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When Script Engravings Establish a New Spatial Dimension in a Monument: The Tomb of Manchu Emperor Qianlong (18th century)

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The significant patronage of Tibetan Buddhism by the first Emperors of the Manchu Qing dynasty (1644-1911) has been noticed for a long time. The erection of temples and chapels dedicated to this cult in Peking and in the surrounding area was one of the most impressive evidence of this process. This patronage was especially important under Qianlong (r. 1736-1795), the 4th Emperor to come to the throne and the one who gave the Manchu Empire its greatest extension.

This support is usually explained as being the result of a purely political strategy aiming at controlling the Mongol population who venerated Tibetan Buddhism. Qianlong is actually generally thought as being totally sinicized. He was a fine connoisseur of Taoist aesthetic and was greatly learned in Confucian thought. During his reign, Chinese art and culture significantly developed. Faced with Chinese literati who considered the Manchu as pure barbarians, he supervised great encyclopaedic works of Chinese knowledge that are still reference works. He also based his government on Imperial Confucian principles that had been developed by previous Chinese dynasties.

Yet, as this has been emphasized by recent studies, the personality of Qianlong is in fact much more complex. His Manchu identity cannot be put aside and his interest for Tibetan Buddhism should be recognized as personal and sincere. The study of his tomb provides a great deal of evidence to support these ideas.

Qianlong's mausoleum was built 120 km North-East of Peking in the Eastern Tombs of Qing Dynasty (*Qing dongling*), a place that had been chosen in 1661 to erect the Imperial tombs of the new Manchu dynasty. The construction of Qianlong's tomb began in 1743, 8th year of his reign. It lasted for nine years.

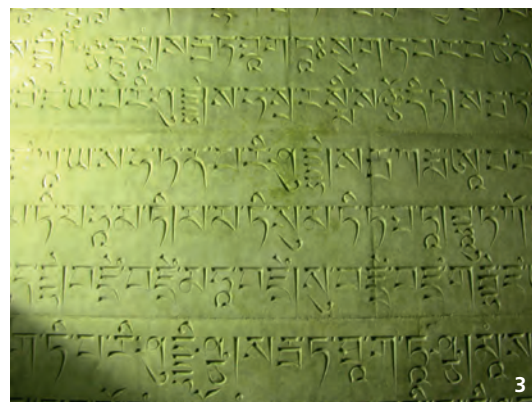
The mausoleum is made up of several buildings (image 1). We focused our research on what is traditionally called in Chinese "the Underground Palace" (*digong*) and which we will call here

the tomb. Located 54 m underground, it has a surface of 372 sq. meters. Its architecture is in accordance with the traditional architecture of Chinese Imperial tombs. But it stands out because of its ornaments. The walls, the doors and the vaults are covered by Buddhist representations and inscriptions (images 2 and 3).

Despite the classification in 2000 of all the Qing Eastern tombs by UNESCO as World Heritage Area, only limited research had been conducted on Qianlong's tomb decoration. Yet, among all the opened Imperial tombs, it is the only one which has so many ornaments. Chinese researchers are mainly interested in how plunderers could enter the tomb in 1928 or in the personality of the people buried with Qianlong. Some of the Buddhist representations have been identified, but the inscriptions remained a mystery.

The total absence of inscriptions in Chinese or Manchu was really surprising given the fact that Qianlong was a Manchu Emperor considered completely sinicized. The engraved scripts are in Tibetan (29 464 letters) and in Lantsa (647 letters), a script used in Tibet and in Mongolia to write Sanskrit. In both cases the calligraphy is extremely fine and of high quality. Tibetan inscriptions are also engraved on the sides of coffins. Dynastic annals only give very little information about this ornamental program.

At the invitation of the local authorities, French researchers began their work in the tomb in 2005. After the identification of each and every Buddhist representation, all the inscriptions were written down and then entered in a computer. It was the first level of safeguarding, and it was urgently needed because recurrent water leaks in the vaults are forming many limestone deposits that erode the inscriptions on the vaults and on the walls. Besides, the high humidity has resulted in the deterioration of the coffins, which seriously crumble. Today, parts of the inscriptions that were written down in 2005 are not legible anymore.



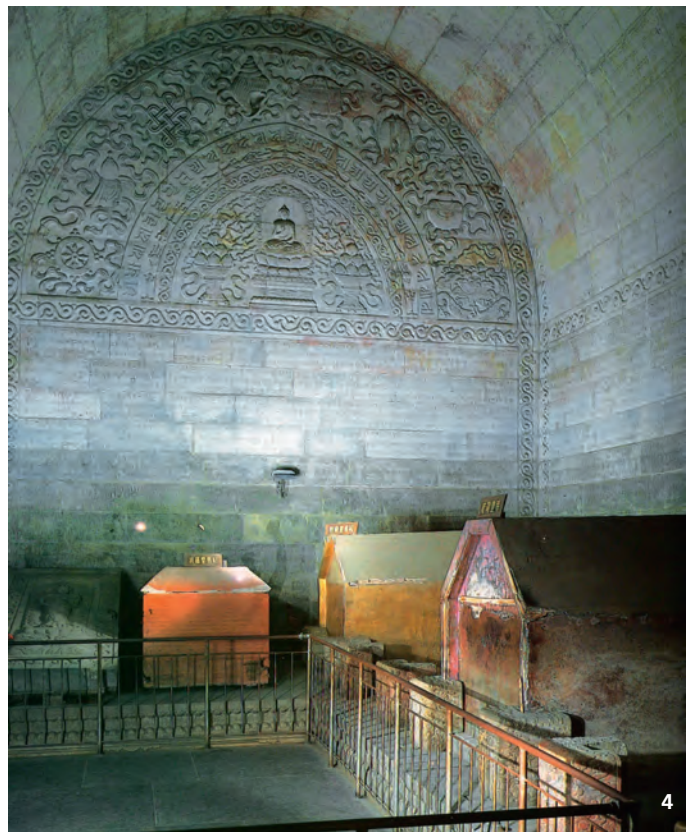
This first edition was the first step but it was not enough. To really protect these extraordinary ornaments, we had to identify all its components and determine the guiding ideas that were behind their design.

We do not have any efficient computer tools to do advanced research in the whole of the Tibetan Buddhist Canon. It was by reading hundreds and hundreds of folios that the identification of all the inscriptions was achieved. All those engraved on the walls and the vaults are only *dharani*, that is, sacred formula, while those found on the coffins also contain prayers.

Almost 150 *dharani* were chosen to accompany the Emperor in his tomb. Some are very long, other are extremely short. Some of them appear several times. Translating these *dharani* was not very useful, since the efficiency of these formulas stands more in their sound than in their meaning. That is the reason why in non-Indian languages these *dharani* are not translated but transcribed. We were more interested in the reasons that had governed the choice of these texts. The analysis of their functions actually demonstrated that there existed unifying threads in the elaboration of this ornamental program. It also became obvious that the inscriptions of each wall and each vault were independent: no *dharani* begins on one wall to finish on another wall. This extremely organized page make-up or “wall make-up” could only result from rigorous calculation and deep reflection. The presence of special *dharani* acting as a kind of “end-of-text markers” at the end of each group of inscriptions reveals that there was a will to precisely segment space.

It is obvious that this whole set of ornaments contributes to the creation of a sacred space. The first funerary chamber plays an important role in this process. Protective divinities are engraved on the walls among several texts well known for their apotropaic function. Acting like a kind of protective airlock, this room marks the entry to the sacred space. Besides, several *dharani* particularly linked with consecration rituals are engraved in strategic places such as vaults, lintels, etc. The identification of the inscriptions also enabled us to distinguish other groups of *dharani*. Those that purify bad deeds and those that lead to good rebirth – two categories closely associated with Buddhist funerary rituals – occur with an extremely high frequency inside the first funerary chambers. This first discovery enabled us to consider the idea that through these inscriptions, a Buddhist funerary ritual was permeating the whole monument, unfolding along the walls and the vaults for eternity for the benefit of the deceased.

The study of the inscriptions of the last funerary chamber where all the Imperial coffins are kept enabled us to make a second important discovery (image 4). The choice and layout of the *dharani* on each wall and on the vault of this room correspond to the rules that govern the deposit of relic texts inside Tibetan *stupa* during consecration ceremonies. The deposit of important relics that may consist of texts is a practice that is common to all the Buddhist traditions. Yet, a particularity of Tibetan Buddhism is that the deposit of relics consisting of texts is done in an extremely hierarchical way. Specific texts are associated with each of the architectural parts of a *stupa*. We thus developed the idea that the layout of the texts in the last funerary chamber enabled the virtual creation of a *stupa* – the Buddhist funer-



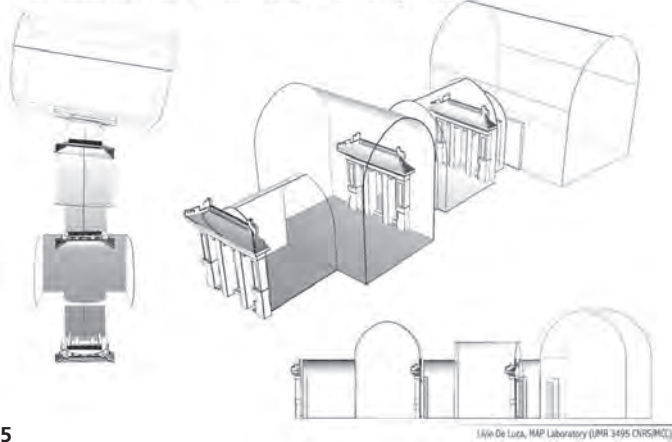
ary monument par excellence. We have to emphasize here the fact that the practice of hierarchical deposit of texts is unknown to Chinese Buddhism. In China, *stupa* are not built and consecrated in the same way that they are in Indo-Tibetan tradition. That is the reason why the hypothesis of a virtual *stupa* inside Qianlong’s tomb can only be valid in a Tibetan context. In a Chinese context, this hypothesis would be totally groundless.

In order to establish the validity of this hypothesis, the ANR SINETOMB (*Système d’informations numériques de l’emploi des textes dans l’ornementation des monuments bouddhiques*) project was elaborated in 2008. It brings together two CNRS laboratories, the Research Center on the Civilizations of Eastern Asia (CRCAO) and the Research Center on Models and Simulation for Architecture and Heritage (MAP). It combines three complementary scientific concerns: (1) improving the knowledge of Qianlong, (2) a new approach of the conception of *stupa*, (3) the design and development of systems of representations that are true tools of investigation and scientific visualization.

Our aim was to use a “3D special design” of both inscriptions and iconographic elements of the ornaments of the tomb in order to reveal the sacred space where funerary rituals and a virtual *stupa* appeared. We initially focused on the process of shaping a virtual *stupa* through the particular layout of the texts.

The construction of this system is based on the linking of the graphical and informatics representation of two parallel levels of description. On the one hand, the description of the morphology of the tomb through the spatial structure of geometric entities in a 3D model (collection of architectural shapes and spatial relationships), on the other, the description of knowledge associated with the Tibetan funerary rituals (abstract con-

3D reconstruction of the Tomb | Surfaces generation

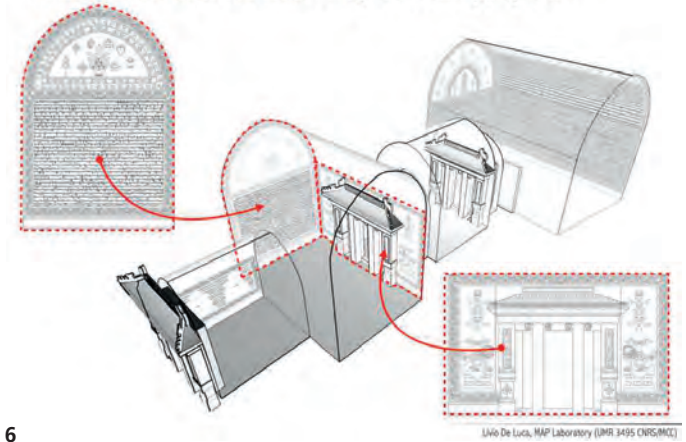


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cepts and semantic relationships). Due to the morphological complexity of these spaces and to the quantity and density of decors and inscriptions, the study of the tomb required the definition and implementation of a specific method of documentation based on several graphics processing techniques. Starting from the point cloud obtained by multi-view stereo photogrammetry, the first phase consists of extracting relevant profiles that describe the geometric entities composing the main spaces and its architectural elements (images 5 and 6). A set of basic morphological entities then served as geometrical support for the processing of high definition orthographic images for the analysis of the inscriptions (image 7). The two-dimensional reproduction of these elements, based on a very thorough inspection of surfaces, was based on a strategy of structuring information in different reading levels (image 8). More than 31 000 characters (Tibetan and lantsa) were restituted basing on a rigorous segmentation and annotation process aiming to isolate fragments of inscriptions (linkable to *dharani*) and symbolic decorative motifs. In order to establish bilateral interlinkages among the morphological and the conceptual description of the space, a method for the semantic characterization of the digital representation of the tomb has been developed (image 9). It is based on three parallel dimensions.

3D reconstruction of the Tomb | Image To Geometry projection



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First, the three-dimensional reconstruction of architectural elements and decorations through the development of projective spatial relationship between three-dimensional elements and two-dimensional media.

Then, the semantic characterization of the isolated morphological elements through the annotation of surface's segments (inscriptions and decorative motifs) (image 10).

Finally, the representation of knowledge about Tibetan funerary rituals through the formalization of the conceptual relationships between *dharani* (inscriptions) and deities (decors). Thanks to the informatics implementation, the graphical and textual data formalized and represented become accessible within an analytical support (information system) allowing to explore the relationship between the morphological and the conceptual description of the tomb by the means of three interactive and interconnected devices: a 3D scene allowing the exploration of the physical space, a dynamic graph allowing the navigation within a network of interconnected concepts, a dynamic image displaying the theoretical position of the selected entities (inscriptions and decors) and the related concepts, within a "virtual stupa". Real working tool for researchers, this system allows to explore the physical and conceptual space in parallel:

3D reconstruction of the Tomb | Restitution of sculpted decors



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3D reconstruction of the Tomb | Images rectification



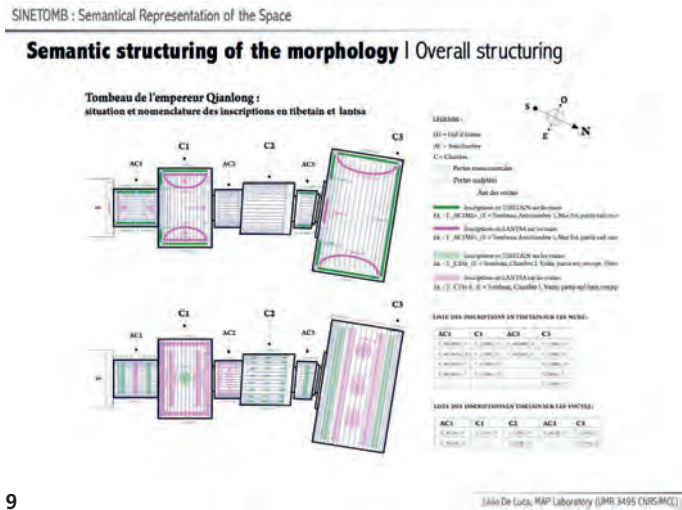
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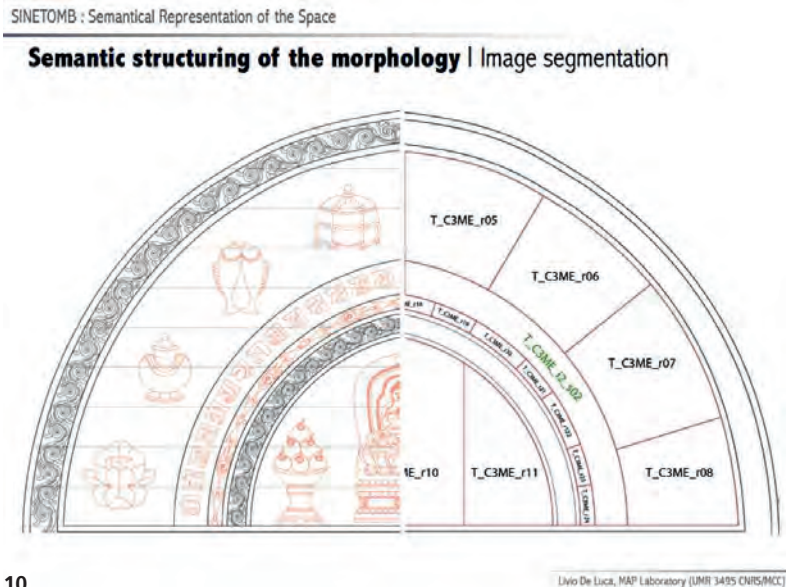
the selection of a entity in the 3D scene (physical space) gives access to the position of the selected element in the dynamic graph of concepts (conceptual space) and vice-versa. This system, developed as a web application, allows users to explore and analyze the conditions and extreme sophistication of the use of writing in the tomb of Qianlong. Future implementations will allow to better analyse this data and compare them with those found in other buildings or objects used in a funerary context.

Although it is certain that Qianlong sometimes used Tibetan Buddhism for political purposes, his interest for this religious tradition was also sincere and personal. Actually if Qianlong worked out such a complicated set of ornaments in his tomb,

it was not to make a showcase that would be shown to the Mongol populations. It was most probably conceived in order to express his own innermost beliefs and may show his will to be buried in a stupa as the universal monarch of the Buddhist tradition would be. Being the Emperor of a vast Empire where Confucian values were predominant prevented Qianlong from building a tomb on the model of a *stupa*. But by engraving script he could shape a virtual *stupa* inside a traditional Chinese tomb. The use of innovative methods as regards 3D space design and the elaboration of an ontology not only enabled us to show this absolutely unparalleled architectural process, but also trigger a new reflection on the definition of a *stupa*. Lastly, given the alarming state of conservation of Qianlong's tomb, this study is of capital importance as a memory of the monument.



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