On the Sounds Rendered by the *s*-, *š*- and *ṣ/z*-Series in Elamite*

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1. Introduction

The study of Elamite phonology is a difficult task. Four reasons make it extremely hard to get a hold on how the Elamites pronounced their language (Reiner 1969:71; Grillot-Susini–Roche 1987:10; Khačikyan 1995:105; Krebernik 2005:161). Firstly, Elamite is written by means of the Sumero-Akkadian cuneiform writing system, a script which was not devised for expressing Elamite. As a result of this, the Sumero-Akkadian cuneiform signs cannot render in a clear way all Elamite phonemes, and as a consequence of this, some signs had to render more than one phoneme. Secondly, given the isolated status of Elamite, there is no comparative linguistic material for the study of Elamite phonology. Although McAlpin (1981) reconstructed a Proto-Elamo-Dravidian substrate language and thus proposed a connection between Elamite and the Dravidian languages, the link between them is still too weak to allow far-going conclusions on Elamite phonology. Thirdly, one should keep in mind the possibility of Elamite dialects, which may touch on phonological issues. Finally the phonological system also had its own diachronic development.[1]

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[1] Basically there are five diachronic stages in the development of the Elamite language. The first one is Old Elamite (ca. 2300–1500 BC), followed by Middle Elamite (ca. 1500–1000 BC), Early Neo-Elamite (NE I; ca. 1000–650 BC), Late Neo-Elamite (NE II; ca. 650–550 BC) and Achaemenid Elamite (ca. 550–330 BC). This framework is relevant not only for Elamite phonology, but also for mor-

Possibly because of these reasons, the recently published Elamite grammars (Grillot-Susini–Roche 1987; Khačikyan 1998; Stolper 2004; Krebernik 2005) devote relatively little attention to Elamite phonology.

Nevertheless, these difficulties should not deter the scholar from trying to solve the mysteries of Elamite phonology given that there are three types of sources which enable him / her to conduct such a study.

(1) Transcriptions of non-Elamite words in Elamite texts (Iranian, Akkadian and West-Semitic proper names and loanwords).
(2) Transcriptions of Elamite proper names and words in non-Elamite texts.
(3) Spelling variants within Elamite texts themselves.

These sources can easily be divided into two groups: internal data have no connection whatsoever with a non-Elamite language (No. 3), whereas external data (nos. 1–2) do have a connection with text attestations in languages other than Elamite.

This article focuses on a particular phonological issue, the sounds rendered by the *s*-, *š*- and *ṣ/z*-series in Elamite. It is not certain how many sibilants and/or affricates Elamite possessed (Foy 1898:129; Reiner 1969:72–73) and therefore several scholars have published various ideas on this topic. With Old Persian phonology in mind, Westergaard (1845:343, 348–349, 355–356) believed in the existence of El. /č/, /s/, /š/ and /z/. Holtzmann (1851:147, 154, 168–169; also Weissbach 1890:47 and Grillot-Susini–Roche 1987:10) accepted the existence of /s/, /š/ and /z/. Four years later Norris (1855:39, 44 and 50) mentioned /č/, /ç/, /s/ and /θ/, whereas according to Mordtmann (1862:31) Elamite possessed /ç/, /s/, /θ/ and /z/. Other scholars assume the existence of only /s/, /š/ and /č/ (Hüsing 1898:15; Bork 1910:569–571 and 1925:74; Weidner 1917:32; Paper 1955:25–29; Reiner 1969:72; McAlpin 1981:65, 90–91). In his study on Proto-Elamo-Dravidian (PED) McAlpin includes a historical phonology of these three phonemes. PED /*š/ remained /š/ in Elamite (whereas it disappeared in Dravidian). PED /*c/ became Proto-Elamite /*c/, but subsequently had a more complicated development, as the following table shows:

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phology and syntax. Only with regard to the writing system it should be slightly modified, in the sense that the Middle Elamite period is divided into two subdivisions: Classical Middle Elamite (the royal inscriptions) and Late Middle Elamite (the administrative tablets from Tall-i Malyān).

Phonetic context	Middle Elamite	Achaemenid Elamite
Before /a/	/*c/ > s	/*c/ > s
	/*c/ > z (= /č/) (rarely)	
Before /e/, /i/	/*c/ > s	/*c/ > z (= /č/)
	/*c/ > z (= /č/) (rarely)	
Before /u/	/*c/ > z (= /č/)	Not mentioned[2]
	/*c/ > s (rarely)	

In reality, however, these rules do not withstand critical research. For example, many times /č/ precedes /a/ and this /č/ cannot have other origins than from PED /*c/ in McAlpin's view.

Khačikyan (1995:105–107; 1998:7–8) has two alveolar fricatives (/s/ and /š/) and two affricates (/c/ and /č/). Stolper (2004:71) postulates at least three fricatives, transcribed as *s*, *š* and *z*, and an affricate /č/. Labat (1951:28) denies the existence of /θ/ and has doubts on /č/, whereas Steve (1992:14) cautiously mentions /ž/ and /ğ/. Recently Krebernik (2005:162) has mentioned /s/, /š/, /z/ with their respectively geminated variants. Finally Henkelman (2008:278, n. 635) assumes the existence of an affricated dental /tˢ/. All together eight fricatives (/ç/, /s/, /ss/, /š/, /šš/, /θ/, /z/ and /zz/) and five affricates (/c/, /č/, /ğ/ and /tˢ/ and /ž/) have been mentioned in previous publications.

Some phonemes are accepted by almost all scholars: /č/, /s/, /š/ and, to a lesser extent, /z/, whereas others (/c/ /ç/, /ğ/, /tˢ/, /θ/ and /ž/) are only mentioned in the works of one or two authors.

Three types of signs may render sibilants or affricates: the *s*-signs, the *š*-signs and the ṣ/z-signs. A problem that emerges when studying the sibilants is that the VC-signs (e. g. ÁŠ) may render various sibilants (*áš* = *ás*; *is* = *iz*, etc.). Also CV-signs, which generally have a clearer distinction, may be confusing, e. g. *zu* may be read as *sú*. Another problem is that the cuneiform writing system is not apt to express affricates. Finally it should be noted that CVC-signs will not be used in this discussion because of their ambiguity as to the precise character of the consonants they express.

2. **Non-Elamite expressions in Elamite texts**

The first step in the study of Elamite sibilants and affricates is an analysis of Elamite renderings of non-Elamite expressions, especially of Akkadian

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[2] As the sign ZU had disappeared by the Achaemenid period, a clear distinction between /cu/ and *su* cannot be made.

and Old Iranian ones (cf. Foy 1898:128–129; Cameron 1948:40–45 and 1954–1959:471; Paper 1955:29–30;[3] Khačikyan 1995:106–107 and 1998: 7–8). There are not many Akkadian expressions rendered in Elamite, in contrast to the numerous Iranian proper names and loanwords appearing in Achaemenid Elamite texts. Nevertheless the Akkadian expressions are important, since they are, contrary to the Iranian proper names and loanwords, not limited to the Neo-Elamite and Achaemenid period. Although CVC-signs are not valuable for this study, one example of an Akkadian sibilant (*ziqquratu*) rendered by CVC-signs, is here included, since it is the only attestation of Akkadian /z/ in Elamite.

Table 2: Akkadian and Aramaic names and words in Elamite

Akkadian	Period	Elamite
Attar-sūrī- (Aramaic), PN	AE	ᴴᴬᴸAt-tur-r[u-i]š-šu-ri-iš
Bēlšunu, PN	AE	ᴴᴬᴸBe-ul-šu-un
ešertu 'chapel, shrine'	ME	ᴬŠi-ši-ir-tu
kiššu 'bundle' (pl. *kišati*)	ME	ki-ša-a-ti
Išme-karāb, a theonym	ME	ᵈIš-ni-ka₄-ra-ab
Man-ištūšu, a royal name[4]	ME	Ma-an-iš-du-uz-zu
misarru '(metal) band'	ME	mi-za-ru-um
mīšaru 'justice'	ME	mi-ša-ri
nikassu 'account'	AE	nu-ik-kás-su-um-me
nisannu month name	AE	nu-šá-an
paspasu 'duck'	ME	ba-as/z-ba-as/z
	AE	ba-is/z.KIMIN
pašīšu anointing priest	NE I–II	ba-ši-šu
qištu 'wood, forest'	ME	ki-iš-tu₄-um
Sîn-qatēni, PN	AE	ᴴᴬᴸŠi-in-ka₄-tan-na
ṣalmu 'statue'	ME	sa-al-mu-um (1 time)
	ME	za-al-mu (14 times)
	NE I	za-al-mi (1 time)
	NE I	za-al-mu (11 times)
	NE II	za-al-mi (2 times)
	NE II	za-al-mu (14 times)
	AE (AHam)[5]	za-al-mu (3 times)

[3] Paper made the mistake of including Babylonian renderings of Old Persian names and loanwords in his table of sibilant correspondence-sets. These names and loanwords, however, do not yield reliable information on Elamite phonology, but rather on Old Iranian phonology.

[4] The later spelling of this name is *Ma-ni-iš-ti-iš-šu* (Steinkeller 1987–1990:334).

[5] The inscription on a stela of Atta-ḫamiti-Inšušinak (EKI 86–89) was formerly dated to the second half of the 7th century BC (Vallat 1996:391) but recently the idea was expressed that this king could very well be identical with the rebel

Akkadian	Period	Elamite
ṣalmu 'statue' (contd.)	AE	za-ul-man (3 times)
ṣimittu 'bundle of silver scrap'	ME	si-mi-it-tum$_4$, si-mi-it-tu$_8$-um
ṣīt šamši 'sunrise'	ME	si-it-ša-am-ši
Šamaš-gerra, PN	AE	^{ḪAL}Ša-ma-iš-ki-la/ra
šaqû 'high'	ME	ša-qu-tu$_4$
ziqquratu 'ziggurat'	ME	sig-ra-tu$_4$-me (1 time)
	ME	zak-ra-tu$_4$-me (3 times)
	NE II	zik-kur-ti-um (1 time)

As can be seen in this overview Akkadian (and Aramaic) /s/ is rendered in Elamite by the three types of signs indicating sibilants: s (*nikassu*), š (Attar-sūrī-, *nisannu*, Sîn-qatēni) and ṣ/z (*misarru*), albeit more frequently by š. Akkadian /ṣ/ is rendered by s in the Middle Elamite texts from Tal-i Malyān (*ṣimittu* and *ṣīt šamši*) and by ṣ/z in other texts (*ṣalmu*); only once is it written with s (*ṣalmu*). Elamite š-signs are the only ones used to render Akkadian /š/ (Bēlšunu, *ešertu*, *kiššu*, Išme-karāb, *mīšaru*, *pašīšu*, *qištu*, Šamaš-gerra, *šaqû*), except for the rendering of Man-ištūšu. The rendering of Akkadian /z/ by CVC-signs makes it difficult to draw any conclusions about it.

Numerous Iranian proper names and words are transcribed in Neo- and Achaemenid Elamite texts. Accordingly they are a very important source for the study of late Elamite sibilants. The Elamo-Iranian transpositions may be divided into four categories: (1) directly transmitted Iranica, (2) semi-directly transmitted Iranica, (3) non-Iranian proper names and loanwords in Old Persian and (4) indirectly transmitted Iranica. The first two categories are the basis for the Elamo-Iranian transpositional system and are also most important for the study of Elam-

Aθamaita- mentioned in Darius' Bīsītūn Inscription (Waters 2000:85; Tavernier 2004:22–29; Henkelman 2008:291). In a rather haughty tone Vallat has criticized this idea, which he has consigned to the "poubelles de l'Histoire" (Vallat 2006:61). Vallat bases his criticism on one sentence in an unpublished text from Atta-ḫamiti-Inšušinak. It goes as follows: "Comme Šutur-Naḫḫunte, fils de Ḫumban-immena, manœuvre à Ayapir, j'ai mâté son armée" (Vallat 2006:59). According to Vallat this sentence proves that Šutur-Naḫḫunte and Atta-ḫamiti-Inšušinak must have been contemporaries. Leaving aside the methodological error of citing unpublished sentences exclusively in translation and without their context, a remark must still be made: it is by no means sure that the Atta-ḫamiti-Inšušinak cited by Vallat is the same individual as the Atta-ḫamiti-Inšušinak of the stela. As long as Vallat presents his arguments in such a way, they cannot be convincing and therefore I see no reason to change my point of view concerning this issue.

ite phonology. In the first category, the names and words whose Iranian original is attested in Old Persian are collected. As there are no Old Iranian texts dating from the Neo-Elamite period, there are no Neo-Elamite Iranica belonging to this category. The second group includes Neo-Elamite and Achaemenid Elamite Iranica that differ only slightly from an attested Old Persian name or word, for example because a proper name or loanword belongs to another Iranian dialect or because it is a younger equivalent of an Old Persian name or word. The third category contains non-Iranian names and loanwords that were transmitted to Elamite through Old Persian. The fourth category is composed of Iranica whose Iranian original is not preserved, but which can be reconstructed according to the transpositional system constructed on the basis of the expressions of categories one and two (Tavernier 2007:3–4).

Old Iranian /č/ is mostly rendered by ṣ/z-signs. More seldom it is expressed by s- or t-signs. The sequence /ču/ had to be rendered by SU, because ZU had disappeared from the syllabary and was no longer available for the scribes. Old Iranian /ç/ was always written by means of š-signs. There is only one exception to this: *dauçaka- 'sacrifice,' appears in Elamite as da-u-si-ka₄ (Hinz 1973:108–109 and 1975:91; Koch 1977:127; Henkelman 2008:212–213; Tavernier 2007:462, No. 4.4.22.8). Old Iranian /j/ is almost exclusively expressed by El. ṣ/z-signs. /Ju/ is expressed by SU because of the lack of ZU and the name *Jīča- is once spelled Si-iz-za (Tavernier 2007:220, No. 4.2.895). Old Iranian /s/ and /š/ are rendered by š-signs, with two exceptions: *patisēka-, a kind of payment, is twice written bat-ti-zé-kaš (Hallock 1969:135, 676; Tavernier 2007:444, No. 4.4.10.15) and *Pēšiyāhvādiya- appears mostly as Be-zí-ia-ma-ti-ia (Tavernier 2007:74, No. 2.3.36). Old Iranian /z/ is mostly represented by El. ṣ/z-signs, but El. š-signs could also be used to render this phoneme. Because of the already mentioned problem with ZU, the sequence /zu/ was rendered by SU, which could also be used in order to write /za/ before /w/. Finally Old Iranian /ž/ was rendered by El. s-, š- or ṣ/z-signs.

The Elamite s- and š-series were, next to the d/t-series, also used for the transcription of Iranian /θ/.

3. Elamite expressions in Akkadian texts

The second step is to study Elamite expressions in Akkadian texts. It should be noted that reconstructed Elamite forms are not included in the general conclusions derived from this table.

Table 3: Elamite names and words in Akkadian (see also Krebernik 2006:84–90)

No.	Elam. spelling	Elam. period	Akk. spelling	Akk. period
1	ak-sir[6]	ME, NE II	ak-si-ir[7]	OBSu
	ak-sír[7]	ME	ak-še-er	OB
	ak-še-ir	ME, AE	ak-sìr[7]	MB
	ak-ši-ri[7]	NE II		
	ak-ši-ra	AE		
2	Az-za-za	NE II	A-za-za	OAkk.
3	ᴮᴱ/ᴴᴬᴸḪal-lu-iš	NE II, AE	el-ta-aš[7]	OBSu
			ᵐḪa-lu-si	NA
			ᵐḪa-lu-su	NA
			ᵐḪal-lu-si	NA
			ᵐḪal-lu-ši	NA
			ᵐḪal-lu-šú	NB
4	ḫal-taš[7]	NE II	ḫal-taš[7]	OBSu
	ᴴᴬᴸḪal-da-iš	AE	al-da-a-še	NA
			al-da-še	NA
			al-da-si	NA
			al-da-su	NA
			ḫal-da-a-šú	NA
			al-da-šú	NB
			ìl-da-šú	NB
5	ḫa-né-eš[7]	OE	ḫa-né-eš	Ur III, OB
	ḫa-ni-iš	ME, NE II	ḫa-ni-iš[7]	OBSu
6	*hašša		ḫa-aš-ša	OBSu
7	*hupiririša		ḫu-pír-ri-ri-ša	OBSu
8	ḫu-ši-°	NE II, AE	ḫu-si-°[7]	OBSu
9	*hutliš		ḫu-ut-li-iš	OBSu
10	ᵈKi-ri-ri-ša	ME, NE II[7]	Ki-ri-ri-ša	OBSu, MBSu
	ᵈKi-ri-ri-šá	AE		
11	ᵈKir-wa-si-ir	OE	Ki-maḫ-si-ir	OAkk.
	ᵈKir-ma-sir	ME	ᵈKi-ir-me-si-ir	MBHT
			ᵈKi-ir-wa-si-ir	MBHT
			ᵈKi-ir-≪sa≫-ma-as	NA
12	*Kutuzuluš		Ku-du-šu-lu-uš	OBMa
			Ku-du-zu-lu-uš	OBSu
13	*kuššuku		Ku-uš-šu-ki	OBSu
14	*Kušum		Gu-šum	OBSu
			Gu-ú-šum	OBSu

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[6] As an element in anthroponyms and toponyms.

[7] Attested as an abbreviated form Kiriša (ᵈKi-ri-iš-ša) in EKI 76:34.

No.	Elam. spelling	Elam. period	Akk. spelling	Akk. period
15	*kutuhtaš		Ku-du-uḫ-ta-aš	OBSu
16	*liriša		li-ri-šà	OBSu
17	*lurs/šu		lu-ur-si	OBSu
			lu-ur-ši	OBSu
			lu-ur-šu	OBSu
18	ᵈMa-zi-at	OE	ᵈMa-an-zi-at	Ur III
	ᵈMa-an-za-at	ME	ᵈMa-an-zi-it	Ur III
	ᵈMa-za-at	ME	ᵈMa-an-za-at	OA, OB, MB, MBHT, NA, NB
19	ᵈNa-pi-ri-ša	ME	ᵈNa-pi-ri-ša	OBSu
			ᵈNa-ap-ri-si	NA
20	pa-ḫaš[8]	ME	Pa-ḫa-aš	OBSu, MBHT
21	*šarnup		šá-ár-nu-up-pu	NB
22	ᵈŠá-iz-zí	NE II	ᵈŠà-zi	OBSu
23	ᵈŠi-da-nu	NE II	ᵈŠu-da-a-nu	NA
	ᵈŠu-d[a-nu]	NE II	ᵈŠu-da-nu	NA
24	si-il-ḫa-ak	OE, ME	si-il-ḫa-ak[7]	Ur III Susa, OBSu, OBTM
	ši-il-ḫa-°	ME, NE II	še-el-ḫa-ak	Ur III
	šil-ḫa-°	ME, NE II, AE	ši-il-ḫa	Ur III
			ši-il-ḫa-°	OB, OBSu[9]
25	Si-[ir-uk-du-uḫ]	OE	Si-ir-uk-du-uḫ	OBSu
	Ši-ir-uk-du-ḫ	ME	Si-ir-uk-tuḫ	OBSu
26	ᵐŠi-mu-mu	AE	Si-mu-mu	OBSu
27	ᵈSi-mu-ut	OE, ME	ᵈSi-mu-ut	OB, OBSu, MB, MBHT
	ᵈŠi-mut	ME, NE I–II	ᵈŠi-mu-ut	OB
	ᵈŠi-mu-ut	ME, AE	ᵈŠi-mut	MB
			ᵈŠu-mu-du	NA
28	si-ia-an	ME, NE I–II	zi-a-na-am	OBSu
	si-a-na	NE II	zi-a-nam	OBSu
	zi-ia-an	NE II, AE	zi-a-ni	OBSu
			zi-ia-an	OBSu
			zi-ia-na-[am]	OBTM

[8] Although this is written with a CVC-sign, it is certain that š is meant, since the verbal endings of the third person singular of conjugation I are exclusively written with š in Elamite.

[9] Dossin (1962:157) reads Ši-il-ḫa-ḫa on an inscribed bronze axe from Luristān. Nevertheless the sign traces on his plate rather point to Si-il-ḫa-ḫa than to a reading Ši-il-ḫa-ḫa.

No.	Elam. spelling	Elam. period	Akk. spelling	Akk. period
	zi-ia-an (contd.)		zi-ia-nam	OBSu
			zi-i-a-ni	MBSu
29	su-uḫ-mu-tú	ME	zu-mi-tum	OBSu
	zu-uḫ-mu-tú	ME		
30	ᵐŠu-tur-ᵈUTU	NE I	ᵐŠu-túr-ᵈNa-ḫu-un-de	NA
31	taš	ME, NE II, AE	ta-aš	OBSu
	da-iš	AE	da-aš	MBHT
32	du-ni-iš	ME	tu-ni-iš[7]	OB
	du-nu-iš	NE II, AE		
33	Zí-we-pa-la-ar-ḫu-uḫ-pa-ak	OE	Si-we-pa-la-a[r-ḫu-uḫ-pa-ak]	OBSu
	Si-me-pá-la-ar-ḫu-uḫ-pa-ak	ME	Še-ep-la-ar-pa-ak	OBMa
	Si-me-pá-la-ar-ḫu-uḫ-pá-ak	ME	Še-ep-[l]a-ra-pa-ak	OBMa
	Si-me-pá-la-ar-ḫu-up-pá-ak	ME	Zí-we-pa-la-ar-ḫu-uh-pa-ak	OBSu
	Si-me-pá-la-ar-ḫu-up-pak	ME	Zí-we-pa-la-ar-ḫu-úḫ-p[a-ak]	OB Babylon
34	Zí-it	OE	Si-it	OB
			Ši-ti	UrIII or OB
35	zu-kir	OE	su-kir	OAkk. Susa
	su-gìr	ME, NE I	zu-uk-ki-ir	OBSu
	su-un-gìr	ME		
	su-un-ki-ir	ME		
	zu-uk-ki-ir	ME		
	zu-un-ki-ir	ME		

The following table (Table 4) summarizes the various transpositions between Akkadian and Elamite. In a strict sense, only transpositions belonging to the same chronological period are listed.

Table 4

Period	Elamite	Akk. (Elam)	Akk. (Mes.)	Examples
OE—Old Akk.	s		s	Kirwasir
	ṣ/z	s		*zunkir*
OE—Ur III	š		š	*haneš*
	ṣ/z		ṣ/z	Manzat
OE—Old Bab.	s	s	s	Simut, Siruktuḫ
	š	š	š	*haneš*

Period	Elamite	Akk. (Elam)	Akk. (Mes.)	Examples
OE—Old Bab. (contd.)	ṣ/z	s		Ziwepalarhuhpak
	ṣ/z		s	Zit
	ṣ/z		š	Ziwepalarhuhpak
	ṣ/z	ṣ/z	ṣ/z	Ziwepalarhuhpak, *zunkir*
ME—Middle Bab.	s		š	Simut
	s	ṣ/z		*siyan*
	š		s	Simut
	š	s	š	Kiririša
	š	s	š	Simut
	ṣ/z	ṣ/z	ṣ/z	Manzat[10]
NE—Neo-Ass.	š		s	Halluš
	š		š	Halluš, Šitanu, Šutur-Nahhunte
AE—Neo-Ass.	š		š	*haltaš*

Elamite *š*-signs are mostly rendered by Akk. *š*-signs as well. The (at first sight) exceptional Akkadian writing Simut for Šimut is explained by the occurrence of Old and Middle Elamite Simut. Neo-Assyrian has a real variation of *s* and *š* in its renderings of Elamite *š*, but this is probably due to Assyrian phonology itself, where an *s/š*-variation exists (Parpola 1974: 1–2; Fales 1986:61–63; GAG § 37). If the strict diachronic approach is set aside, i. e. if transpositions of different periods are included, it becomes apparent that the transposition El. *š*—Akk. *š* is maintained, with one exception: El. *akšer* (ME—AE) is once rendered by ak-si-ir (in a personal name) in an Old Babylonian text from Susa.

Elamite *s*-signs are rendered by signs belonging to the *s*- and *ṣ/z*-series. This pattern remains unchanged, when including non-diachronic transpositions.

Finally Elamite *ṣ/z*-signs are mostly written by means of *ṣ/z*-signs (Old Elamite—Ur III and Old Babylonian, Middle Elamite—Middle Babylonian; see, however, below, No. 1). In two cases they are rendered by *s*-signs (Old Elamite—Old Akkadian, Old Elamite—Old Babylonian), but each of these examples is attested only once. The first example may be due to Old Akkadian orthography while the usual spelling of Ziwepalarhuhpak in the Old Babylonian texts from Susa is with *z*.

If the strict diachronic approach is set aside, one can see that Old Elamite *ṣ/z* is exclusively rendered by Akkadian *ṣ/z*-signs, both in Mesopotamia and in Elam.

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[10] Possibly the following nasal had influence on the real character of this sibilant.

Two more interesting aspects should be mentioned:

1) Some Elamite expressions showing an initial variation *s/z* are rendered in Elamite Akkadian by equivalents with initial *z*. El. S/Ziwepalarhuhpak, *s/ziyan*, *s/zuhmutu* and *s/zunki* appear in Akkadian as Ziwepalarhuhpak, *ziyan*, *zuhmutum* and *zukkir*. In Mari this variation was expressed with *š*-signs: S/Ziwepalarhuhpak became Šeplarpak.

2) Elamite words with an initial variation of *s* and *š* (cf. infra) are rendered in Elamite Akkadian by *s*, whereas in Mesopotamian Akkadian *š* is the exclusive way to render these lexemes (*silḫa-*, Simut and Siruktuḫ).[11]

The following tables incorporate all the data in a clear overview. The italics in Table 7 indicate that these transpositions are not very frequent.

Table 5: Akkado-Elamite transpositions

Akkadian	Elamite
Voiceless alveolar fricative (/s/)	s (rare)
	š
	ṣ/z (rare)
Emphatic alveolar fricative (/ṣ/)	s
	ṣ/z
Voiceless palato-alveolar fricative (/š/)	š
Voiced alveolar fricative (/z/)	z

Table 6: Irano-Elamite transpositions

Old Iranian	Elamite
Voiceless palato-alveolar affricate (/č/)	s (seldom)
	t (rare)
	ṣ/z (frequent)
Voiceless alveolar fricative (/ç/)	s (once)
	š (frequently)
Voiced palato-alveolar affricate (/j/)	s (rare)
	ṣ/z (frequent)
Voiceless alveolar affricate (/s/)	š (frequent)
	ṣ/z (once)
Voiceless palato-alveolar fricative (/š/)	š (frequent)
	ṣ/z (once)
Voiceless interdental fricative (/θ/)	d/t
	s (frequent)
	š (rare)
Voiced alveolar fricative (/z/)	š (rare)
	ṣ/z (frequent)

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[11] This study is based on material from ElW. Additional Old Babylonian examples are Ri-ib-Ši-mu-ut (BIN 10, 157:7), Si-el-ḫa, Še-el-ḫa, Šim-še-il-ḫa (Whiting 1987:29, n. 90) and ᵈŠi-mu-ut-a-bi (OECT 15, 95:22).

Old Iranian	Elamite
Voiced palato-alveolar fricative (/ž/)	s (once; su for zu)
	š (three times)
	ṣ/z (twice)

Table 7: Elamo-Akkadian transpositions

Elamite	El. Akkadian	Mes. Akkadian
s	voiceless alveolar fricative (/s/)	voiceless alveolar fricative (/s/)
s/š (initial)	voiceless alveolar fricative (/s/)	voiceless palato-alveolar fricative (/š/)
	voiceless palato-alveolar fricative (/š/)	
s/z (initial)	voiced alveolar fricative (/z/)	*voiced alveolar fricative (/z/)*
		voiceless palato-alveolar fricative (/š/)
š	*voiceless alveolar fricative (/s/)*[12]	*voiceless alveolar fricative (/s/)*[13]
	voiceless palato-alveolar fricative (/š/)	voiceless palato-alveolar fricative (/š/)
ṣ/z	voiced alveolar fricative (/z/)	voiced alveolar fricative (/z/)
		voiceless alveolar fricative (/s/)
		voiceless palato-alveolar fricative (/š/)

4. Spelling variants in Elamite

The third source for studying Elamite phonology is the corpus of spelling variants within Elamite. First of all, it must be emphasized that some lexemes are spelled exclusively with only one grapheme, *s*, *š* or *z*.

(1) Only *s*: *halsa-* 'to banish'; *hasur* 'anointer' (?); *husa-* 'tree'; *kars-* 'to paint, dye'; *sa-* 'to travel'; *sari-* 'to destroy'; *sati-* 'to ration, portion'; *sira-* 'to weigh, hang.'

(2) Only *š*: *ǝrša-* 'great'; *hušu-* 'to retaliate'; *meša* 'later'; *niški-* 'to guard'; *šalhu-* 'to command'; *šara-* 'to enforce'; *šera-* 'to command'; *šinni-* 'to come'; *šišna-* 'beautiful.'

(3) Only *z*: *haz-* 'to be big'; *izzi-* 'to go'; Manzat, a theonym (both in Akkadian and Elamite texts); *zak-* 'to spend; value'; *zaᵤm-* 'to labour'; *zikka-* 'to heap up.'

It is unfortunately not possible to determine to what extent scribal habits inspired the exclusiveness of the writings above. There is no diachronic aspect involved here since most of the lexemes are attested from

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[12] Examples: *akšir*, *ḫuši-* and Šimumu.

[13] In Neo-Assyrian only.

the Old or Middle Elamite down to the Achaemenid period (*halsa-*, *izzi-*, *niški-*, *sari-*, *sira-*, *šalhu-*, *šera-*, etc.).

More information comes from the spelling variations, of which there are various types. The first one is *s/š*. Foy (1898:129; also Khačikyan 1995:106) mentions a shift from Old Elamite *s* to Middle and later Elamite *š*, with reference to Old Elamite *sutet* > Middle El. *šutme* and to Old and Middle El. Simut > Middle and Neo-Elamite Šimut. That this shift should be considered a "rule," as Khačikyan puts it, is, however, exaggerated. A closer look at the various examples yields a modified result.

There is certainty on the alternation *s/š*. Examples are (1) *hipis* (AE) ~ *ipiš* (NE II) 'axe,' (2) Insušinak (OE, ME, NE I) ~ Inšušinak (ME, NE I), a theonym, (3) *musika* (AE) ~ *mušika* (AE) 'it is counted,' (4) *pepsi-* (ME) ~ *pepši-* (ME, NE II, AE) 'to renew,' (5) *silḫa-* (ME, NE II[14]) ~ *šilḫa-* (NE II, AE) 'strong,' (6) *s[ip]ari* (ME TTM) ~ *šipari* (AE), a month name, (7) Simut (OE, ME) ~ Šimut (ME, NE I–II, AE), a theonym, (8) Si[ruktuḫ] (OE) ~ Širuktuḫ (ME), a personal name, (9) *suhter* (ME) ~ *šuhter* (ME; only once) 'altar,' (10) *sut-* (OE) ~ *šut-* (ME) and *šit-* (AE) 'night'[15] and (11) *šasika* (AE) ~ *šašika* (AE) 'left over.'

In some cases the variation seems to have a diachronic nature. In others, however, both variants occur in the same time period (e. g. nos. 3, 4 and 8). Remarkably, the diachronic examples all concern an initial variation: *silha*, *sipari*, Simut, Siruktuh, *suhter* (su-uḫ-te-er, su-uḫ-ter) and *sutet* (su-dè-et). Four of these forms concern a sequence rendered by the sign SI, which can easily be read *ší* (as Glassner–Herrero 1990:12 and Stolper 1982:60 transcribe).[16] In that sense, this could be used to argue against any shift or variation. Fortunately the fifth and sixth form differ from the four other ones and corroborate the variation. It is, however, still possible that the variation only applies to the sequence /su/.

The general pattern seems to be that Old Elamite and Middle Elamite *s* (in the cases of *silha-*, *sipari* and Simut) became *š* during the Middle Elamite period. This is, however, not a general rule and may thus point

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[14] In the adjective si-ul-ḫi-te-ek-ra, attested three times in the inscriptions of Hanne (ca. 625–600 BC). These attestations are rather exceptional, appearing at a time when all other attestations of the lexeme *šilha* 'strong,' are written with *š*. Perhaps a dialect aspect of Hanne's inscriptions could be seen here.

[15] S/*šut-* is the stem and appears in such forms as *sutet*, *šutkume*, *šutme* and *šitmana*.

[16] One should also keep in mind that *i* may have a palatalizing influence on sibilants.

to a specific phoneme which in the Middle Elamite period merged with a phoneme rendered by *š* (at least in initial position).

It is also illustrative that sometimes the Akkadian scribes in OBSu used *s* (at least in non-initial position) where later Elamite has *š*: *aksir ~ akšir* 'guide, leader,' *husi- ~ huši-* 'to hurdle.'

Another type of variation is *s/z*. Examples are (1) *hasi* (NE II) ~ *hazi* (NE II, AE) 'hair (?),' (2) *kass-* (ME) ~ *kazz-* (ME, NE II, AE) 'to forge, smith,' (3) *kusi-* (ME) ~ *kuši-* (ME, NE, AE) 'to build,' (4) *mass-* (ME, NE I–II) ~ *mazz-* (NE II, AE) 'to cut off,' (5) Pessitme (AE) ~ Pezzatme (AE), a toponym, (6) *siya-* (ME, NE II, AE) ~ *ziya-* (NE II, AE) 'to see,' (7) *siyan* (ME, NE II) ~ *ziyan* (NE II, AE) 'temple,' (8) *sila* (ME) ~ *zila* (OE, NE II, AE) 'statue,' (9) Silili (OBSu) ~ Zilili (OBSu), a personal name, (10) Simepalarhuhpak (ME) vs. Zimepalarhuhpak (OE), (11) *sizzim* (NE II) ~ *zizzim* (NE II), a type of shoes (?), (12) Sinini (NE II) ~ Zinini (AE), a personal name, (13) *sip* (ME) ~ *zip* (AE) 'door, gate,' (14) *sukuka* (AE) ~ *zikuka* (AE) 'demanded, requested,' (15) Sunkiki (ME) ~ Zunkiki (ME), a personal name.

Some examples of a variation *š/t/z* are attested: (1) *huršubum* (OBSu) ~ *hurtebum* (OBSu), a month name, (2) *kit-* 'to pour out' (with forms ki-iz ~ ki-ti-iš and ki-iz-za[17] ~ ki-ti-iš-da) and (3) *kuti-* 'to carry' (with forms ku-iz ~ ku-ti-iš, ku-iz-da ~ ku-iz-iš-da, ku-iz-da-ti-iš-da, ku-iz-za-iš-da and ku-ti(-iš)-šá ~ ku-(-iz)-za, ku-iz-za-iš). *Tempt* 'lord' (with forms *semm*, *semt*, *šemm*, *šemt*, *temm*, *temp*, *temt* and *tept*) is a special case. The forms beginning with *s* and *š* are attested in Mesopotamian sources dating from the Ur-III period to the Old Babylonian period. In all probability these spellings are the result of popular etymology, as Akkadian has a lexeme *simtu* 'appropriate, proper (symbol)' (Zadok 1984:43), although Henkelman (2008:278, n. 635) considers the various spellings as possible proof for an affricated dental /tˢ/ in Elamite.

Another interesting case could be the divine name Zit, spelled ᵈZí-it in the Narām-Sîn Treaty (EKI 2 i 6). This name was connected by Vallat (2000:1068; 2002–2003:530, 537; see Henkelman 2008:278, n. 635) with Ši-ti (*Iraq* 38, 62:6), occurring in a Mesopotamian magical spell. Moreover, it is very likely that both spellings are related to Si-it (MHEO 2, 75:6), as Šit(i) and Sit appear in very similar contexts. This would, however, be the only example of such a variation.

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[17] According to ElW 472 this form was pronounced /kitsa/.

Finally there is the interchangeability of *š* and *z*. Stève (1992:17; also Khačikyan 1995; Stolper 2004:71 and Vallat 2004:136, n. 6) argues that *š* and *z* often alternated in Elamite, but only three examples of such an alternation are attested. The first one is the Middle Elamite divine name Hutekašan (in ᶠÚ-tuk-ᵈḪu-te-ka₄-ša-an), which appears as Hutekazan on an Old Elamite cylinder seal (Ḫu-te-kà-za-an; Vallat 2004:137). The second one is the personal name Kutuš/zuluš. Ku-du-šu-lu-uš is attested in an Old Babylonian text from Mari (Durand 1986:119, n. 26), while Ku-du-zu-lu-uš occurs various times in Old Babylonian texts from Susa. The third example is the place name Anšan (OE, ME)/Anzan (ME, NE I–II, AE). It should be mentioned, however, that toponyms are usually very difficult to explain and that the name Anšan may not even be Elamite at all. Accordingly, the phonological conclusions that can be drawn from the latter example are minimal, as a consequence of which there are only two examples for this variation. This, of course, does not support a variation *š/z* in Elamite phonology.[18]

It seems that each of these variations (*s/š*, *s/z*, *s/š/z* and *š/t/z*; perhaps *š/z*) points to a specific phoneme. Diachronic aspects (e. g. phoneme shifts) are not likely to have played a great role here, since all spellings occur in all periods.

4. Analysis

What conclusions can be drawn from this data? According to Khačikyan (1995:106; 1998:7; also Stolper 2004:71) the *s*-series must render an affricate for three reasons: (1) the connection between *s* and OP /θ/, (2) the variation *s/š* and (3) the variation *s/š/t*. This is not probable. As the ṣ/z-series also indicates a fricative, the interchangeability of *s* and *z* must be seen in this connection. Moreover, a variation *s/š/t/z* does not exist, since the spellings with *s* all come from Mesopotamia and are probably the result of popular etymology. Moreover, there is one example of a variation *s/š/z*, signs which again can all render fricatives.

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[18] The variations between Hutekašan and Hutekazan on the one hand and Kutušuluš and Kutuzuluš on the other hand might be explained by assuming that the former ones are palatalized pronunciations of the latter ones. In fact there are both diachronic and synchronic (geographic) differences between the various spellings. Diachronically, in later Elamite the palatalized equivalent of /z/, i. e. /ž/, is mostly rendered by a *š*-sign. Synchronically, the Mari texts seem to have a preference for *š*. The two names attested in these texts are Kutušuluš and Šeplarpak, which appear with *z* (Kutuzuluš and Ziwepalarhuhpak) in the Old Babylonian texts from Babylon and Susa.

Accordingly, these reasons are rather indications for the *s*-series denoting a fricative. In addition to this the external data favour a connection between the *s*-series and fricatives: El. *s* = Old Ir. /θ/. It must be accepted that the *s*-series expresses a fricative. The character of this fricative is, however, not known with certainty (see below).

It is also possible that the *s*-series can express an affricate. This suspicion is raised by the variation between *s*- and *z*-signs (Stolper 2004:71). This (and not the three reasons mentioned by Khačikyan) is the main indication for this idea. Again the character of the affricate is far from certain. The spelling variation *s/z* shows that the affricates behind *s* and *z* are not very different. The affricate closest to /č/ is its non-palatalized equivalent /c/. Khačikyan (1995:107; 1998:6) observes that the external evidence (El. *s* = OP /θ/ and El. *ṣ/z* = OP /č/ and /j/) suggests that the *s*-series renders /c/, whereas the *ṣ/z*-series was used to express /č/.

With regard to the *š*-series the situation seems quite clear (Khačikyan 1995:106 and 1998:7). Both the external data (e. g. Akk. and Old Ir. /s/ and /š/ are mostly rendered by *š*) and the variation *s/š* indicate that this series renders one or more fricatives. Mesopotamian orthography supports this, since the *š*-series is used for the notation of historical non-affricates in Akkadian (Diakonoff 1988:37). In all likelihood the *š*-series rendered both /s/ and /š/.

The *ṣ/z*-series only rendered one phoneme according to Khačikyan (1995:106). Nevertheless the external data favours a connection of the *ṣ/z*-series and affricates on the one hand and a connection of the *ṣ/z*-series and the voiced alveolar fricative /z/ on the other hand. The latter is not abnormal as this series was also used to render this phoneme in Akkadian. It can be assumed that this series is the usual notation for an affricate, but it is not sure which affricate is meant. Here the internal variation *š/t/z* may be important and may point the researcher in the direction of a phoneme /č/ (Paper 1955:29–30; Khačikyan 1995:106; 1998:7; Stolper 2004:71),[19] although Labat (1951:28) is reluctant to accept the existence of such a phoneme in Elamite. The forms ku-iz and ku-ti-iš then represent spoken /kuč/, while ku-ti-iš-da and ku-iz-da render /kučta/.

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[19] Stolper's idea that spellings like ku-iz-iš-da and ku-iz-da-ti-iš-da served to clarify a cluster /tšt/ does not pose a problem for this assumption since this cluster contains an affricate. ElW 308 believe that this variation (*s/š/t*) indicates the interdental fricative /θ/ (probably because *s*, *š* and *t* are the three sign series that can render OP /θ/).

It is likely that Elamite also had a phoneme or allophone /s'/, a lax version of /s/, that was written by means of the ṣ/z-series. This would parallel the existence of lax and tense variants in the Elamite plosive series. Proof for this phoneme is the frequent transposition of Akkadian and Old Iranian /z/ by El. z. If Elamite had not known /s'/, then Ir. /z/ would have been rendered more often by š-signs.

With historical Dravidian phonology in mind, one could postulate a retroflex approximant /ẓ/ for Elamite (Proto-Dravidian has a such a phoneme, see McAlpin 1981:24–25). This phoneme would be expressed by the ṣ/z-series. Yet, the existence of such a phoneme remains very uncertain, because of the weak ties between Dravidian and Elamite.

Based on an alleged variation š/z, Steve has postulated the existence of palato-alveolar affricates /č/ (voiceless) or /j/ (voiced) on the one hand or of a voiced fricative /ž/ on the other hand. It has been shown, however, that this variation should not be automatically accepted within the Elamite graphemic and phonological system.

The only question left open is the character of the fricative rendered by the s-series. This question is very hard to answer. First of all, it is not impossible that one phoneme could be rendered by more than one sign (e. g. /t/ by d and t; cf. Reiner 1969:72–73). Accordingly, s may also represent /s/. Nevertheless, the variation s/š and the fact that in initial position this variation became š during the middle Elamite period point to a separate phoneme, which merged with /s/ in initial position. Possible candidates are an interdental fricative /θ/ (based on the external evidence: El. s = OP /θ/) or a lateral fricative /ś/.

To sum up, Elamite probably had six (or seven, if one accepts the retroflex approximant) alveolar fricatives, palato-alveolar fricatives and affricates: the alveolar fricatives /s/ and /s'/, a palato-alveolar fricative (/š/), two affricates (/c/ and /č/) and one yet unknown fricative (/θ/ or /ś/). The table below connects these phonemes with graphemes.

Sign series	Phoneme	
s	Interdental or lateral fricative	/ś/ or /θ/
	Alveolar affricate (?)	/c/
š	Alveolar fricative	/s/
	Palato-alveolar fricative	/š/
ṣ/z	Alveolar fricative	/s'/
	Palato-alveolar affricate	/č/
	Retroflex approximant (?)	/ẓ/

Variations	Phoneme	
s/š	Alveolar, interdental or lateral frica-tive; or Palato-alveolar fricative	/s/, /ś/, /š/ or /θ/
s/z	Alveolar affricate	/c/ or /s'/
š/t/z	Palato-alveolar affricate	/č/

In the reverse order, this gives

Elamite phoneme	Graphic rendering
/c/	s-series, s/z-variation
/č/	ṣ/z-series, š/t/z-variation
/s/	š-series, s/š-variation
/ś/ or /θ/	s-series, s/š-variation
/s'/	ṣ/z-series, s/z-variation
/š/	š-series, s/š-variation
/z̧/	ṣ/z-series

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