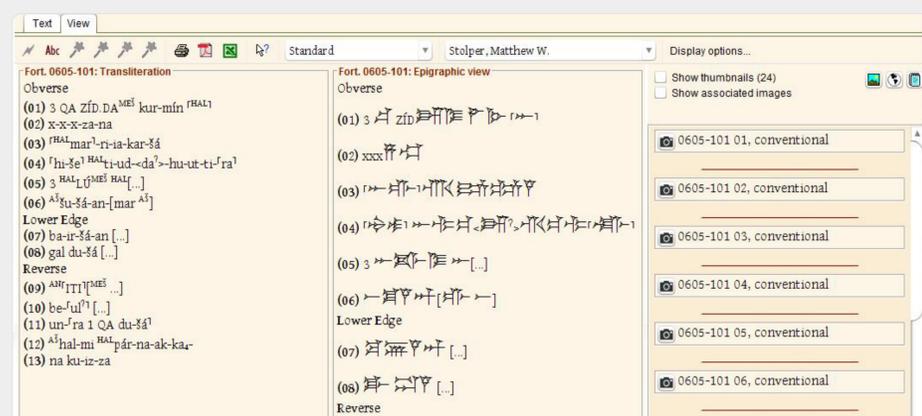


Development of the Elamite Cuneiform Font

Difficulties and Challenges

OCHRE (Online Cultural and Historical Research Environment, <https://ochre.uchicago.edu/>), the database management system employed by the Persepolis Fortification Archive Project (<https://oi.uchicago.edu/research/projects/persepolis-fortification-archive>), provides a capability to visualize transliterations of the cuneiform texts with cuneiform signs thanks to the use of computer fonts. To make use of this capability I have designed the font for the Achaemenid Elamite cuneiform script.



Elamite font in OCHRE

Purpose

The font was designed for displaying Achaemenid Elamite texts in the epigraphic view in OCHRE, which generates on-the-fly representations of the text in roman-character transliteration and in cuneiform signs from the same source data. The font provides additional way of representing the text and helping the user to interpret transliteration, the photographic images, and the relationship between them. For now, it is used for the texts from the Persepolis Fortification Archive (509-493 BC) only, and this purpose shaped its design.

Other uses

Although the Elamite font is not intended to replace hand-drawn copies for publication, it might do so for teaching or self-instruction, since hand-drawn copies of Fortification texts are not available, and since images of the tablets themselves may pose difficulties for students familiar with cuneiform scripts only in hand-copy formats.



The same line of text on tablet, hand-drawn copy, and in Elamite font: ^[AS]ba^{AS}-ir-sá-mar^{AS}ma-tas^{AS}pa-rás-da^{AS}hal-mi^{MM}pár-na-ak-ka-na ku-iz "[...] he went from Persepolis to Media, he carried the sealed document of Parnakka."

Sign forms

- Signs are based on the Achaemenid Elamite phase of the Elamite cuneiform script, specifically on the script of the Persepolitan archives, and Achaemenid Elamite royal inscriptions.
- Sign forms were designed with the use of the common Elamite sign lists: Hallock (1969), Cameron (1948), and Steve (1992). When the sign lists differ regarding the "standard" forms of signs, the design usually follows Steve. Therefore, some of the forms are subject to further improvement.
- Standard sign forms, characters in the font partially resemble cursive forms and partially lapidary forms, follow Hallock's sign list and the common practice in designing cuneiform fonts.
- Alternative fonts for lapidary and cursive scripts, as well as for different phases of Elamite, might be developed in the future.

Font specification

- The font is still under development, now in testing phase in OCHRE, so its specification is subject to change.
- It is designed in OpenType font format with TrueType Outlines.
- Some OpenType features (like alternates and ligatures), are not yet implemented, but they are planned.
- The glyphs are encoded in Unicode, so they are mostly compatible with Cuneiform Unicode Block, and therefore the font can be used in all Unicode supported applications on both Mac and PC, etc.
- The font has 143 signs so far.
- Therefore, it does not cover the whole extent of the Cuneiform Unicode Block. The rest of the Cuneiform Unicode Block is supplemented with the signs from font "Akkadian" by George Douros.

Challenges

Sign forms sometimes significantly differ between sign lists; some signs occur in several graphic variants. This will be solved by including alternates in future versions of the font. The user will be able to select the form which best represents the particular text.

The biggest challenge so far is connected with Unicode implementation. The Cuneiform Unicode Block was designed for Akkadian cuneiform, which results in some incompatibilities with Elamite cuneiform. That is especially the case when one composite cuneiform sign is construed as a combination of two Unicode characters. In such cases, the composite sign would be valid in Akkadian, but not in Elamite (see table below). For now, this problem has been solved by providing all problematic sign in the private area of the Unicode block within the font. This means, however, that the signs must be picked manually every time. It is not yet clear right now whether there is a better solution, e.g., internally in the font, with usage of OpenType ligature feature, or on the software level (planned in OCHRE). Optimal would be to update the Cuneiform Unicode Block to work with Elamite cuneiform script (and possibly other rare cuneiform scripts), or to make a separate Elamite Cuneiform Unicode Block, after submitting a proposition to the Unicode Consortium.

The Elamite font is yet another digital tool at the disposal of Elamitists, who are less fortunate in this regard than other Assyriologists working with common scripts. In the future, we hope to provide a range of fonts to cover other phases of Elamite. Our hope is that our experiences with designing and implementing the Elamite font will benefit other similar ventures with rare cuneiform scripts.

Incompatibilities of the Cuneiform Unicode Block with Elamite cuneiform

Proper Elamite sign	Akkadian sign	Elamite sign resulting in Unicode	Traditional name	Elamite value	Borger No.	Steve No.	Unicode
			ISSEBU	ESSANA (log.)	837	593	U+12408 + U+1230B + U+1230B
			MAN	man	708	471	U+1230B + U+1230B
			KAR	kar	590	376*	U+122FC + U+12000
			MES	mes (det.)	754	533	U+12228 + U+1230D

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