear from the alternative spelling *e-uk-ši* (KBo 22.1 rev. 28 (OS)), where the labial feature of /k^w/ is spelled in front of the stop.

spellings *e-ez-ši* and *[e-za-]aš-ši* represent /ʔěts:i/, containing a cluster of /t/ + fortis /s:/. As a consequence, we can maintain our analysis of *°š-ke-ez-zi* as representing /°skétsi/ with a cluster of /t/ + lenis /s/.

In fact, the analysis of *e-ez-ši* as /ʔěts:i/ containing a cluster of /t/ + fortis /s:/ is confirmed by other forms showing the sequence *Vz-šV*. For instance, *tu-ug-ga-az-še-e-et* ‘from his body’ (KUB 17.10 iii 10 (OH/MS)) contains the ablative form *tuggaz* ‘from the body’, to which the enclitic possessive pronoun =ššet ‘his’ is added. Since this possessive pronoun shows geminate spelling of its sibilant in cases where it is attached after a word ending in a vowel (e.g. *pedi=šši* ‘at his place’), there can be no doubt that its initial consonant is fortis, /s:V-. As a consequence, it is clear that also in *tu-ug-ga-az-še-e-et* the spelling *Vz-šV* spells a cluster of /t/ + fortis /s:/. This is moreover corroborated by the form *tu-ug-ga-za-aš-ši-it* ‘from his body’ (KBo 13.99 rev. 13 (NS)) in which the fortis character of /s:/ is overtly expressed by geminate spelling. Another such case is e.g. *ka-ra-a-az-ša-an* (KUB 17.10 ii 14 (OH/MS)), which can be analysed as *karāz* ‘entrails (nom.sg.)’ + =ššan (clause initial particle). The fortis character of the sibilant in =ššan is supported by post-vocalic spellings like *nu-uš-ša-an* = *nu=ššan*. Likewise *ku-un-na-az-še* (KBo 30.39 iii 18 (OH/MS)), which is *kunnaz* ‘right (abl.)’ + =šše ‘to him/her’: the fortis character of the sibilant of =šše is showcased by spellings like *nu-uš-še* = *nu=šše*. It is therefore clear that also in *ka-ra-a-az-ša-an* and *ku-un-na-az-še* the sequence *Vz-šV* spells a cluster of /t/ + fortis /s:/.²⁸

We can conclude that next to the spelling *Vz-zV* (sometimes also *V-zV*), which was postulated to denote a cluster of /t/ + lenis /s/, the spelling *Vz-šV* (sometimes also *V-za-aš-šV*) represents a cluster of /t/ + fortis /s:/.

6. Interpreting the spelling *Vt-šV*

Next to the spellings *Vz-zV* (*V-zV*) and *Vz-šV* (*V-za-aš-šV*), we find a third way of writing a *ts*-sound, namely *Vt-šV* as attested in forms like *a-ni-at-še-et*, *a-pa-a-at-ši*, *ku-it-ša-an*, *na-at-ša-an*, *na-at-ši*, etc. What to think of this spelling? In all cases mentioned, we are dealing with a word or morpheme ending in a dental stop, to which an enclitic starting in a sibilant is attached: *aniat* ‘task (nom.-acc.sg.)’ + =ššet ‘his/her’, *apāt* ‘that’ + =šši ‘to him/her’, *kuit* ‘what’ + =ššan (clause initial particle), *nu* (conj.) + =at ‘it’ + =ššan (clause initial particle), *nu* (conj.) + =at ‘it’ + =šši ‘to him/her’. Moreover, in all cases we know that the sibilant of this enclitic is a fortis one, since in postvocalic position they show geminate spelling: *pedi=šši*, *nu=šši*, *nu=ššan*. It may therefore seem puzzling why these forms are not spelled with *Vz-šV* as is the case in *e-ez-ši* = /ʔěts:i/ ‘you eat’, or *tuggazšet* = /tuk:áts:et/ ‘from his body’, which contain a fortis /s:/ as well.

One may try to answer this question by assuming that *Vt-šV* is a spelling that is used as a graphic device to mark a morpheme boundary. By using this spelling it would be clear to the reader that we are dealing with a combination of *aniat* + =ššet, *apāt* + =šši, etc. However, if this were true, and if thus the sound spelled by *Vt-šV* would be phonetically the same as the sound expressed by either *Vz-zV* or *Vz-šV*, it would be puzzling to me why we *never* find a case in which a non-morphological spelling is used. Especially the forms *na-at-ša-an* and *na-at-ši* are telling: together they are attested more than 250 times, *always* spelled *Vt-šV*. If these words contained the same sound as expressed by either *Vz-zV* or *Vz-šV*, why do we *not even once* find the spellings ***na-az-zV(-)* or ***na-az-šV(-)*? To my mind, this is a clear indication that the spelling *Vt-šV* represents a sound different from *Vz-zV* = /ts/ and *Vz-šV* = /ts:/, and that it is not used to mark a morpheme boundary. This is supported by the theonym ^d*Haratši-*, which is consistently spelled ^d*ha-ra-at-ši-*, with *Vt-šV* (attested eleven times, cf. Van Gessel 1998: 93-4), but *never* ***^dha-ra-az-zi-* or ***^dha-ra-az-ši-*. The spelling of this name, which is morphologically unanalysable, clearly indicates that *Vt-šV* is not a graphic device to mark a morpheme

²⁷ It thus contrasts with the postvocalic variant of this ending, which was *-ši* = /-si/, with lenis /s/, as can be seen in e.g. *te-ši* ‘you speak’, *i-ja-ši* ‘you do’, etc.

²⁸ An anonymous reviewer suggests that a spelling like *tu-ug-ga-az-še-e-et* is non-probative since it may be used to make it easier to recognize the ablative form, which without an enclitic would be spelled *tu-ug-ga-az*. The spelling *Vz-šV* would thus be morphological (which is suggested for *Vt-šV* as well, see the next section). However, this reasoning would not work for *e-ez-ši*. The reviewer’s suggestion that the spelling of *e-ez-ši* is analogical after 3sg. *e-ez-za-az-zi* is unattractive: on the basis of 1sg.pres. *e-et-mi* and 2sg.impt. *e-et*, we would expect that a hypothetical ‘morphological spelling’ of the 2sg.pres. form should have had the shape ***e-et-ši*.

boundary,²⁹ but that it here must represent a specific sound that is distinct from the sounds denoted by Vz-zV and Vz-šV. This sound must then be present in *aniatšet*, *apātši*, etc. as well.

I have argued elsewhere that Hittite knew word-final postvocalic fortis stops going back to PIE voiceless stops, like in nom.-acc.sg. *šepit* ‘grain’ = /sép:it/ < *sép-it.³⁰ Since most of the words spelled by Vt-šV contain a lexeme that ends in a dental stop that etymologically reflects a PIE *t (e.g. *kuit* < PIE *k^wit),³¹ I propose that the spelling Vt-šV represents /-t:s:/:, i.e. a cluster of fortis /t:/ and fortis /s:/. This means that a form like *ku-it-ši* can be analyzed as /k^wit:s:i/, in which *kuit* ends in a fortis /t:/, /k^wit:/, and =šši starts with a fortis /s:/, =s:i/. In the same way, we can analyse the other forms containing the spelling Vt-šV as follows: *a-ni-at-še-et* = /əniát:s:et:/, *a-pa-a-at-ši* = /ʔapát:s:i/, *ku-it-ša-an* = /k^wit:s:an/, *na-at-ša-an* = /nat:s:an/, *na-at-ši* = /nat:s:i/, and ^d*ha-ra-at-ši* = /χ(a)rat:s:i-/.

7. Preliminary conclusions

On the basis of the foregoing sections, we can conclude that Hittite contained at least three different types of clusters of dental stop + sibilant, which were spelled in different ways:

1. A cluster of lenis /t/ + lenis /s/ is spelled as Vz-zV (or V-zV), e.g. ^o*š-ke-ez-zi* = /^oskétsi/
2. A cluster of lenis /t/ + fortis /s:/ is spelled as Vz-šV (or V-za-aš-šV), e.g. *e-ez-ši* = /éts:i/
3. A cluster of fortis /t:/ + fortis /s:/ is spelled as Vt-šV, e.g. *ku-it-ši* = /k^wit:s:i/

Having identified these three clusters, we may ask ourselves whether the theoretically possible fourth cluster, namely consisting of a combination of fortis /t:/ + lenis /s/, existed as well. I believe it did.

8. In search of /t:/ + /s/

In order to investigate whether clusters of the shape /t:/ + /s/ existed, we have to look at imperfectives of verbs whose root ends in a lenis stop. It is well known that the root-final lenis stop of such verbs undergoes fortition before the imperfective suffix *-ské/ó-. For instance, *eku-zi* / *aku-* ‘to drink’, which has a root-final lenis /k^w/ < *g^{wh}, shows in its imperfective the spelling *ak-ku-uš-ke/a-*, with geminate spelling of the labiovelar, which represents a form /ək^w:sk:é/á-/ with fortis /k^w:. This means that PIE *g^{wh} has undergone fortition in the form *h₁g^{wh}ské/ó- > /ək^w:sk:é/á-. Likewise in the verb *lāk-i* / *lak-* ‘to knock out’, which has a root-final lenis /k/ < PIE *g^h: its imperfective is spelled *la-ak-ki-iš-ke/a-*, with geminate spelling of the velar stop, pointing to a phonological form /lək:isk:e/a-/ with fortis /k:/. This means that the PIE consonant *g^h underwent fortition in the form *lg^hske/o-, which first yielded pre-Hitt. */lək:sk:e/a-/ which, with regular epenthesis, yielded the form /lək:isk:e/a-/ that is attested as *lakkiške/a-*.

8a. A cluster /t:/ + /s/ in *azzikke/a-*

On the basis of these examples, we may assume that a similar fortition affected original lenis dental stops as well. This means that for the verb *et-zi* / *at-* ‘to eat’, which contains a root-final lenis /t/ < PIE *d, we can expect that its imperfective *h₁dské/ó- yielded a form with a fortis /t:/, /ət:sk:é/á-. It would then be this form that underlies the Middle Hittite imperfective stem spelled *az-za(-aš)-ke/a-* (no Old Hittite attestations are known). Interestingly, within the Middle Hittite period the stem *azza(š)ke/a-* undergoes an epenthesis, yielding the form that is spelled as *az-zi-ik-ke/a-* (attested in MH and NH texts). Being the younger, epenthesized outcome of *azza(š)ke/a-* = /ət:sk:é/á-, we may assume that

²⁹ According to an anonymous reviewer, this theonym, which clearly is of a non-Hittite origin, is “etymologisch unklar, so dass man nicht weiß, ob in der betreffenden Sprache nicht doch eine Morphemgrenze vorliegt”. This suggestion is unverifiable, however, and therefore cannot be used as an argument. Moreover, the idea that a morpheme boundary in words like *apātši*, etc. should be marked is based on the concept that in this way the different morphemes still retain the spelling that they show when they occur independently (so *apātši* because of independent *apāt*). However, there is no evidence whatsoever that an independent element **^d*harat* would have existed that would have been the impetus for the spelling ^d*haratši*. I thus maintain that this theonym shows that the spelling Vt-šV represents a sound that differs from the sounds spelled Vz-zV and Vz-šV.

³⁰ Cf. Kloekhorst 2016: 221-2.

³¹ Cf. Kloekhorst 2018: 197 for the view that Hitt. *kuit* reflects PIE *k^wit, and thus synchronically must have been /k^wit:/, with a fortis word-final /t:/.

azzikke/a- represents a phonological form /ət:sik:é/á-/,³² with an intervocalic cluster of fortis /t:/ + lenis /s/.

If these considerations are correct, we would have to assume that in *az-zi-ik-ke/a-* the cluster consisting of fortis /t:/ + lenis /s/ is spelled as Vz-zV. However, it is remarkable that this is the exact same way that the cluster consisting of lenis /t/ + lenis /s/ is spelled in e.g. °š-ke-ez-zi = /°skétsi/. One may therefore wonder whether the interpretation of *az-zi-ik-ke/a-* as representing /ət:sik:é/á-/ is correct. Should this form not just reflect /ətsiké/á-/ , with a lenis /t/?

8b. An additional argument in favor of *azzikke/a-* = /ət:sik:é/á-/

To my mind, there exists an additional argument in favor of the interpretation of *azzikke/a-* as /ət:sik:é/á-/ , with a cluster of fortis /t:/ + lenis /s/. This argument follows from an investigation of imperfectives of verbs that have a root structure CVRt-.

Hittite verbs of the structure CVRt-, like *ḫuḫart-i* ‘to curse’, *išpānt-i* ‘to libate’ and *mālt-i* ‘to recite’, show imperfectives that are spelled CVRza(š)ke/a-. Thus, the imperfective of *ḫuḫart-i* is spelled *ḫur-za-ke/a-*, *ḫur-za-aš-ke/a-*; the imperfective of *išpānt-i* is attested as *iš-pa-an-za-ke/a-*, *iš-pa-an-za-aš-ke/a-*; and the imperfective of *mālt-i* is written as *ma-al-za-ke/a-*, *ma-al-za-aš-ke/a-*. In all cases, we may assume that the spelling CVRza(š)ke/a- represents an underlying cluster /°Rtsk:°/, i.e. /χortsk:é/á-/ , /ispəntsk:é/á-/ , and /məltsk:é/á-/ , respectively. Interestingly, all imperfectives of this structure retain their shape throughout the history of Hittite. E.g. *išpanza(š)ke/a-* is attested in this way in OH, MH, and NH texts; *ḫurza(š)ke/a-* is attested as such in MH and NH texts; and *malza(š)ke/a-* occurs in NH texts. None of them undergoes epenthesis: we never find forms like ***ḫurzikke/a-*, ***išpanzikke/a-* or ***malzikke/a-*. This is strikingly different from the development of the imperfective of *et-zi* / *at-* ‘to eat’. As we saw in the preceding section, in MH texts its imperfective is spelled *azza(š)ke/a-*, but half-way the MH period it changes to *azzikke/a-*, which is the only attested form in NH texts. The *-i-* of *azzikke/a-* is thus an epenthetic vowel that arose in the original cluster of *azza(š)ke/a-*.

The question now is: why did an epenthetic vowel develop in *azza(š)ke/a-* > *azzikke/a-*, but not in *ḫurza(š)ke/a-*, *išpanza(š)ke/a-* and *malza(š)ke/a-*? We would *a priori* expect that epenthesis arises earlier in heavier consonant clusters than in lighter ones. If we assume that *azza(š)ke/a-* renders a phonological form /ətsk:é/á-/ , with a cluster /-tsk:-/, its cluster would be lighter than the clusters in *ḫurza(š)ke/a-*, *išpanza(š)ke/a-* and *malza(š)ke/a-*, which are /-rtsk:-/, /-ntsk:-/ and /-ltsk:-/, respectively. It would then be incomprehensible why *azza(š)ke/a-* did undergo epenthesis, whereas *ḫurza(š)ke/a-*, *išpanza(š)ke/a-* and *malza(š)ke/a-* did not. However, if we assume that the lenis /t/ of *et-zi* / *at-* indeed underwent fortition in its imperfective stem (like in *akkuške/a-* and *lakkiške/a-*), and *azza(š)ke/a-* thus denotes /ət:sk:é/á-/ with a cluster /-t:sk:-/, then we can understand why its cluster counted as heavier than the cluster /-Rtsk:-/ as present in *ḫurza(š)ke/a-* = /χortsk:e/a-/ , *išpanza(š)ke/a-* = /ispəntsk:é/á-/ , and *malza(š)ke/a-* = /məltsk:é/á-/.³³ It would then be perfectly understandable why *azza(š)ke/a-* underwent epenthesis to *azzikke/a-*, whereas *ḫurza(š)ke/a-*, *išpanza(š)ke/a-* and *malza(š)ke/a-* did not develop such an epenthetic vowel.

In other words, the rise of an epenthetic vowel in *azza(š)ke/a-* to *azzikke/a-* can be regarded as an extra argument that its cluster contained a fortis /t:/, the presence of which was expected on the basis of fortition of root-final lenis stops in imperfective stems like *akkuške/a-* < **h₁g^{wh}ské/ó-* and *lakkiške/a-* < **lg^hské/ó-* anyway. We can therefore safely assume that *azzikke/a-* represents /ət:sik:é/á-/ , containing an intervocalic cluster consisting of fortis /t:/ + lenis /s/, which is the combination that we were

³² We may likewise assume that Hitt. *ḫazzikke/a-*, imperfective to *ḫatt-a(ri)*, *ḫazzije/a-zi* ‘to pierce, to prick, to hit’ represents /χat:sik:é/á-/ < **h₂et-ské/ó-* or /χət:sik:é/á-/ < **h₂t-ské/ó-*. Note, however, that this stem is only attested in NS texts, whereas OS and MS texts show *ḫazziške/a-* /χətsisk:é/á-/ < **h₂t-i-ské/ó-* and *ḫazziješke/a-* /χətsiesk:e/a-/ < **h₂t-ie-ske/o-*, which are derived from the active stem *ḫazzije/a-* < **h₂t-ie/o-* (cf. Kloekhorst 2008: 330). It therefore is not fully clear to what extent NH *ḫazzikke/a-*, which seems to be derived from the middle stem *ḫatt-*, is an original formation (see Kloekhorst 2008: 332 for a discussion, parts of which I would not endorse anymore). Nevertheless, synchronically the form *ḫazziške/a-* undoubtedly must have contained a cluster /-t:s-/ , too.

³³ This requires that we assume that the fortition of root-final lenis stops before **-ske/o-* is blocked by a preceding resonant. So, although PIE **h₁dské/ó-* yielded Hitt. /ət:sk:é/á-/ , with a fortis /t:/, PIE **spndské/ó-* developed into Hitt. /ispəntsk:é/á-/ with a lenis /t/.

looking for. Moreover, this form shows that this cluster is represented in writing the same way that a cluster of *lenis* /t/ + *lenis* /s/ is spelled, namely as Vz-zV.

9. Final conclusions

On the basis of all the foregoing considerations, we can conclude that Hittite did not contain a monophonemic dental affricate /tʃ/. Instead, it contained several different clusters of dental stop + sibilant. In this paper we have discussed four of such clusters and the way they are spelled in intervocalic position:

1. A cluster of *lenis* /t/ + *lenis* /s/, which is spelled Vz-zV (also V-zV), e.g. *°š-ke-ez-zi* = /-skétsi/
2. A cluster of *lenis* /t/ + *fortis* /s:/, which is spelled Vz-šV (also V-za-aš-šV), e.g. *e-ez-ši* = /ʔéts:i/
3. A cluster of *fortis* /t:/ + *lenis* /s/, which is spelled Vz-zV, e.g. *az-zi-ik-ke/a-* = /ət:sik:é/á-/
4. A cluster of *fortis* /t:/ + *fortis* /s:/, which is spelled Vt-šV, e.g. *ku-it-ši* = /kʷit:s:i/

A discussion of the exact ins and outs of the spelling of these clusters in word-initial and word-final position, or as part of larger clusters, remains a task for the future.

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