

Art in the Numbers: Photogrammetry and the Principles of Design of a Roman Sarcophagus

An unpublished, well-preserved mid-third century *Prachtsarkophag* purchased in 1933 by The Nelson-Atkins Museum of Art (Kansas City, Missouri) provided the perfect test case for the application of photogrammetry to Roman art. This door-sarcophagus is richly decorated and neatly rendered with an aedicula in the center and flanking strigillated panels and corner columns. The use of architectural forms suggested the possibility of finding systems of proportions and the employment of integers of basic units of measure just as in actual Roman buildings and monuments. Haarløv (1977) had published on the iconography of door-sarcophagi and Huskinson (2015) on the social and cultural context of strigillated sarcophagi, but taking numerous precise measurements and analyzing them had been eschewed—indeed, this is true for almost all Roman sarcophagi and Roman sculpture. In part this may have been due to the time-consuming nature of measuring by hand and the risk of inaccuracies, especially with rich three-dimensional surfaces. The employment of fine laser systems can be prohibitively expensive. Photogrammetry—the use of numerous digital images meshed on a sophisticated computer system where distances can be measured—has been used extensively on archaeological sites because it is remarkably accurate, inexpensive, and fast. Applying it to specific Roman works of art for an extensive analysis is not customary. With this method, however, the analysis of more

than 150 measurements of the Kansas City sarcophagus has been revelatory.

A complex series of harmonious proportional relations governed the design of the face of the sarcophagus with a particular concentration in the aedicula. A few examples suffice. The ratio of the height of the aedicula's pediment to the overall height of the aedicula, the width of the aedicula to the overall length of the sarcophagus, and even the greatest width of each strigil to the strigil's height is uniformly 3:10. On the four columns, the ratio of the height of the capital to the overall height of the column and the ratio of the diameter of the lower part of the shaft to the overall height of the column is 1:10. The ratio of the fill to the fluting of the corner columns is 1:3. Other pervasive ratios include 2.5:10; 4.5:10; 8:10.

The measurements reflect the use of integers of large basic units of Roman measure for several distances. For example, the height on the left of the façade of the sarcophagus is 3 *pedes* 1 *palmus*; the height between the fascia and plinth 3 *pedes*, and the height of the left strigillated panel is 2 *pedes*, 2 *palmi*, 2 *digiti*. The fill of the corner columns' fluting is 3 *palmi*; the fluting itself 2 *pedes*, 1 *palmus*. The aedicula measures 3 *pedes* high.

The measurements further reveal that the artist was using a sophisticated model for his work. The complexity of the design is so great that one can scarcely believe it was used just once or that Kansas City had the original work. A close reading of the measurements indicates that the artist had to modify the model's design to fit the block of marble which had been cut slightly

askew; that is, a bit higher on the right than the left. The sculptor used the left side as the closest fit to the model. He used templates but had to modify them to fit the changing height of the block.

A close observation of the more sophisticated examples of door-sarcophagi through photogrammetry may be equally revelatory. The style and iconography of the little-known *Prachtsarkophag* in the Torre de' Conti, Rome, suggest it comes from the same workshop as the Kansas City sarcophagus. A close study of the proportions and metrology may well prove the point. The application of photogrammetry to many other sarcophagi may further our understanding of many aspects of design and execution.

Bibliography

- Haarløv 1977 = Britt Haarløv, *The Half-Open Door: A Common Symbolic Motif within Roman Sepulchral Sculpture. Odense University Classical Studies, vol. 10* (Odense: Odense University Press, 1977).
- Huskinson 2015 = Janet Huskinson, *Roman Strigillated Sarcophagi: Art and Social History* (Oxford: Oxford University Press, 2015).

