Replicating Archaic Documents: A Typographic Challenge

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Abstract

The replication of archaic documents on paper using modern typographic tools is a quite challenging task. This task is usually broken in two sub-tasks: the design of a font that fully respects all aspects of the handwritten document and the design of software tools (macros for the digital typesetter and/or external routines) that are used to set the archaic document. Here we report on the creation of a font and the accompanying typographic tools for the replication of Epi-Olmec stelae. In addition, based on the experience we gained from our work on the tools for the Epi-Olmec script, we developed a font and similar typographic tools for the replication of the Philokalia book, which we also report.

Résumé

La reproduction de documents archaïques en utilisant des outils typographiques modernes est une tâche ardue. Nous l'avons subdivisée en deux sous-tâches : la création d'une fonte qui respecte tous les aspects du document manuscrit et le développement d'outils logiciels (macros pour le compositeur numérique et/ou routines externes) utilisés pour le document arachaïques. Nous présentons ici la création d'outils typographiques pour les stèles Épi-Olmec. D'autre part, nous appuyant sur l'expérience acquise par notre travail sur les outils de l'écriture Épi-Olmec, nous avons développé une autre série d'outils typographiques pour la reproduction du livre *Philokalia*, outils également présentés ici.

Introduction

Different people view the same things in different ways. So a book or a pamphlet crafted in the pre-typographic era is just a text for some people. For others it is something more—the binding, the material the text was scribed on and the scribing style. We have to admit that we are fascinated by digital typography and writing and its history. Since writing is a system of human intercommunication by means of a set of visible marks with a conventional reference [2], the arrangement of symbols is an essential part of writing. Consequently, we tend to view "documents" as streams of little pieces of art arranged in a particular way on paper, a stone, a pot, etc.

Pre-typographic documents are now available in print. However, they are not readily available in their "original" form, but in a modern version of their "original" form. Thus, it is quite difficult to have copies of the "original" documents. In order to fill this gap, certain publishers produce exact replicas of the "original" documents by scanning the text and printing the images on a type of paper that gives the reader a particular feeling. On the other hand, there are documents that have been carved on stone and so it is not possible to produce replicas of these documents. So one can create a computer font that contains the symbols of the script and thus provide a means to have access to the "original" form of the text. Obviously, the font is not enough. In addition, we need typographic tools that will provide the means of replicating the text using the font. But is it easy to create such fonts and the accompanying typographic tools?

Our answer to the question above is affirmative and here we report the results of our endeavor to create both the font and the typographic tools for two different documents: the Epi-Olmec steles and the Philokalia book. Since we describe the creation of a font for a non-alphabetic script, we start by describing how writing systems are classified. Next, we describe the various steps that were necessary for the fabrication of a font for the Epi-Olmec script (an ancient Mesoamerican logosyllabic script, see Table 1) plus the various accompanying typographic tools. We continue with the presentation of the Philokalia fonts that were fabricated using the procedure developed for the Epi-Olmec font. Although the Greek book entitled *Philokalia* was published in 1782, we present the corresponding font as a demonstration of our technique. We conclude with some remarks concerning our work and our future plans.

Table 1: The Epi-Olmec symbol table.

Classification of Writing Systems

Historically, writing is the only permanent means of intercommunication between humans. Naturally, nowadays other permanent means of intercommunication exist (e.g., tapes, CD, DVD, etc.), but still writing is the primary means to convey ideas, information and knowledge. In general, there are two forms of writing: *lexigraphy* or *glottography* (i.e., visual symbols that make a permanent record of speech) and *semasiography* (i.e., sign systems that communicate information between human beings) [2, 3]. Examples of semasiographic systems include pictographs and articulated symbolic systems (e.g., mathematics and musical notations). There are three categories of lexigraphic writing: *logographic* writing (i.e., symbols represent significant elements of speech such as words or phrases), *phonographic* writing and *logosyllabic* writing (i.e., symbols are either *logograms*, that is symbols that denote words, or *syllabograms*, that is symbols that indicate syllables). Furthermore, there are two forms of phonographic writing: syllabography (i.e., writing with symbols that represent syllables of words) and alphabetic writing (i.e., symbols are not individually pronounceable yet when formed in sequential combinations are able to indicate with surprising accuracy the sounds of spoken language).

Typesetting Epi-Olmec Texts

Epi-Olmec is an ancient Mesoamerican logosyllabic script which has been recently deciphered by Terrence Kaufman and John Justeson. A complete description of the
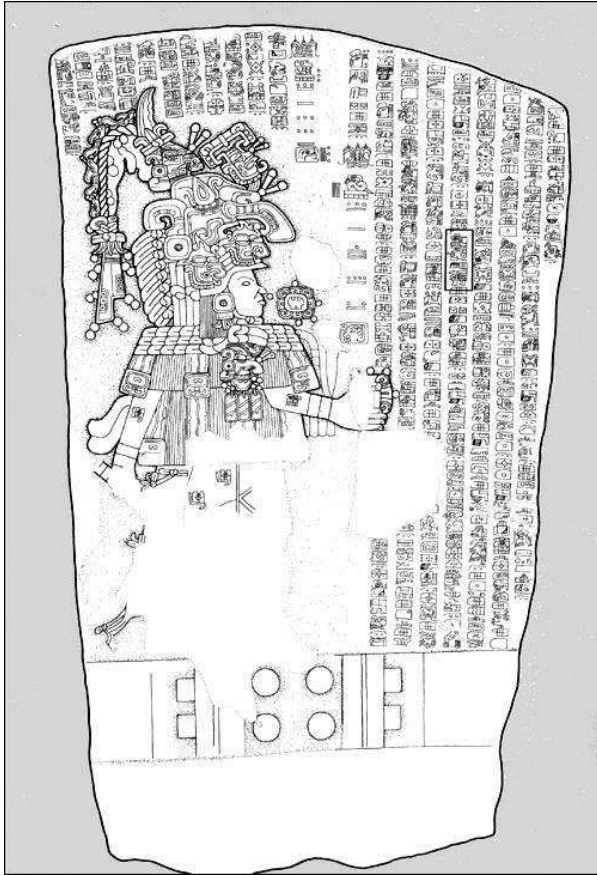
order to create a truly scalable font. However, since the lines of the symbols were not smooth, we had to simplify the lines. For this purpose, we had to resort to a commercial product (namely Adobe Illustrator). With this program we visually manipulated the images of each symbol and generated EPS files. These files were transformed to AI-EPS files with a program called aimaker. The AI-EPS files were the basis for the font that was created with pfaedit. We had to perform a number of different tasks (e.g., reducing the number of control points, correcting the direction of lines, etc.) in order to bring each glyph to a decent form. The result of our work is shown in Table 1.

Naturally, a font is not enough in order to typeset text with it, especially when it comes to the typesetting of text in a "peculiar" writing direction. This particular "peculiar" writing direction dictated the use of Ω as our basis for the design of the typesetting tools that accompany the Epi-Olmec font. Although the reader may expect that we relied on Ω's capabilities to typeset text in various writing directions, still we realized that this capability was not helpful at all. In the two examples that follow, the text on right was typeset using these extra capabilities, while the text on the left uses the conventional capabilities of TeX:
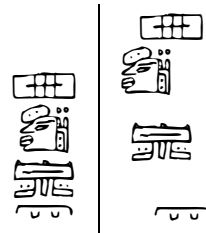
However, we must note that these extra capabilities of Ω yield the expected results in some other cases. This led us to believe that there is some problem with our font, but we have not figured out the problem yet.

Since the Epi-Olmec script is a logosyllagraphy we need some practical way to access the symbols of the script. One solution is the development of an Ω translation process that will map words and "syllables" to the corresponding glyphs of the font. In this way one obtains a natural way for typing in Epi-Olmec texts. In addition, in order to avoid the problem mentioned above, we need a wrapper that will typeset the text vertically. For short texts \shortstacks are quite adequate, while for longer texts, one can use a multicols environment inside a relatively narrow minipage. We have partially implemented this solution, but at the same time we investigate some other ideas, which might produce better results.

Typesetting with the Philokalia Fonts

The Philokalia fonts consist of three fonts: one that contains the normal typeface, one that contains the ligatures
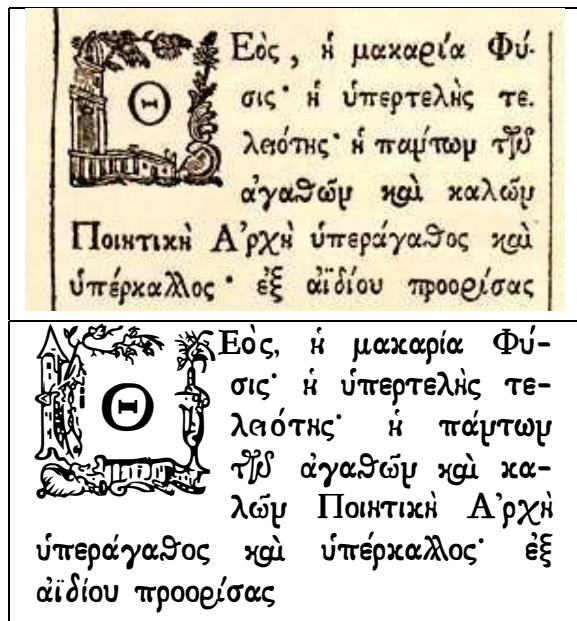

FIG. 1: The la Mojerra stele.

script can be found in [1]. Table 1 shows all the symbols used in the Epi-Olmec script to the best of our knowledge. People of the Mesoamericas used the vigesimal numbering system and the first two rows of the table contain the digits of the system. Note that the Mayas had a designated symbol to indicate zero, but there is no evidence whether zero was known to the Olmec people. Epi-Olmec texts were written in columns either from left to right or from right to left. For example, the text in Figure 1 follows both writing directions. In particular, the left part of text follows the first writing direction and the right part the second writing direction. Note also that the text on Figure 1 is the largest piece of Epi-Olmec text that has been found so far.

Let us now describe how we created the Epi-Olmec font. Since we had no pictures of any Epi-Olmec document we had to resort to [1] to get the shapes of the symbols of the script. For each symbol we generated a bitmap from a screenshot of a magnified image of the symbol. The screen shots were made with the GNU Image Manipulation Program (GIMP). Then, we traced the generated bitmaps with autotrace. This step was necessary in

Fɪɢ. 2: Text from the original Philokalia book (top) and the text as it is typeset with the Philokalia fonts and LaTeX (bottom).

and one that contains the special ornament characters that decorate the beginning of each chapter. The glyphs were generated from scanned images of the book pages. However, the scans were made in low resolution, which prevented us from doing quick and dirty work. My collegue Yannis Gamvetas spent many hours working on the smoothing of the curves of the letters with Adobe Illustrator.

When this work was finished, we had to create an Ω translation process plus an Ω virtual property list file to handle the numerous ligatures of the font. Another problem was the handling of the ornament glyphs. For this purpose we used the lettrine package, which we felt was quite adequate for this particular task.

Figure 2 shows a little piece of text from the Philokalia book and how LaTeX typeset the same text using the Philokalia fonts. The reader is invited to judge whether the fonts meet our original goal. In addition, the reader is invited to judge whether the resulting fonts produce aesthetically pleasing results.

Conclusions and Future Work

We have presented a procedure by means of which one can create fonts from archaic or old documents. These fonts accompanied by a set of macros can be used to digitally reproduce the original documents. In this way it is possible to replicate old documents in a very efficient and systematic way. In the near future, we plan to release both the fonts and the macros presented here so that people can use them. In addition, we plan to create a font for the script of the famous disk of Phaistos[1] and possibly a font with all the known symbols of Linear A.

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References

[1] Terrence Kaufman and John Justeson. Epi-Olmec Hieroglyphic Writing and Texts. Available from http://www.albany.edu/anthro/maldp/EOTEXTS.pdf, 2001.

[2] Barry B. Powell. *Homer and the Origin of the Greek alphabet*. Cambridge University Press, Cambridge, U.K., 1991.

[3] Javier Serrano Urcid. *Zapotec Hieroglyphic Writing*. Dumbarton Oaks Public Service, Washington, D.C., U.S.A., 2001.

1. This font has been completed since the time of writing and is available from CTAN in fonts/phaistos.