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NEW PERSPECTIVES ON DOCUMENTING ATTIC POTTERY

1. Attic figured pottery and connoisseurship: 'instruction for use'

This paper aims to show how new technologies, and particularly 3D modelling, can be applied in the study of Attic figured pottery. Their use allows a better recording of this kind of items, enhancing their potential for interpretation. It is well known that Attic figured pottery is a valuable tool to interpret archaeological contexts, especially when it is found in a primary deposit or in a closed context.

This is primarily due to the intrinsic dating value of this type of finds, often enclosed within a narrow chronological range. We owe it to John Beazley for the opportunity to fully exploit the value of Attic figured pottery; the Scottish scholar identified hundreds of painters by adopting a Morellian stylistic approach (*ABV*, *ARV*^{2}; *Para*).

Beazley's method is based on the analysis and identification of recurring stylistic elements in a painter's production (for example, the way of representing anatomical details); these elements, as a whole, make up what is defined as the painter's style (Beazley 1917; 1922; Sapirstein 2013a, 193; 2013b, 1; 2014, 175; Pace 2019, 149-150). Therefore, all vases characterized by a specific style, constitute the *corpus* of a painter.

This approach allows us to date a vase within a 25-year range, and, sometimes, with even more accuracy (up to a 5-year range).

Nonetheless, we need to pay attention in using Attic pottery as an interpretative tool; there are pitfalls and issues. Difficulties are both theoretical and practical. Beazley's work itself is problematic; many scholars have challenged and criticised some aspects, questioning its theoretical basis and its value for the scientific community (Sparkes 1996, 90-113; Arrington 2017, pp. 21-23; Pace 2019, 149-154).

In other words, connoisseurship has been accused of being a dangerous and useless practice because it drained resources from other fields that might have been much more useful in the study of the past (Arrington 2017, 21). Instead of 'wasting time' attributing a vase to a painter, it would have been best fully developing its potential as a tool for archaeological research, promoting its technological, commercial and cultural value.

After an initial phase of rejection of Beazley's work, the positive aspects of connoisseurship are now being proposed again, avoiding throwing the baby out with the bathwater (Sparkes 1996, 112). We are aware that Beazley's work, with its limits, is still useful, but it needs to be employed into a wider horizon as a stepping stone to study other aspects of the ancient world (Marconi 2004, x).

Other issues concern more 'prosaic' aspects, but are crucial to the debate on the study of Attic figured pottery. The attribution process works through comparison; to incorporate a new vase into the lists provided by Beazley, it is necessary to identify those style-defining figurative elements and provide strict correlation between them and the production of an already known painter. When there are the necessary conditions, the new vase can be added to a painter's *corpus*. The process appears pretty straightforward; but anyone who has tried to do it, can testify that it is not so easy.

One of the main problems is the difficulty of obtaining pictures that can adequately be used from a stylistic viewpoint in the already published material. Often, shape or size of a vase does not allow, when published, to get images that can be adequately analyzed from a stylistical point of view (Bursich, Pace 2017; 2018; Pace 2018; 2019, 41; 2020).

Generally, to overcome this problem, the main published *corpora*, such as the issues of *Corpus Vasorum Antiquorum*, show panoramic photos accompanied by images of details, but this solution cannot permit an analysis of the whole-figured frieze.

In this paper, we aim to illustrate how the application of new technology to Attic pottery, especially 3D modelling, can offer to the scientific community a useful tool to overcome these obstacles.

2. From theory to practice. Some case studies

As mentioned before, the shape of some objects constitutes an obstacle to get images that can be really analyzed from a stylistic point of view. Kraters, for example, are necessarily published showing a panoramic view in order to show it as a whole. These kinds of images, generally, do not allow a probative analysis of the style due to the small size of the details. Even the morphology of the vase can be a problem; the convex and rounded shoulder of a column krater distorts the subject depicted. In a calyx krater the figures are represented all around the body of the vase; a disposition impossible to reproduce with only one picture.

A calyx krater, attributed to the Group of Polygnotos, is stored at the Museo Archeologico Regionale Paolo Orsi of Syracuse; the vase is already published in an issue of the *Corpus Vasorum Antiquorum* (Arias 1941, III I, 7, pl. 11, nos. 2-3; Pace 2018, 89, no. C81, figs. 34, 116). Here, only two photographs of the main sides are published (Fig. 1). It would be ideal to unroll the whole decoration in a single picture, transporting it from the convex surface onto a flat one, translating it from three to two dimensions.

Thanks to the 3D photo-modelling process, it is possible to get a single image with the whole decoration, an image that can be really analyzed from a stylistic point of view (Pace, Bursich 2018, 550, fig. 4; Pace 2019, 193, fig. 116) (Fig. 2).

Fig. 1 – Calyx krater attributed to the Group of Polygnotos (Arias 1941, III I, 7, tav. 11, nn. 2-3).

Fig. 2 – Calyx krater attributed to the Group of Polygnotos (Pace, Bursich 2018, 550, fig. 4).

Another 'problematic' shape is the *lekythos*; its cylindrical body often provides support for a figurative frieze that develops on most of its surface. Its morphology greatly increases the difficulty of providing a complete documentation. For this reason, *lekythoi* are often published with a single photograph, providing only a partial view of the decoration. The possibility of obtaining a whole, continual representation of the decorative frieze in a single picture would be very useful, such in the case of a *lekythos* depicting the escape of Aeneas from Troy, attributed to the Edinburgh Painter and recently re-published (SR inv. 19882) (Pace 2019, 166, fig. 97) (Fig. 3).

This technique of documentation can, therefore, provide new insights to the debate on Attic pottery; new perspectives of research have stimulated some reconsiderations about certain aspects of Beazley's method, especially regarding the historical plausibility of the hundreds of *ateliers* and painters

Fig. 3 – *Lekythos* attributed to the Edinburgh Painter (Pace 2019, 166, fig. 97).

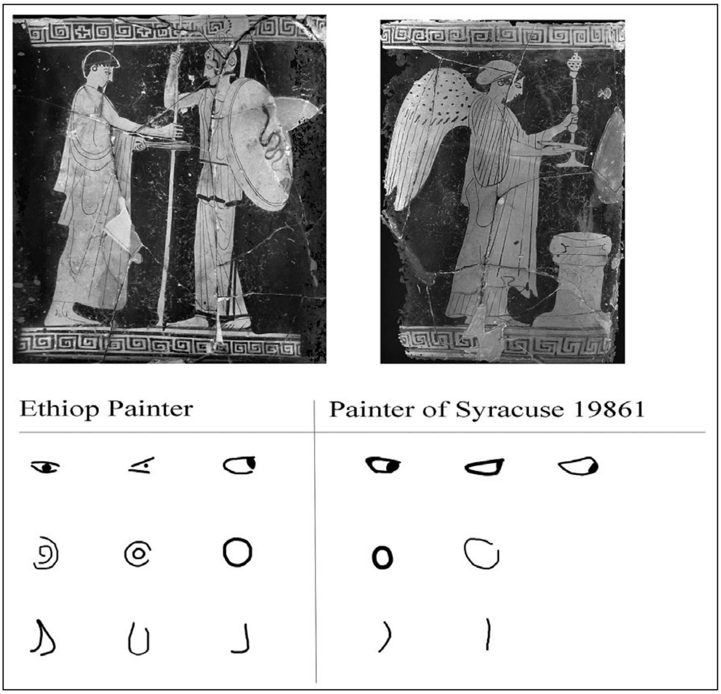

Fig. 4 – *Lekythoi* attributed to the Painter of Syracuse 19861 (Bursich, Pace 2017, fig. 5-6).

that the scholar has identified only on a stylistic basis (Sapirstein 2013b, 1; Id. 2014, 185; Bursich, Pace 2017, 82-83; 2019, 150).

Many painters have only a few objects attributed, but a low amount of attributed vases does not necessarily equate to the historical inconsistency of a painter. Random factors, such as lack of documentation, or the productive profile of the artisan – who might have been a potter-painter more heavily involved in shaping vases rather than in their decoration – can explain short attribution lists (Sapirstein 2013b, 3-9; 2020, 82-83).

Sometimes, when there are the conditions, it is possible to proceed with a 'rationalisation' of Beazley's lists, joining smaller painters to others' productions, especially when there is a clear affinity in style (Sapirstein 2014, 185; Bursich, Pace 2017, 82-83).

It is the case of the Painter of Syracuse 19861, a painter whose style recalls that of the Ethiopian Painter (*ARV*[2] 672). Only two *lekythoi*, to date, are attributed to the Painter of Syracuse 19861: they are both found in Gela, and now stored at the Museum of Syracuse (Bursich, Pace 2017; Pace 2019, 78, nos. C58-C59, figs. 28, 109-110).

The analysis of these two objects, however, shows how in reality there is no difference in style with the production of the Ethiop Painter, especially in its late phase (Fig. 4). This close stylistic relationship is not limited to anatomical details but also concerns the space in which the figures are inserted. What is, then, the reason that led Beazley to separate these two *lekythoi* from the rest of the Ethiop Painter production?

Since there are no other *lekythoi* attributed to the Ethiop Painter, it is reasonable to think the shape must have been the discriminating reason. Is it then possible to hypothesize that the Ethiop Painter could have collaborated occasionally with potters coming from outside from his workshop, or using internal resources (perhaps himself, being a potter-painter) to realize a batch of products specifically targeted to the Sicilian market, or more specifically for the Geloan market, where *lekythoi* were highly sought after (Bursich, Pace 2017, 83-89).

3D photo-modelling can be used, also, to better define the production profile of a painter; it is the case of a *lekythos* attributed to Nikon Painter (*ARV*[2] 651.28), coming from Gela and stored at the Museum of Syracuse (Pace 2019, 76, no. C54, figs. 27, 108) (Fig. 5).

The Nikon Painter is a minor figure within the crowded workshop of the Berlin Painter, where many important figures of the following generation were trained, for example the Achilles Painter (Oakley 1997, 99; 109). Generally speaking, the proof to attest to the existence of the student/master relationship between two painters is to identify a stylistic debt at the beginning of the career of the first and compare it with the later works of the second (Sourvinou-Inwood 1975, 108; Arrington 2017, 30-32). The analysis of the Syracuse *lekythos* proves how this relationship can be much more fluid and less schematic.

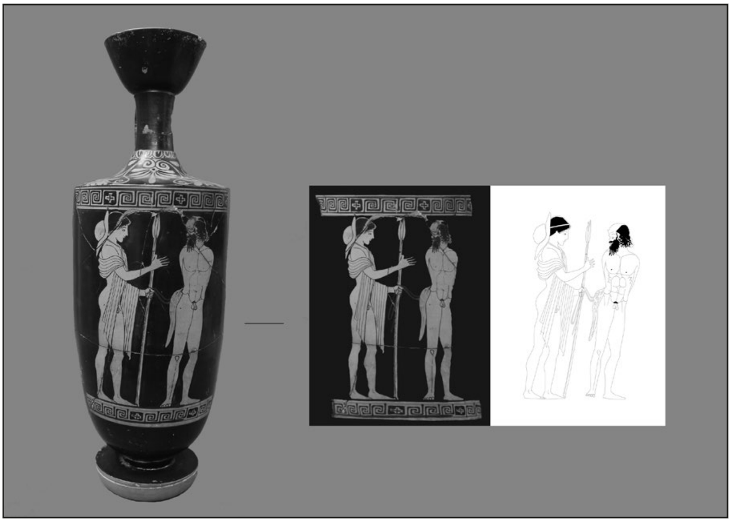

Fig. 5 – *Lekythos* attributed to the Nikon Painter (Pace 2019, 76, n. C54, figg. 27, 108).

It is important to underline how the image of the figured frieze obtained through 3D photo-modelling can be further elaborated with other graphic software applications, in order to obtain a simple drawing, thus overcoming the limitations of a traditional hand drawing (Fig. 5).

Analyzing the peculiar scene with Silenus on the Geloan *lekythos* by the Nikon Painter, it is possible to recognize a series of anatomical details that can be found in the Berlin Painter's first phase of production (Beazley 1911, 286; Kurtz 1983, 23, pl. I, no. 2; Smith 2006, 444, tab. 1); it seems therefore possible to infer that the Nikon Painter trained in his master's atelier while it was newly established. The rendering of Sileno's clavicles is peculiar; these are not welded to the handlebars but are bent forming a hook, as often happens in the early part of the production of the Berlin Painter. This solution was never again adopted in later productions of the Berlin Painter, and it allows us to attribute the Geloan *lekythos* amongst the first objects decorated by the Nikon Painter, therefore around 480 BC (Pace 2018, 96).

A.P.

3. 3D scanning for Beazley's system

As stated before, the application of 3D modelling to Attic figured pottery presents a variety of methodological advantages; firstly, the possibility to obtain an image of the figured frieze without using the traditional technique of drawing, avoiding many problems related, for example, to the vase's morphology or to the skills of the person who drew it (Bursich, Pace 2017; Pace, Bursich 2018).

At the moment, many indirect techniques of surveying are available for the creation of a three-dimensional record to scale. In the past few years one of these, photo-modelling, a technique which allows to obtain 3D models with a precision up to one millimeter, and rendered with photo-realistic texture, has come to be highly employed and widespread in the archaeological field (Arbace *et al*. 2012; Ranzuglia *et al*. 2013). There are many advantages in using these technologies: firstly, the speed of obtaining data and resulting reductions of costs: it needs only a digital camera and a personal computer. Moving from theory to practice, we show here the potential of 3D modelling by applying it to a black figure *lekythos* attributed to the Edinburgh Painter (500-475 BC). The vase was discovered in Gela at the beginning of the 20th century and is now stored at the Regional Archaeological Museum Paolo Orsi of Syracuse (inv. 19882) (Pace 2019, 57-58, no. C23) (Fig. 3).

D.B.

4. Workflow

The procedure that will be shown here, is not the only way to achieve the final outcome, but it is shown as a case study. Every phase of the workflow, synthesized in the flowchart (Fig. 6), is divided in two moments of execution: data acquisition phase (Fig. 6, point 1 - Digital Photo) and data elaboration. The whole process is carried out using only freeware or open source software (Fig. 6, points 2-5). The final output of this procedure is to obtain an image of the entire vase's figured frieze (Fig. 6, point 6 - Photo Survey).

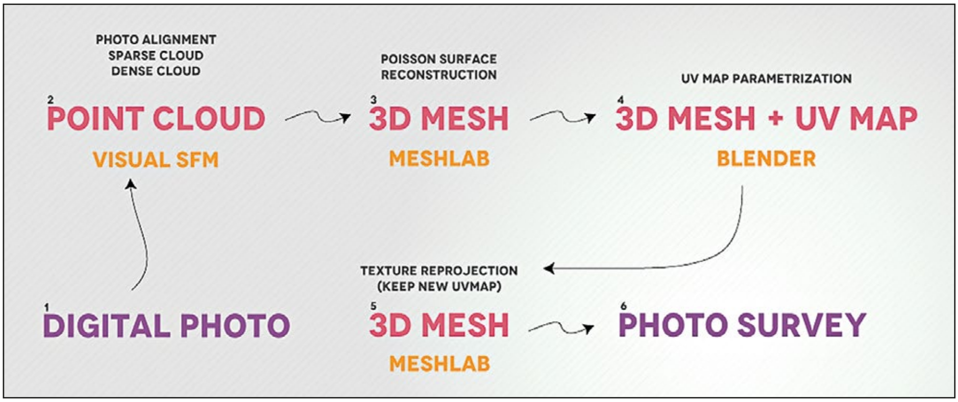

Fig. 6 – 3D modeling flowchart.

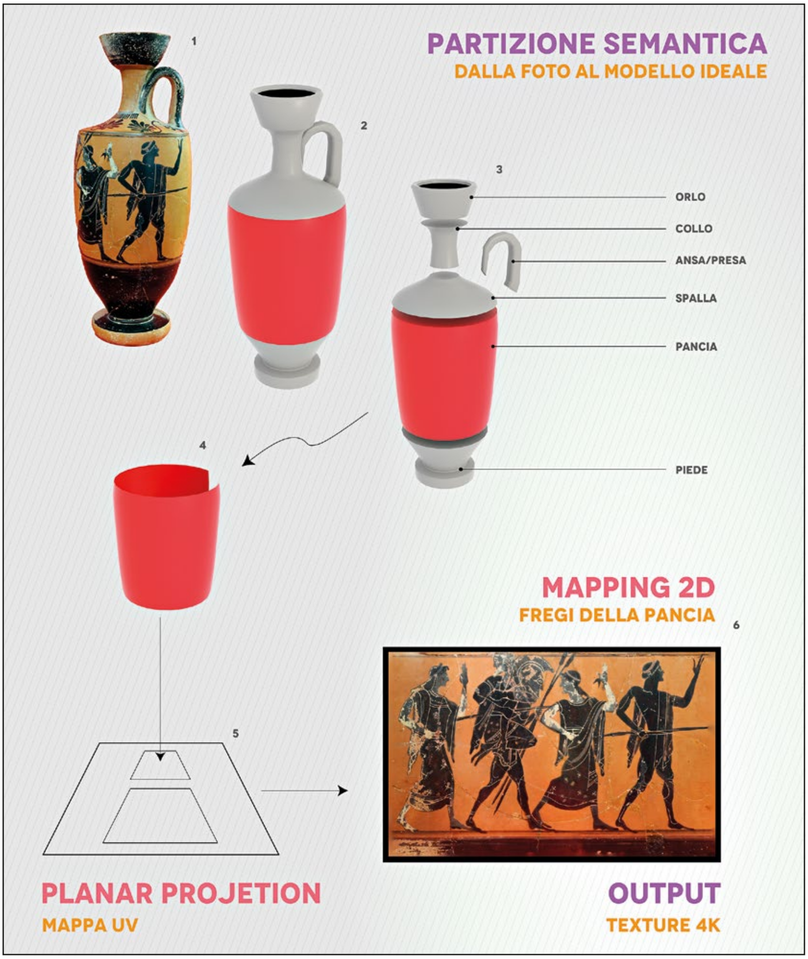

Fig. 7 – Planar projection of a *lekythos*.

With the survey, it is possible to create a 3D photorealistic model of the artefact that can be projected onto a plane surface. This procedure was already described for other applications but almost never employed for this specific kind of documentation.

It is fundamental for the correct execution of this survey to deeply ponder the semantic interpretation of the artefact (Fig. 7), which leads to ideally dividing it based on its elements; in fact, each element of the vase can be represented as a geometrical solid (cylinder, cube, etc.) and can be related to a two-dimensional projection. For example, the decoration portrayed on

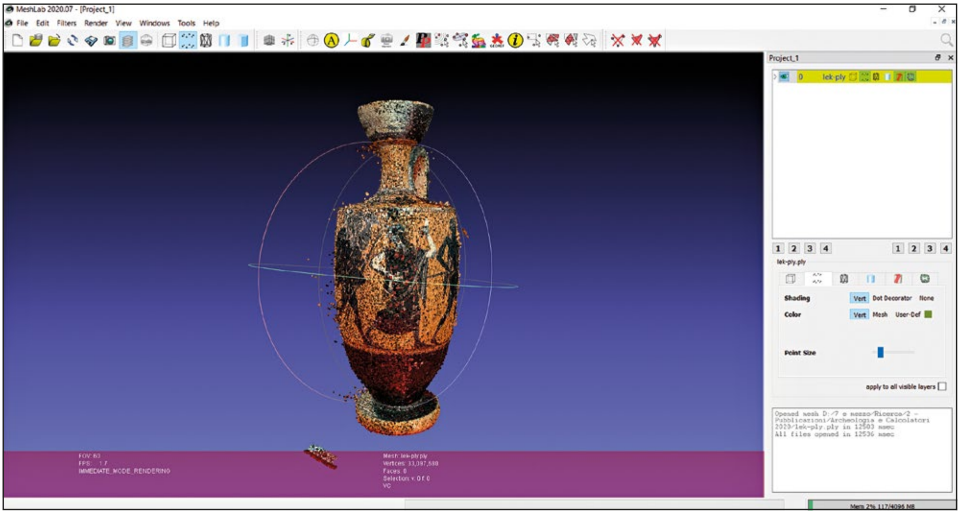

Fig. 8 – 3D modeling with Meshlab software.

the body of a *lekythos* can be translated on a plane using a planar projection, while a cylindrical projection could be employed for the accessory decoration of the shoulder (Fig. 7).

Digital imagery was imported in the photogrammetry elaboration VisualSFM software to be aligned and utilised to create a point cloud which can be exported in multiple formats (Fig. 6, Point 2 - Point Cloud). This software, unlike others, can acquire the placement within the space of each photo in real time, as well as their preview and the position from which it was taken. Once the point cloud is obtained it can be exported in .ply format, highly compatible with numerous other software and therefore very versatile for insertion in other workflows. The chosen software to elaborate the point cloud and process its 3D model was Meshlab (Fig. 8). This software can turn the point cloud into a mesh (3D shape) using the 'Poisson' filter, onto which the digital photos of the vase can be applied. Using the 'Raster Layers' function it is possible to import 2D images (raster) into a project, which can be used not only to project color data onto the 3D model, but also to save specific viewpoints or record an entire 3D photogrammetry procedure, including the pictures used to elaborate the final model.

The texture is automatically generated by Meshlab and exported to a very high resolution in graphic format (.jpg, .tga, .tiff). Since the texture creation process (UV mapping) is automated, it does not take into account the semantic approach to the 3D model previously described. To overcome this issue, it is necessary to introduce a further step to parametrise the texture based on the

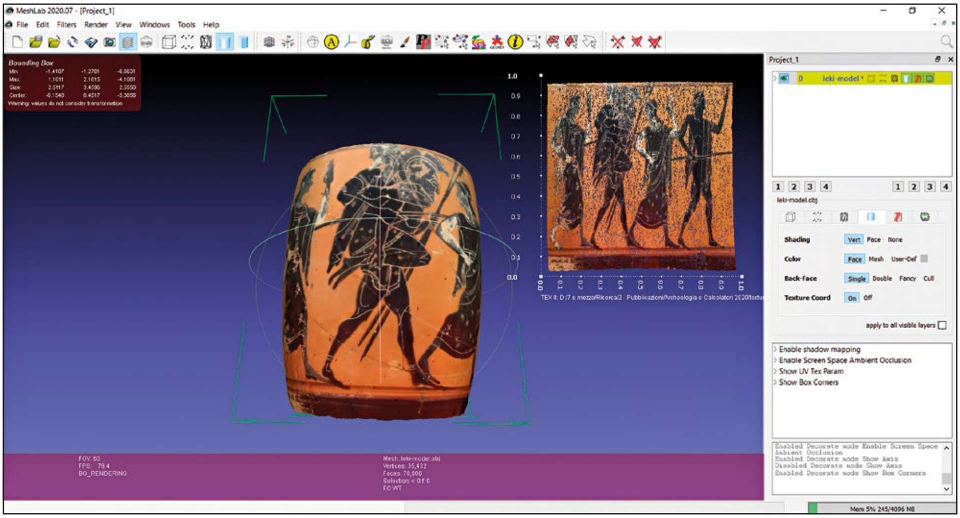

Fig. 9 – 3D modeling with Meshlab software.

morphology of each specific part of the vase. For this reason, the 3D model is subsequently exported from Meshlab and imported into Blender, a software that can modify the UV map and then be imported again into Meshlab with the new UV map (Fig. 9), making it possible to export the texture in order to obtain the required portion of the vase.

At the end of the workflow, it is possible to obtain, without employing any kind of direct survey, the graphic representation of the entire figurative apparatus, with a photo of realistic quality, without the limitations that a traditional approach would imply. It has already been suggested the vital importance of being able to provide, in publishing Attic artefacts, pictures which can really be stylistically analyzed; to overcome the limits imposed by the contemporary connoisseurship, it would, in fact, be necessary for future publications to provide adequate images. For this reason, only open source software applications have been employed, in order to allow access to this new technology to the widest possible demographic of scholars.

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ABSTRACT

The study of the Attic-figured pottery is closely connected with the 'Beazley method', which consists in the possibility of recognizing a painting 'hand' exclusively based on the style of the work; the Beazley method, despite having suffered some criticism, is still considered substantially valid. The need to have images which can be analyzed from a stylistic point of view, has suggested to combine the use of some open-source programs of 3D photogrammetry (such as VisualSFM and Meshlab) and 3D modeling (such as Blender), in order to shift the figured frieze from the pot to paper, avoiding the limitations associated with traditional direct drawing.