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AN EXPERIMENT IN STYLISTIC ANALYSIS  
BY COMPARISON OF VIRTUAL 3D MODELS:  
THE PALAGI HEAD IN BOLOGNA  
AND VINCENZO GEMITO'S EFEBO

ÁGNES BENCZE\*

ABSTRACT

This paper sums up the results of the comparison of virtual models of two marble heads, obtained by 3D scanning: the famous Palagi Head of the Museo Civico in Bologna, and a modern copy of it, realized by Vincenzo Gemito at the beginning of the twentieth century. The technique employed was the superimposition of the two virtual models, which revealed coincidences and divergencies between the two volumes, thus shedding light both on the copying method used by the sculptor and on those slight differences which may be regarded as the markers of his individual style. The significance of this experiment resides in the fact that our method made it possible to describe in mathematical terms some stylistic observations, which had been formulated until now only textually and thus in subjective terms.

KEYWORDS: Analysis of marble copies, 3D scanning, *Athena Lemnia*, Palagi Head, Vincenzo Gemito.

INTRODUCTION

THE marble head inv. G 1060 of the Archaeological Museum in Bologna (FIG. 1), also called the «Palagi Head», from the name of the Collection it belonged to originally, is one of the best known documents of classical Greek sculpture.<sup>1</sup> It is a work of the early Roman imperial period, most probably a copy of the head of a bronze statue, dating to the middle of the fifth century BC, which was identified by A. Furtwängler as Pheidias's *Athena Lemnia* as early as in 1893.<sup>2</sup> As well known, this reconstruction has been disputed and defended several times since then, but

the question of its correctness is beyond the scope of this paper.

In any case, thanks to its attribution to an emblematic name of classical Greek sculpture, the Palagi Head had become one of the best known ancient sculptures by around 1910: as an ancient marble piece of outstanding quality, at the center of scholarly debate of the highest levels, it was eagerly discussed, described and reproduced, both in photography and in plaster casts. Significantly, it was one of the first ancient works of art to have a plaster cast ordered by E. Löwy for the Museo dei gessi at «La Sapienza» University in Rome.<sup>3</sup>

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<sup>1</sup> For a detailed description and essential bibliography see CULLEN DAVISON 2009, 59.

<sup>2</sup> FURTWÄNGLER 1893, 3-45.

<sup>3</sup> MARTORELLI 2016, 32; GUALANDI 1976.

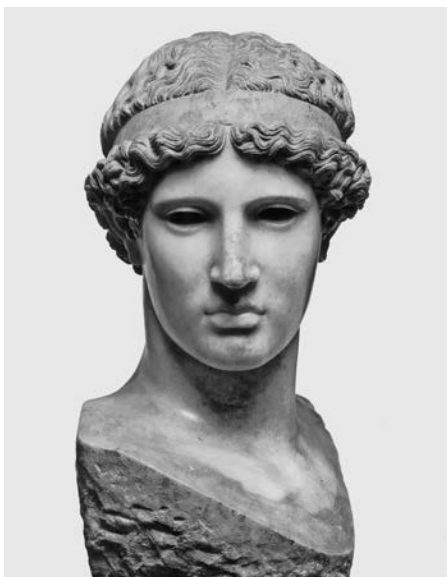


FIG. 1. Bologna, Museo Civico Archeologico, The Palagi Head., inv. G 1060 (photo courtesy of the Museum).

As chance would have it, one plaster cast of the Palagi Head became a source of inspiration for one of the most important personalities of Italian art at the turn of the century. By that time Vincenzo Gemito (1852-1929) was already regarded as a legendary figure of his native *milieu*, Naples, and of Italian culture as a whole, being praised by Gabriele d'Annunzio already in 1901 as an example of the reincarnation of pure and lively Hellenic spirit in modern Italy.<sup>1</sup> At the beginning of the 1910s he was at the beginning of what could be called his second great phase of activity, after a long period spent in almost complete isolation. Indeed, after the brilliant start of his career, Gemito was affected by a mental crisis toward 1887 and literally disappeared from

sight for more than twenty years. While he certainly faced true mental disorders, it is likely however that he also used the years of his voluntary exile for a fervent search for new artistic forms. In fact, when he returned to public life in 1909, his works were characterized by a profoundly renewed style, which was largely inspired by classical antiquity and was to earn further success for him during the years to come.<sup>2</sup>

Still at the beginning of this second heyday of his career Gemito received a plaster cast of the famous Palagi Head from a friend without any particular knowledge about its art historical placement, and he was so deeply affected by it, it would seem, that he decided to copy it in a block of Carrara marble (FIGS. 2-3). The sculpture thus realized was signed and dated «V. Gemito 1912», and displayed in several art exhibitions during the same year with the title of «Efeba» (later corrected to «Efebo»). In one of these exhibitions it was seen by Gh. Gherardini, director of the Civic Museum in Bologna, who recognized it as a copy of the prestigious antique piece in his own Museum and decided to let it be purchased and put on display beside the Palagi Head. Gemito's work was removed and transferred to Palazzo d'Accursio in 1952, when a reorganization of museums took place in Bologna, with the separation of collections with different profiles.

The story of Gemito's *Efebo* was recently reconstructed by L. Martorelli, with thoroughly collected documentation and some inspiring observations about its sculptural qualities.<sup>3</sup> This reconsideration of a relatively well known case of emulation between a

<sup>1</sup> *In morte di Giuseppe Verdi. Canzone, preceduta da un'orazione ai giovani*, 1901, second edn., Milano, 1913, 7-8.

<sup>2</sup> See BENCZE 2014 (2016), 80-81 and 89-91.

<sup>3</sup> MARTORELLI 2016.



FIGS. 2-3. Bologna, Palazzo d'Accursio, Collezioni Comunali d'Arte, V. GEMITO, *Efebo* (photo by L. Mátyus).

modern sculptor and his antique model suggested the idea of a trial in stylistic analysis supported by a new instrument, *i.e.*, computer-based comparison of digitized models, realized by 3D scanning.

#### COMPARISON OF SCULPTURAL FORMS WITH THE HELP OF 3D SCANNING

The experiment described below was executed within the framework of a wider research project focused on the possibilities of stylistic analysis helped by 3D scanning, directed by A. Patay-

Horváth (Eötvös Loránd University of Sciences, Budapest) and supported by the Hungarian National Research Fund.<sup>1</sup> The scanning was carried out in December 2014, in the rooms of the Civiche Raccolte d'Arte, Palazzo d'Accursio, Bologna. High definition 3D models were realized by K. Kovács, computer scientist, from data acquired on the spot by P. Gyuris, as a specialized technician.<sup>2</sup>

The two objects that were scanned are a modern plaster cast of the Palagi Head, belonging to the collection of Palazzo d'Accursio, and the bust real-

<sup>1</sup> OTKA (Hungarian National Fund for Scientific Research), project no. OT 101755.

<sup>2</sup> I seize the occasion to express my gratitude towards Dr. C. Bernardini, director and Dr. A. Mampiero, curator of the Civiche Raccolte d'Arte for authorizing the scanning and for the valuable technical and professional assistance provided to our team during our campaign of documentation in Bologna. I also wish to thank L. Mátyus, photographer of the Museum of Fine Arts in Budapest, for his assistance to the scanning and for his important contribution to the set of illustrations used in this paper.

ized by Vincenzo Gemito, based on a different plaster cast of the Palagi Head, which is now lost.

THE STARTING POINT:  
STYLISTIC FEATURES OBSERVED BY EYE

Observed on its own, Vincenzo Gemito's *Efebo* shows the characteristic traits of a good personal achievement in the study of classical Greek sculpture. The author's intention of *copying* the antique head is revealed at first sight by his accuracy in the reproduction of the hairstyle, comprising the minor details of the elaborated, wavy locks. Furthermore, if one recalls to mind some of Gemito's sculptures, whether from his earlier period, or from his later years, it is also evident that on this occasion the artist must have tried intentionally to detach himself from his own repertory of physiognomies, as well as from his usual formulae, used for the rendering of anatomical details.<sup>1</sup> The proportions of the face, thin and elongated, are those of the *Athena Lemnia*, quite different from those of Gemito's other creations. The same can be said about the sharp edges and the extreme economy of the surface reliefs, particularly evident if one observes the straight nose, with its fine nose wings or the brow-bridges, reduced to one thin edge, separating the plane of the forehead from the orbits. Evidently all of this is the result of intentional self-control on the part of a sculptor who usually took delight in swelling contours, exuberant plasticity and, at least in the first phase of his career, also in pictorially nuanced surfaces.

On a closer look it becomes equally clear, however, that the author of the *Efebo* modified the contours of his model practically everywhere. What makes the difference is not only the most evident fact that he added plastically rendered eyes to fill in the gap of the lost eyes of the original. This must have been the only fully intentional change he made. What is more interesting is that in the meantime Gemito seems to have slightly modified the volume of the head, too, rounding out the contours in some points and adding some bulging surfaces. As far as the naked eye can discern, the most important changes took place in the modelling of the cheeks, at the outer corners of the upper eyelids, at their transition to the orbits, and in the connection of the lips with the surrounding area. These specific changes of details are added to the general impression that the observer sees a somewhat squabbier volume and rounded-down edges in comparison with the general sharpness of the Palagi Head.

These observations taken together could provide grounds for the identification of at least some specific traits that characterize Vincenzo Gemito's personal style, at least in a specific period of his activity. On the one hand, we can suppose, in fact, that he sculpted the *Efebo* bust with the intention of creating a precise reproduction; it would have been also typical of his attitude towards antiquity to think he could resuscitate the beauty of an incomplete antique monument by integrating it with eyes, but otherwise trying to remain as faithful to its original shape as

<sup>1</sup> For a good overview of Gemito's artistic production see, e.g., Pagano 2009 or the catalogue of the earlier Spoleto Exhibition; Mantura 1989 (both with an exhaustive bibliography of the preceding literature).

possible.<sup>1</sup> In the meanwhile, however, his own artistic perception must have revealed itself unintentionally in the modelling of those delicate details where mechanical reproduction of the model was not possible. If this idea is correct, it also means that Gemito's divergencies from the ancient model can be considered as 'automatisms' characterizing an individual artistic personality, it can be said, in the Morellian sense of these terms.<sup>2</sup>

We must admit, however, that all these considerations are largely subjective, as formulated up to this point, since they depend on the analytic skills of the observer's eyes, not to mention such accidental, but decisive circumstances as illumination or the angle of observation. These accidental features can be excluded with the help of virtual models produced by high resolution 3D scanning. Moreover virtual models can be used in this case also for an objective comparison between the two objects, the result of which can be expressed in exact quantitative terms.

#### THE TECHNOLOGY USED AND PRIMARY RESULTS

The scanning was executed with the combined use of Artec 3D Eva and Spider manual scanners, and the data thus acquired were transformed into rotatable virtual models with the help of Artec Studio professional 3D processing software.<sup>3</sup> The resolution and the accuracy of these instruments were considered to be sufficient for the realization of digitized models appropriate for stylistic observations and analysis.

Beside the possibility provided by this technology of rotating the models freely and thus comparing the two sculptures from identical points of observation and with identical (simulated) illumination, the software also made another simple investigative technique possible: the superimposition of the two models, so that a color scale would indicate the grade of difference between the two volumes. Figures 4, 5 and 6 illustrate three different views of Gemito's *Efebo* (a), the Palagi Head (b) and the color scale image obtained by the superimposition of the two models (c). The third element allows an exact quantitative description of those divergencies, which could be described here above only with a series of subjective impressions, difficult to express with a verbal terminology.

The three color Figures (FIGS. 4C, 5C, 6C) were realized by superimposing the scanned model of the Palagi Head's plaster cast to Gemito's *Efebo*. The first result to emerge was that Gemito's work has effectively a slightly bigger volume. However, it should be noted that the difference is exiguous: in fact, it never exceeds 1 cm. Thus, to remain within a range that would provide significant data, the color scale was adjusted to indicate divergencies up to 0.6 cm. The lowest differences in the positive sense, *i.e.*, where the volume of the modern head exceeds that of the plaster cast of the antique, are marked with dark green shades, becoming gradually lighter as the difference grows, so that light yellow denotes a digression of 0.5 to 0.59 cm. In some places, where the divergency exceeds the range of 0.59

<sup>1</sup> For Gemito's attitude in this respect see, *e.g.*, P. Ducati's testimony in MARTORELLI 2016, 34-36.

<sup>2</sup> On Morelli's method see PFISTERER 2007; BORBEIN 2015, 529-531.

<sup>3</sup> <http://www.artec3d.com/files/pdf/ArtecScanners-Booklet-EURO.pdf>.



FIG. 4. Digitized model of GEMITO's *Efebo* (a); the Palagi Head (b); a color chart obtained from the superposition of the two former (c), frontal view.

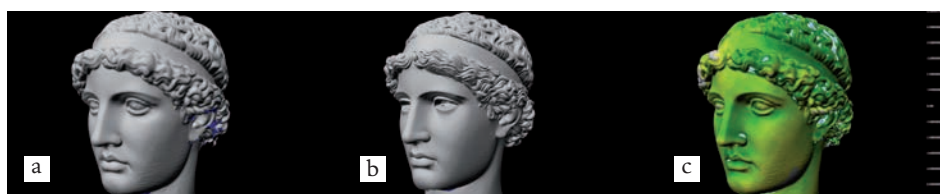


FIG. 5. Digitized model of GEMITO's *Efebo* (a); the Palagi Head (b); a color chart obtained from the superimposition of the former two (c), three-quarter view.

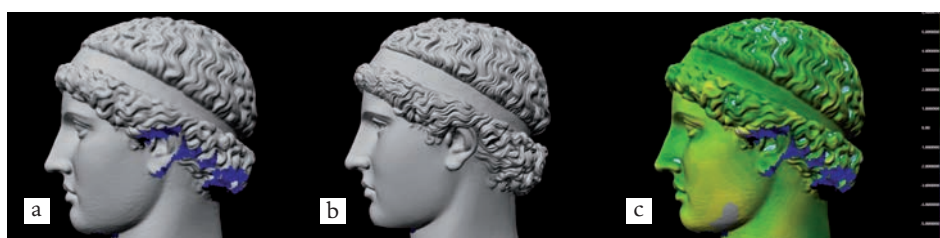


FIG. 6. Digitized model of GEMITO's *Efebo* (a); the Palagi Head (b); a color chart obtained from the superimposition of the former two (c), profile view.

cm, the color scale was abandoned, thus all these areas appear in dark grey in the illustrations. Finally, negative differences, *i.e.*, areas where the Palagi Head reached a higher point than the *Efebo*'s surface, were colored with shades ranging from light bluish gray to purple. It must be noted, however, that there were extremely few such cases, and the difference was always minimal

(see especially the light blue on the nose wings and some patches in the hair locks).<sup>1</sup>

As the color scale shows, Gemito's sculpture matches its antique model almost perfectly along the vertical axe of the nose, with insignificant differences, marked in dark shades from the upper zone of the chin to the peak of the cranium, with only one lighter area, corre-

<sup>1</sup> Not to be mentioned among the colors used for the illustration of divergences in superposition, dark blue areas, present on all images correspond to the details which could not have been captured with the laser scanner, for some simple technical reason.



sponding to the somewhat stronger bulging of the forehead. Excessive divergencies, going beyond the color scale to the 'grey zone' are to be found only in peripheral areas, first of all in some lateral areas of the hair and in the lower zone of the jaw. Further on, as was to be expected, the eye-balls added to the *Efebo* became partly yellow, partly grey.

The most interesting element from our point of view is, however, the presence of rather large light green and yellow areas, denoting slight, but perceivable divergencies ranging from 0.4 to 0.59 cm. Apart from the previously mentioned bulging area of the forehead, such yellow patches are to be observed principally on the outer surfaces of the cheeks and jaws, which prove the correctness of the subjective impression that Gemito's sculpture is a somewhat thicker version of its model. The differences in the modelling of the cheeks can also be noted through the comparison of the 3D models themselves, which reveal, if observed from the same point of view and with the same illumination, as illustrated here in Figure 6, the clearly convex curve of the surface starting from below the eye on Gemito's sculpture, whereas the antique head has a definitely concave surface at the same level. As a consequence of the difference in the treatment of this detail, the articulation of the eye zone to the cheeks and to the nose changes overall, and all this divergence between the two models is revealed by the large light green and yellow patches of our color chart. The perceivably heavier lower part of the cheeks reaches the grey zone of our color chart.

Another interesting area is the outer zone of the orbits, where a characteristic slight bulge modifies the relation between brow-bridge and upper eyelid on

Gemito's work. In addition, he made the lower eyelid heavier and more protuberant, too. All these divergencies are marked in an objective way by the lighter shades of the color chart.

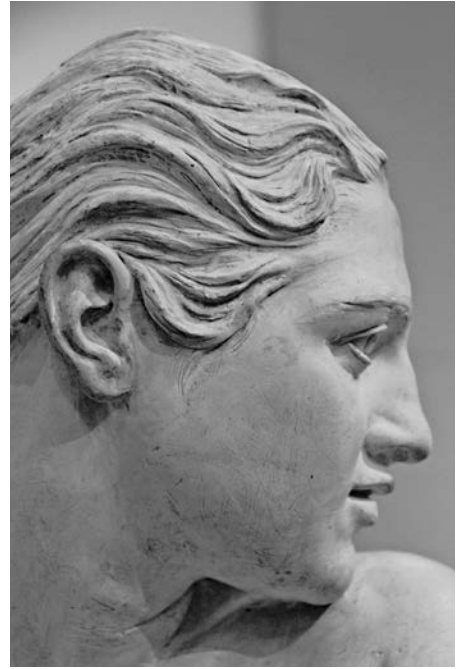
As already noted, the only area where the face of the *Efebo* denotes negative divergence is that of the nose wings, which are shown to be somewhat shallower by the light bluish gray color. The naked-eye control of the two pieces confirms that the nose-wings of the antique head are, indeed, more accentuated.

#### ART HISTORICAL INTERPRETATION OF THE RESULTS AND QUESTIONS RAISED BY THEM

This comparison of the two digitized 3D models can provide evidence for some assumptions formulated hitherto hypothetically, and make some others at least plausible.

The first of these statements concerns the intentions of the sculptor and the methods he used when he realized the *Efebo*. The very close correspondence of the general dimensions of the two sculptures confirms what was supposed in the introduction, that is to say, that Gemito's idea was to copy the classical bust, as precisely as it was possible. Ironically, the hair locks, which seemed to be rather meticulously reproduced at first sight, are revealed now not to be the most precisely copied detail.

It might be much more important to notice the almost continuous dark green zones, corresponding to the vertical axis of symmetry in the frontal view and to the headband, mainly in profile and three-quarter view. The precision of these axes suggests that Gemito used a mechanical tool to transfer at least some measurements of his plaster model to his own work. To judge from



FIGS. 7-8. Rome, Galleria Comunale d'Arte Moderna e Contemporanea, inv. AM 947V, GEMITO, *Neapolitan maiden*, plaster version (photo by L. Czifrák).

the relatively low proportion of these extremely precisely reproduced areas, it is likely that he did not use a pantograph, but more probably a variant of the point translation method used by ancient Roman copyists.<sup>1</sup> It might also have been a trial on his part of the ancient copying technique.<sup>2</sup> It is possible, however, that still more detailed analysis of the correspondences between the model and the replica could shed light even more precisely on the copying technique used by the sculptor.

Anyhow, it seems certain that Gemito used a rather loose grid, composed of only a few measurements, and thus all the rest had to be completed according to his own feeling for volumes and proportions. This seems to corroborate our second initial assumption, according to which the final contours and reliefs of the face are likely to reveal a good amount of the personal taste of the 'copyist'. Moreover, since we are more certain now that his intention was to make a good reproduction, diver-

<sup>1</sup> For a good introduction to ancient and modern copying techniques used in stone sculpture see PFANNER 2015.

<sup>2</sup> There are several cases of Gemito's own translation of his creations from clay or wax to marble. The question is often raised whether these versions were executed by himself or by a specialized marble-worker. An illuminating example is illustrated in Pagano 2009, 106-107, cat. no. 15a-b, a version in terracotta and one in marble of the same boy's head; I agree with the author of the catalogue description to consider the latter as an autographical copy, executed by Gemito himself. At a closer look these two sculptures would reveal probably the same degree of coincidences and divergencies as the two heads examined in this paper.



FIG. 9. V. GEMITO, Head of Alexander the Great, drawing, private Collection (from Pagano 2009, no. 85).



FIG. 10. Florence, Galleria degli Uffizi, inv. 338, marble bust, formerly considered a portrait of Alexander the Great (photo Brogi, after MANSUELLI 1958, fig. 64a).

gencies from the model could be regarded also as the result of unconscious or semi-conscious solutions, distinctive of his sculptural style.

In particular, the way in which Gemito modified the relief of the cheeks and the zone between the brow-bridges and the eyes might be considered as two distinctive elements of his own artistic vision and his personal technique for the representation of the human face. Let us illustrate here his typical way of modelling these anatomical elements with two examples, chosen almost at random from his late production. The first is one of his best known sculptures, created in the years around 1920 (FIGS. 7-8), the «Neapolitan maiden» preserved in a number of replicas in wax, plaster and bronze.<sup>1</sup> The other is a

drawing, of unknown date, but most probably executed after 1909 (FIG. 9),<sup>2</sup> which is nothing but a graphical elaboration of the antique marble bust inv. 338 of the Uffizi, traditionally identified with a portrait of Alexander the Great. More precisely, Gemito must have made the drawing based on an inversely developed photograph of the sculpture, as can be seen from a direct comparison (FIG. 10).<sup>3</sup> But what interests more here is the series of delicate modifications carried out by the modern artist, who succeeded in transforming the ancient model into a characteristic 'Gemitian' face, on this occasion. Among the most decisive changes here,

<sup>1</sup> Pagano 2009, 162-163, no. 53a-b. The replica reproduced here is the plaster version, inv. AM 947, Galleria Comunale d'Arte Moderna e Contemporanea, Rome: see Virno 2014.

<sup>2</sup> Pagano 2009, 215, no. 85.

<sup>3</sup> Galleria degli Uffizi, Florence, inv. 338.

too, we can observe the complete remodeling of the relief of the cheeks and the insertion of the characteristic protuberances between brow-bridge and upper eyelid. In sum, two characteristic formulae can be observed, which closely resemble those revealed by the objectively measured divergencies between the Palagi Head and the *Efebo* and its 'copy' realized by the same artist.

There is evidently an intriguing question raised by these observations, which has to be left open for the moment, as to whether the digitization of sculpture and the comparison of virtual 3D models can provide also a tool for a generic and objective description of individual features in sculpture. In other words, after having noticed and documented in mathematical terms the difference between a model and its partly unintentionally modified 'copy' executed by a well-known artist, the next step would be to know whether there is also a way to tackle the recurrent features, typical of an artistic personality and identify them on works of different theme, iconography and dimensions, with more certainty than by relying merely on subjective observation.

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