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Julius Caesar in a 3D rendering from a 2D picture

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Abstract: Discussion after the proposal of a 3D rendering of the Caesar's bust of Leiden, published on 22 June 2018 by the web site of the National Museum of Antiquities (Rijksmuseum van Oudheden). For this rendering, it seems that some data from Tusculum bust had been used too. Here we consider only the Tusculum bust and give some 3D rendering, using a software developed by Jackson, Bulat, Argyriou and Tzimiropoulos at the University of Nottingham and Kingston University. This software is giving a 3D image from a single 2D picture.

Keywords: Face recognition, 3D rendering, History of art, Caesar's portraitures, Tusculum bust, Arles bust.

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On 22 June 2018, an article has been published by the web site of the National Museum of Antiquities (Rijksmuseum van Oudheden), in Leiden [1]. It is showing a new 3D reconstruction of Julius Caesar's head based on a bust of the museum. Ref.2 is telling that this 3D reconstruction is "including the bizarre proportions of his cranium."

The 3D reconstruction of the bust was revealed at an event during which a new book on Caesar written by archaeologist Tom Buijtendorp had been promoted [3]. As told in [2], "Buijtendorp came up with the idea of recreating Caesar's head based on a marble bust of the ancient Roman leader that's held at the Rijksmuseum van Oudheden". However, on the cover of his book, the author, or the Editor, used the Tusculum portrait of Caesar [4]. Today, the Tusculum bust is exhibited at the Museo Archeologico of Torino [5].

Actually, in 2012 [6], I suggested the use of a 3D scanning and rendering to create some virtual copies of ancient objects to study and compare them. In particular, I told that this approach could be interesting for some Roman marble busts, two of which are well-known portraits of Julius Caesar (Tusculum and Farnese [7]), and the third is a realistic portrait of a man, probably Caesar too, found at Arles, France (see Figure 1).

It was probably between 49 and 46 BC, when Caesar had close relationships with Arles, that, according to the French archaeologist Luc Long who found it in 2007, the marble bust of Arles had been carved. This beautiful portrait, discovered in the depths of the right bank of the river near Arles, has been undoubtedly attributed by Long to Julius Caesar [8,9]. Besides comparing to the Tusculum bust, in [10,11], we compared the Arles bust with

Pantelleria bust and a bust of a private collection, proposed by F. Johansen as a replica of the Arles bust [12,13]. The reader can find this head in the Figure 2 and more detail at [10].



Fig1: The Arles bust on the left and the Tusculum bust on the right. In the middle, the two images superposed (courtesy: Wikipedia).

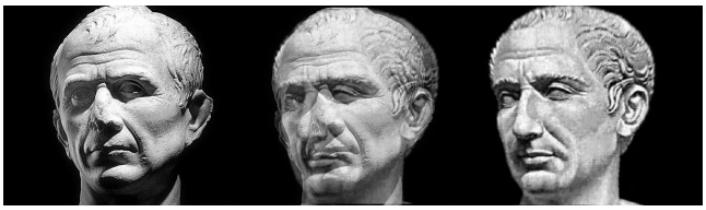


Fig.2: The Arles bust on the left and the Farnese bust on the right. In the middle, the two images superposed (Courtesy, [1] and [11]).

Figure 1: Reproduction of Figs.1 and 2 from [6]. Upper part. Arles bust on the left and Tusculum bust on the right (Image courtesy: Wikipedia). In the middle, the two images superposed. Lower part: Arles bust on the left and Farnese bust (Courtesy, [7]) on the right.

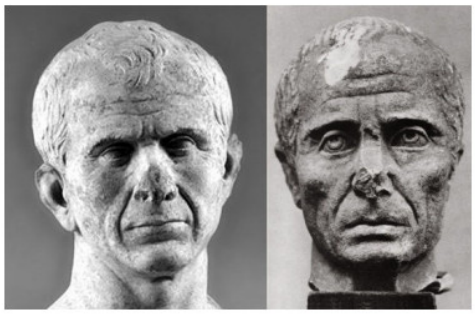


Figure 2: Arles and the head from a private collection, proposed by F. Johansen as a replica of the Arles bust. The man on the right seems the old Arles one.



Figure 3: Caesar from Arles, Tusculum, Pantelleria and from the private collection, processed by means of a morphing from site In20Years.com, which makes a face looking older of about twenty years. Note the similarity between the Arles portrait and that of the private collection, disclosed by F. Johansen.

Let us note that the Tusculum bust is considered the more ancient and faithful portrait of Caesar. After its discovery, also the Arles bust was proposed as a portrait of Caesar. Because of the period of time it was sculpted, the Arles bust could be a faithful portrait too.

Therefore, in [10], we considered the following question. “What is then, between the portraits of Arles and Tusculum, the most likely portrait of Caesar?” To find a proper answer, as we told in [10], we need a systematic comparison with other busts. Moreover, the discovery of other portraits, such as the one recently found in an ancient cistern of Pantelleria, could help in the analysis of Caesar’s portraitures.

As stressed in [10], the use of biometric software for face detection and morphing can help us for rendering these marble portraits in more realistic faces, turning them out in some sort of pictures of real people. An example of the results is given in the Figure 3, which is showing that proposed in [10], obtained by a software that in 2013 was freely available at the site In20Years.com. The face of Arles and the portrait of the private collection, proposed by F. Johansen, appear greatly resembling. Other “faces” of Caesar are given in the Figure 4 (see the discussion in Ref.14). In [15,16] we proposed the same rendering for Augustus and other Roman emperors. In particular, in [15], we used In20Years.com for ageing the face of young Augustus, to compare with his portraits as emperor.



Figure 4: Portraits of Caesar (more detail at Ref. 14).

For what concerns the Leiden bust, as told in [2], “Archaeologist and anthropologist Maja d’Hollosy brought the bust to life, using a 3D scan of the marble piece before drawing on other existing portraits of Caesar to fill in gaps where the marble was damaged. Caesar was then given a realistic-looking face using silicon and clay.” In [1], we can see d’Hollosy’s rendering. We gain also the information that the other bust used is the Tusculum bust.

In the Figure 5 we can see the Tusculum head in profile and frontal view. A remarkable work by Francesco Carotta, [17], is discussing this head and the best perspective we have to use to see it. Let us concentrate on the face.

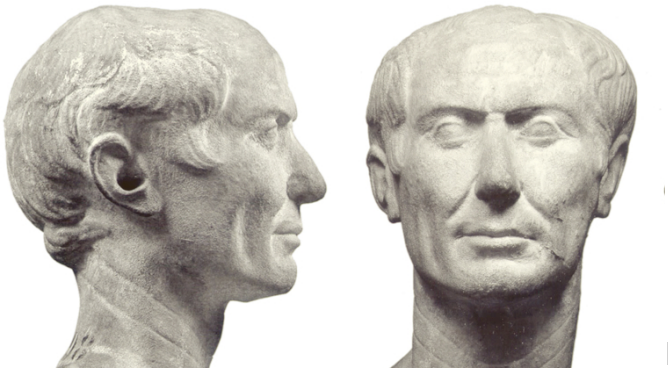


Figure 5. The Tusculum head.

Since we have not a 3D scan of Tusculum bust, let us apply a different approach, which we have used for articles [18,19] (in [19] I investigated the Arles bust).

In the research field of face recognition, a very difficult problem to solve is that of having a 3D facial reconstruction from a single 2D image. A remarkable software which is solving this task has been recently developed by Jackson, Bulat, Argyriou and Tzimiropoulos at the University of Nottingham and Kingston University. The researchers have obtained their result by training a Convolutional Neural Network (CNN) on an appropriate dataset consisting of 2D images and 3D facial models [20]. The researchers are also providing a site for experiments, at the address http://www.cs.nott.ac.uk/~psxasj/3dme/index.php . Let us call here this software as “3DME”. For experiments, a frontal image is required. After the image is uploaded, the site brings us to the corresponding 3D model, which is easy to move by means of the mouse. An OBJ file of the 3D model is also given.

So, in [19], we used 3MDE for the Arles bust. And here, let us use 3MDE for the Tusculum bust. The frontal image used is that of Wikipedia page [21] (Courtesy images Users Soerfm and Gautier Poupeau).



Figure 6: Results of the 3DME software [20], applied to the top left image, which is that given by Wikipedia [21].



Figure 7: Results of the 3DME software (middle and right), applied to the image given by Wikipedia [21], and compared to the profile of the statue (left).

In the Figures 6 and 7 we can see some results that we can obtain from a picture of the Tusculum bust. Let me stress once more that the 3D rendering of the 3DME software [20] is obtained from one image only. I consider the software remarkable and of fundamental importance for several applications. One application is in the field of the history of arts and, in particular, in the analysis of the marble portraitures.

For what concerns the Caesar's bust of Leiden [1], it would be interesting to have more detail on the technique and the data used for the 3D rendering.

Ref.2 is telling that this 3D reconstruction is "including the bizarre proportions of his [Caesar's] cranium." However, Suetonius, in De vita Caesarum [22], is not mentioning any bizarre proportion. And, to the author's knowledge, no witty remark exists on Caesar's head, besides his baldness of course.

Let us conclude reporting the Suetonius' works. "It is said that he was tall, of a fair complexion, round limbed, rather full faced, with eyes black and piercing; and that he enjoyed excellent health, except towards the close of his life, when he was subject to sudden fainting-fits, and disturbance in his sleep. … He was so nice in the care of his person, that he not only kept the hair of his head closely cut and had his face smoothly shaved, but even caused the hair on other parts of the body to be plucked out by the roots,

a practice for which some persons rallied him. His baldness gave him much uneasiness, having often found himself on that account exposed to the jibes of his enemies. He therefore used to bring forward the hair from the crown of his head; and of all the honours conferred upon him by the senate and people, there was none which he either accepted or used with greater pleasure, than the right of wearing constantly a laurel crown" [22].

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