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Opportunities for Epigraphy in the Context of 3D Digitization

The advent of three-dimensional digitization offers a number of new possibilities for epigraphic study and publication. Traditionally, the publication of inscriptions has been at best accompanied by line drawings or photographs--two-dimensional representations of items with three-dimensional structure. Scholars wishing to reassess the published readings must either consult the original artifact or a squeeze, or else take the word of the author of the editio princeps that a given photograph is an adequate representation of the surface of the stone.

Three-dimensional digitization techniques, however, allow for unprecedented distribution and access to the complete structure of inscriptions. While long-standing methods of replication such as squeezes have some advantages over photography or drawings, producing and distributing copies of them poses problems similar to the object itself. The inherent digital nature of acquisition systems like 3D laser scanning enables the associated ease of digital distribution. The advantages of electronic publication have already been seen for the extension of traditional epigraphic study into the digital realm; online publications such as Inscriptions of Aphrodisias enable access from anywhere in the world, and the absence of restrictions on printed length permits the inclusion of multiple images of nearly every stone (cf. IAph2007).

The ability to capture 3D digital replicas of inscriptions in situ, then, should represent a leap forward for the field of epigraphy. However, adoption of this technology for both epigraphic study and publication has been slow. One major work with this technology in the study of inscribed text has been with cuneiform tablets (Anderson and Levoy, 2002), but applications to Greek and Roman epigraphy have remained largely unexplored.

Progress has been made showing that stroke detection can enhance the interpretation of incised text, however, many of these algorithms are based on analyzing 2D images with relighting in an attempt to recover information about incision depth (Molton et al., 2003; cf. Terras 2006, pp. 9-12). As 3D digitization at the appropriate resolution captures the full geometric properties of an object, the information available for algorithmic analysis and enhanced visualization is much greater.

In this paper, we intend to present the results of the 3D acquisition, analysis, and publication of a selection of epigraphic materials from the British Museum. (1) Two defaced Roman inscriptions from Cyrene, which will be published along with some 1500 texts in EpiDoc XML by the Inscriptions of Roman Cyrenaica project (in a similar manner to IAph2007), may be good candidates for close analysis of erased surface for traces of surviving letter-strokes. (2) Several hundred selenite curse tablet fragments from Amathous in Cyprus offer an exciting and invaluable research opportunity, but are also notoriously difficult to read and image. As well as the usual problems with reading the cursive, often clumsy script on curse tablets, reading is hindered by two further features of these artifacts: (a) the fragile nature of the selenite crystal has resulted in both fragmentation and flaking, sometimes to the extent that the surface layer has almost entirely fallen away leaving only the faintest trace of letters; (b) the material is semi-translucent making traditional photography very difficult to light usefully. This last issue may also affect the ability of a laser-scanner accurately to detect surfaces, thereby adding a further challenge to the imaging process. A good 3-D image of the tablet would be of such value to the epigraphers reading the text that it is certainly worth carrying out some exploratory work in this area. New possibilities for geometric analysis, epigraphic scholarship, and enhanced visualization made possible by the acquired 3D volumes will also be explored.