

SHORT COMMUNICATION

An Integrated Software Application for the Ancient Coptic Language

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ABSTRACT

Coptic language was an important period of the Egyptian language, coinciding with a period of social and cultural changes. Coptic is also associated with the Greek language, as its alphabet is used for the transcription of Coptic. Despite the fact that the Coptic element is strong in Greece, the theoretical background is rather weak. For this reason, it is considered necessary to create a software tool that aims to help in the translation of Coptic into Greek and at the same time to overcome various obstacles that the researcher may encounter while processing the various corpora or artifacts, such as processing issuer, diacritics etc. This tool consists of a database, a search engine and an interface.

Keywords: Coptic software tools; Computer-assisted translation; Digital heritage

1. Introduction

Ancient Egypt has been a cradle of culture and Egyptian script is one of its best accomplishments. As language is a living and evolving organism, the Egyptian language was no exception to this rule and created a transitional continuum as it was affected by various political, economic and social changes. The last stage of these linguistic changes is the Cop-

tic script, which is the last phase of a language that remained active from 3200 BCE until almost 1500 CE. When Alexander the Great conquered Egypt (332 BCE), the Greek language started supplanting Egyptian in documents of public administration. Thus, an impetus was given to abolish hieroglyphics and to incorporate into the script phonetic elements that aided the understanding of written texts. This transition from the Egyptian to Greek alphabet was

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ARTICLE INFO

Received: 5 November 2023 | Revised: 22 November 2023 | Accepted: 30 November 2023 | Published Online: 8 December 2023

DOI: <https://doi.org/10.30564/jcsr.v5i4.6068>

CITATION

Kontogianni, A., Papakitsos, E.C., Ganetsos, T., 2023. An Integrated Software Application for the Ancient Coptic Language. Journal of Computer Science Research. 5(4): 38-42. DOI: <https://doi.org/10.30564/jcsr.v5i4.6068>

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also prompted by the spread of the Christian religion in the Middle East, which desired a new script for its sacred texts rather than Demotic Egyptian which was directly associated with the existing pagan religion. So, Coptic, by the 5th century CE, gradually became the dominant script for secular and sacred texts. The six main dialects of Coptic (there are also many sub-dialects) are Sahidic, Bohairic, Fayyumic, Akhmimic, Lycopolitan, and Oxyrhynchite. Although each dialect has some separate linguistic features, some common features help researchers place a dialect in specific geographical areas ^[1,2]. When Egypt was conquered by the Arabs in 640 CE, its Islamization gradually began, naturally affecting the language as well. Nowadays the Christian communities of Egypt and the expatriate Coptic communities around the world use Coptic as a functional language ^[3].

2. Methodology

The Greek language had a decisive influence on the formation of Coptic. First of all, Egyptians adopted the Greek alphabet and used the Greek language for documents and administrative affairs. Furthermore, they transliterated their language by using the Greek alphabet. Thus, Egyptians enriched their alphabet with additional 8 signs, to represent the consonants that do not exist in the Greek language and created a script of 32 signs and 26 distinctive sounds. According to some researchers, Coptic language was created by Pantainos, director of the Catechetical School of Alexandria ^[4]. It is worth mentioning that the creation of Coptic was a way for the Egyptians to read their language as it happened to other populations (e.g. Slavic languages). Due to the strong influence of Greek on Coptic, there are various loanwords and Greek words that have been incorporated into the Coptic language: in the Biblical, Ecclesiastical, Liturgical, dogmatic, monastic and ascetic traditions, even in everyday speech. In this aspect, Coptic proves the transition from pagan Egypt to Christianity, as is the language of Christian religious texts, the language of the gospels, and the language of letters.

In Greece, Coptic element survives in museums and institutions. Manuscripts and artifacts in various

materials of different durability, such as ivory, limestone, fabric, wood and clay be found on display or in archives at:

- the Byzantine and Christian Museum of Athens,
- the Benaki Museum in Athens,
- the Museum of Modern Greek Culture in Athens,
- the Peloponnesian Folklore Foundation “V. Papantoniou” in Nafplion,
- the Holy Monastery of Iveron on Mount Athos,
- the National Library of Greece in Athens.

Despite these findings, the digital tools for Greek researchers are absent ^[1].

3. Results

Worldwide, there is some interest in creating tools for the Coptic language. One of the most remarkable works is Coptic SCRIPTORIUM, (created by Caroline T. Schroeder and Amir Zeldes ^[5]) where researchers can search Coptic dictionaries with translations to English, French and German, corpora, or use NLP service and tools for annotation etc. However, in regards to Greek scholarship, we have concluded that researchers are in need of a tool that will allow them to recognize the Coptic script and will be a useful aid for interpreting the texts and studying the language, and this is the aim of this software application presented herein. Moreover, Coptic writings appear on various artifacts, so this is meant to be a useful tool for Greek museums and heritage curators, with no or limited knowledge of Coptic. The intention of the development of this tool is also to overcome various obstacles that may occur, like processing issues, absence of spaces between words, use of diacritics, punctuation, abbreviations etc. So, the semi-automated approach allows interfering with the artifacts without effort and risk of damaging them.

This software tool consists of three parts:

i) *The database*, is practically the Coptic-Greek digital dictionary and one of the major parts of our tool. The database is an Excel file, instructed on a single spreadsheet (**Figure 1**) to be modified or enriched

	A	B	C
1	Coptic	Greek	Comments
2	ⲁⲓⲁ	αυξάνω, μεγαλώνω, μεγεθύνω	to increase
3	ⲁⲓⲟϮ	ταξιδεύω, πηγαίνω	(πιθανόν), το νόημα είναι άγνωστο to travel (?)
4	ⲁⲓⲟϩ	παύω	to cease
5	ⲁⲃⲏⲩⲩ	—	άγνωστο νόημα, επίθετο (unknown adjective)
6	ⲁⲓⲟϮ	παιδί, νέος	child, young
7	ⲁⲓⲛⲉ	αρχιμανδρίτης	archimandrite
8	ⲁⲩⲩⲁ	πληθαίνω, πολλαπλασιάζω	to multiply
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			

Figure 1. A sample of the Coptic-Greek digital dictionary.

easily. Coptic dictionaries were used, available both in printed form and online (such as Crum [6] and Coptic Dictionary Online [7]). The Coptic words are sorted into lists, by size (according to the number of their letters) and then alphabetically in each separate list. Each spreadsheet includes three columns: The first column is used for the word in Coptic, the second one for translation into Greek and the third one for comments considered necessary (e.g., original source, dialect, or anything we consider important for the user).

ii) *The search process*, will be done in two ways. First, there is a Cartesian dictionary in which the words were arranged in size and alphabetically doing a linear search. Secondly, another base will be created in order to be used for a weighted linear search, a process based on Zipf’s law [8]. It is also sequential,

like the previous one, but it is executed in tables with the data in terms of their probability of occurrence, in descending order (preloading) [9]. For creating the frequency tables, Scriptorium corpora will be used. It will provide us with 39 separate texts for reading, analysis and complex searches.

Their subject matter is quite long like magic papyri, the *Book of Ruth*, manuscripts, the *Gospel of Mark*, the *Assumption of John*, various biographies, etc. The benefits of dual search are great. It will achieve faster and more accurate search results, while at the same time, it will provide the necessary conclusions on how to rank databases for faster search with the most reliable results.

iii) *The interface*, is very simple and user friendly (Figure 2). On the left side, we have the Coptic al-

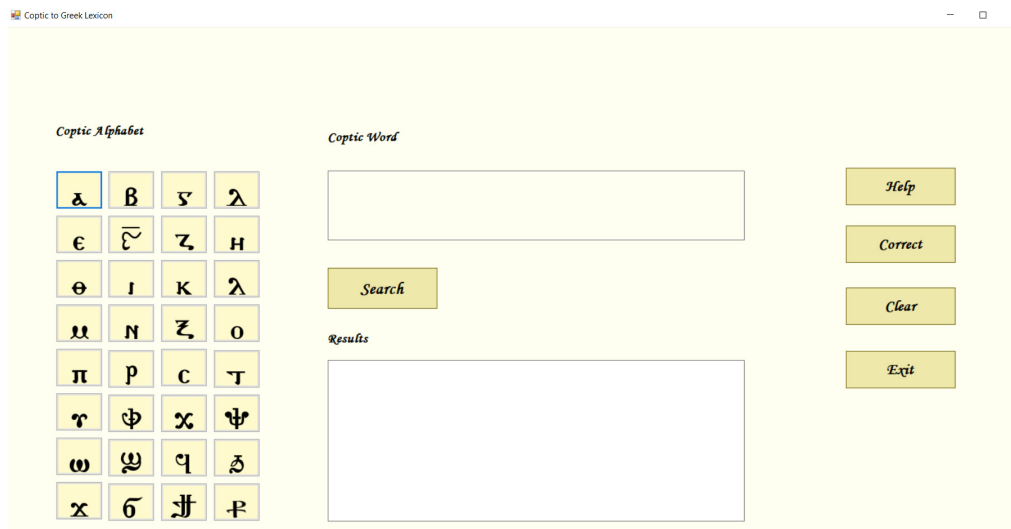


Figure 2. The interface of the computer-assisted translation software.

phabet. The users choose the letters that they see on their artifact or on their papyrus. Then they click the “Search” button or the “Correct” button in the case of a mistake. The “Results” text-box, returns the Greek translation and the corresponding comments, if the formed word exists in the dictionary. Otherwise, a failure message will be displayed. When the user clicks the box “Clear” he can move on to the next word search, or the box “Help” for further information. Finally, with the “Exit” button, the user can save all the work in a “txt” file.

4. Conclusions

Although the Coptic community in Greece is particularly active ^[10], the Greeks seem to ignore the Coptic as an ethno-religious community and the same applies to the plethora of their artifacts which have not received the attention of the majority of Greeks. Furthermore, the theoretical background for Coptic is limited and the software tools related to this language for Greek researchers are, currently, non-existent. This tool is an excellent way of digitizing the Coptic heritage, since the Coptic script is written on such fragile materials and artifacts, that could be potentially destroyed, and human intervention is imperative. Although there are other tools for the Coptic language, none of them translate Coptic to Greek. Moreover, this tool could help to avoid the physical interference of human-artifact and diminish the possibility of damage. Finally, it is part of a wider range of software tools, which have been developed for processing ancient languages ^[11,12] and are still being developed under the auspices of the University of West Attica ^[13-15], in order to study the ancient languages and digitize cultural heritage.

Author Contributions

All authors contributed equally to this work.

Conflict of Interest

The authors declare no conflict of interest.

Funding

This research received no external funding.

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