THE KARNAK PROJECT: 2002-2003 INTERIM REPORT

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Purpose of this paper is to present the latest results of an ongoing research project carried out by the Computer Aided Design Research Group (GRCAO) of the Université de Montréal, in order to define new methods of archaeological restitution using computer-aided means. This novel approach involves a redefinition of surveying techniques, data processing and knowledge-based thinking in disciplines such as epigraphy and architecture. In a context where the scientific community still uses analogical working methods inherited from the past to carry out surveys, it is essential to make the best out of the technological breakthrough of recent years in terms of Computer-Aided Architectural Design, so as to restitute ancient monuments in all their spacial and temporal complexity. Instead of the traditional approach which uses paper as the main support to reproduce historical architectural structures bidimensionally, the GRCAO wishes to use computer programming as an aid other than a modern computerized version of the drawing board; it seeks to build a 'metamodel' that will serve as a prototype to better study and understand a great number of monuments.

In order to reach this aim, the GRCAO is actively collaborating with archaeologists working in the field, in the event the French CNRS mission-UPR 1002 in Egypt. As its chosen field of investigation, the GRCAO is using the temple of Karnak. This impressive archaeological site serves as an excellent case study and testing ground for the project, since it underwent tremendous and complex architectural transformations in the course of its two thousand year-long history.

Objectives that have been met in the course of the past year are fivefold:

1) Recording of the geometric configuration of hieroglyphic signs.

It is now possible to draw the contour of a sign by calling up the prototype of that sign from the database, and then to modify and adapt it to each of its occurrences. Increased knowledge of paleography is thus gained, which allows for diachronical as well as synchronical studies of signs.

2) Recording of the phonetic value of hieroglyphic signs.

Once a sign is drawn, its phonetic value can automatically be recorded by selecting the sign from a list containing all known glyphs, which in turn enables the user to search a sign and locate it in the three-dimensional model of the temple.

3) 3-D reproduction of hieroglyphic signs.

By extruding the figures and the signs in one direction or another, one can reproduce either sunken or raised relief, thus giving the wall carvings a three-dimensional aspect.

4) Integration of the decorative program together with the stone masonry.

The reliefs of a block can be drawn while taking into account the degree to which the stone is damaged or broken.

5) Interactive transposition of digital drawings of figures and glyphs originally carved on a cylindrical or conical surface into a three-dimensional environmental framework.

As several hundreds of decorated columns with circular shafts were built inside the temple, this method is of great use in carrying out epigraphic surveys of non-flat surfaces.