Egyptology meets Computer Science: The Digital Rosetta Stone Project

https://rosetta-stone.dh.uni-leipzig.de

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Who are we?

The Digital Rosetta Stone is a collaborative project of the Egyptological Institute and the Chair for Digital Humanities at Leipzig University. As a teaching-training initiative, it is funded by the German Federal Ministry of Education and Research within the line *StiL – Studieren in Leipzig*. Our cooperation partners include the Humboldt University Berlin and the British Museum in London.

The foci of the project are the languages and scripts of the Rosetta Stone (Hieroglyphic, Demotic, Ancient Greek) and its content. With our teaching-training initiative, we are combining the text with training the languages, i.e.:

- language competences (vocabulary, grammar, syntax; interlinear glossing)
- activation of knowledge (retrieval, absorption, extension)
- transformation of text (interpretation of contexts with complex inner structures)
- text critique (dealing with scholarly translations).

Several tools from Digital Humanities help facilitating this process:

- learning the languages: alignment
- morpho-syntactic structures (text composition): treebanking
- display of script (without Unicode): text-image visualization.

The aim of the project is a digital edition combining methodology from Egyptology, Classics and Digital Humanities.

Duration: October 2017–September 2019

What is Textual Alignment?

Preliminary work: Within the *Leipzig Open Fragmentary Text Series* (LOFTS), the Greek text of the Rosetta Stone has already been translated and annotated. For the Hieroglyphic part, we did a text alignment with the tool Alpheios (https://alpheios.net/).

An alignment constitutes of the linkage of words, which facilitates learning a language and comparing languages through digital methods. In our project, we used the software *Ugarit iAligner* developed by **Dr. Tariq Yousef** (https://Ugarit.ialigner.com/index.php).

Fig. 1: Alignment Demotic – German.

The software offers the possibility to compare up to three languages. Corresponding words are selected by mouse click and linked to each other. Fig. 1 shows these links for §39 (= line 25) of the Demotic part of the Rosetta Stone. Relationships with the languages can be 1:1, 1:n, n:1, and n:n.

Firstly, the three scripts of the decree have been added individually to the iAligner. For this, every version of the text has been divided into sentences. In order to compare the three languages, which represent their own version of the same content, we created a synopsis. This formed the base of a second alignment which focuses on parts of sentences (see Fig. 2).

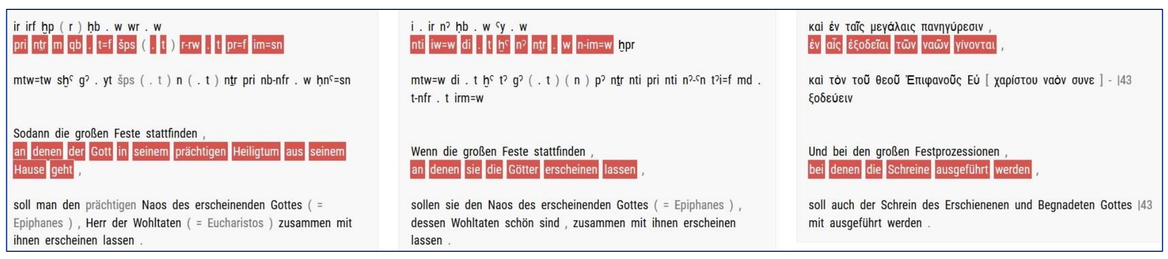


Fig. 2: Alignment Hieroglyphic – Demotic – Greek.

What is the Rosetta Stone?

The Rosetta Stone is a synodal decree from the reign of Pharaoh Ptolemaios V Epiphanes (204–180 BC) and was drawn up on 27 March 196 BC. The decree has been written in three languages and scripts: Hieroglyphic (x+14 lines, 707 words), Demotic (32 lines, 2305 words), and Ancient Greek (54 lines, 1505 words). The material of the stone is granodiorite, weighs 762 kg and measures today 114.4 cm in height, 72.3 cm in width and 27.93 in depth. Originally, the monument must have been about 150 cm high. The upper part and the lower right corner are broken off.

During Napoleon's expedition to Egypt in 1798/99, the artefact was discovered in the seaport al-Rashid. It is now housed in the British Museum in London (inv. no. EA 24). It is one of the most famous objects from the Ancient World. Its importance, however, was often reduced only to the breakthrough in the decipherment of the Egyptian Hieroglyphs. In 1822, Jean-François Champollion (1790–1832, see Fig. 3) worked on this script by studying the Rosetta Stone, and more successfully, the Bankes Obelisk, and shared his results in the famous letter to Bon-Joseph Dacier (Fig. 4).

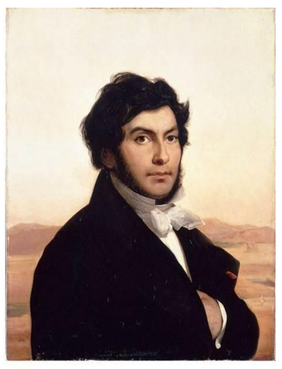


Fig. 3: J.-F. Champollion, portrait by Léon Cogniet (© Joconde database: entry 000PE000522).

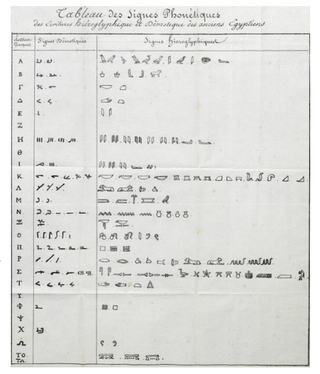


Fig. 4: J.-F. Champollion 1822: *Lettre à M. Dacier*, pl. IV.

What's in the Text?

The decisions of the priestly synod on the occasion of the coronation of Pharaoh Ptolemy V comprise of: tax reductions, concessions to priests, amnesty for prisoners, confirmation of temple property, economic benefits, subjugation of revolts within Egypt, execution of the rebels, rules for the animal cults and temple equipment by the king. Moreover, the Pharaoh and his ancestors were awarded several honors (erection of a statue, cult, festivals) and the priests received a new title.

How do we visualize the text?

Since the implementation of Hieroglyphic and Demotic into the Unicode font system is still work in progress, we need photographs for the visualization. For the linkage of text and image based on vectors, we connect the text data of the alignment with the script on a photograph. For this, we created a combined 3D-image using the shape-from-shading method. As a result, every corresponding sentence on the Rosetta Stone is highlighted in color (Fig. 5).

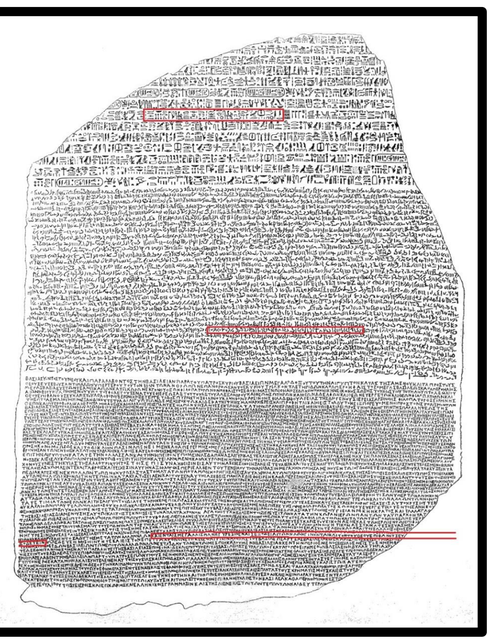
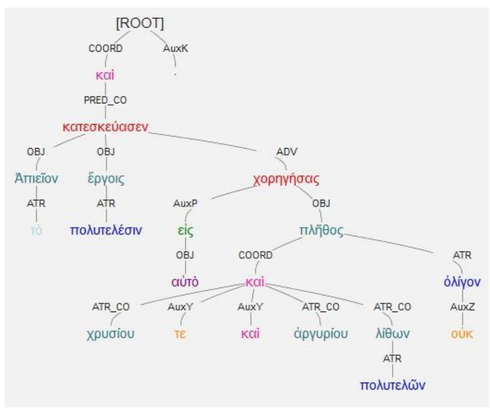


Fig. 5: Visualization of §39 (Quirke/Andrews 1988: *The Rosetta Stone Facsimile Drawing*).

What is Treebanking?

The data and annotations of grammar and syntax collected in our project are supposed to be depicted by a method called "treebanking". This has been done already for the Greek part of the Rosetta Stone with the tool Arethusa (http://www.perseids.org). By this, the syntax is visualized within a tree-shaped structure.



Furthermore, users can retrieve information on grammar and morphology resulting from the glossing of the texts. The treebanking of the two Egyptian versions is work in progress; for this, we are cooperating with the project The Rosetta Stone Online (HU Berlin) which has already coded the texts.

Fig. 6: Sentence structure of the Greek text, line 33–34.

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