Portraits of Benvenuto Cellini and Anthropological Methods of their Identification

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ABSTRACT

Modern methods of biometric identification are increasingly more applied in order to attribute works of art. Forensic experts and criminalists have nowadays developed two successive methods of anthropological comparisons in order to identify persons by their facial geometrical proportions. These methods could be applied for the identification of sitters in the oeuvres of Renaissance and Mannerism periods, as this works generally differs by the high degree of realism. This article describes how the successional anthropological methods were used in practice for identifying Benvenuto Cellini in unknown life time portraits throughout 12 different oeuvres of art XVI century.

Introduction

In his tome "Benvenuto Cellini" Dr. Pope-Hennessy compares the rough, grotesque face found on the back of the "Perseus" head ("an elderly male head wit vacant eye sockets") (Fig.1, Right) with "one authentic portrait" of Benvenuto by Vasari (Pope-Hennessy, 1985) (Fig. 2, Left). In doing so, Dr. Pope-Hennessy puts one of the existing biometric comparative analysis methods into practice. He is trying to compare two distinct faces, in order to define the degree of their difference or similitude.

Generally, the identification of a human is possible on the basis of both physiological and "dynamic" (i.e. behavioural) parameters of an individual. Anthropology name the following 14 characteristics by which the subject can be identified (not including general physical characteristics such as sex, age, race, or distinctive marks) (Agafonov & Filippov, 2013; Moskvina, Smirnov & Khaziev, 2004; Piskunova, 2013; Zlotnikova & Bogatyrev, 2010): fingerprints, face geometry, hand geometry, iris, retina, DNA, ear shape, odor/scent, light reflection on skin, face thermogram, signature (handwriting), keyboard signature (typing style), gait (individual behavioural characteristics when performing simple routines) and voice.

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Figure 1. Left: Cellini, Benvenuto "The Rescue of Andromeda", 1553. Bronze, relief. 81 cm by 90 cm (1552-1553.) Loggia dei Lanzi, Florence. Detail: Cellini's self-portrait.
Right: Cellini, Benvenuto. "Perseus", 1553. Bronze, 320 cm. Loggia dei Lanzi, Florence. Detail: Portrait on the back of Perseus's head.
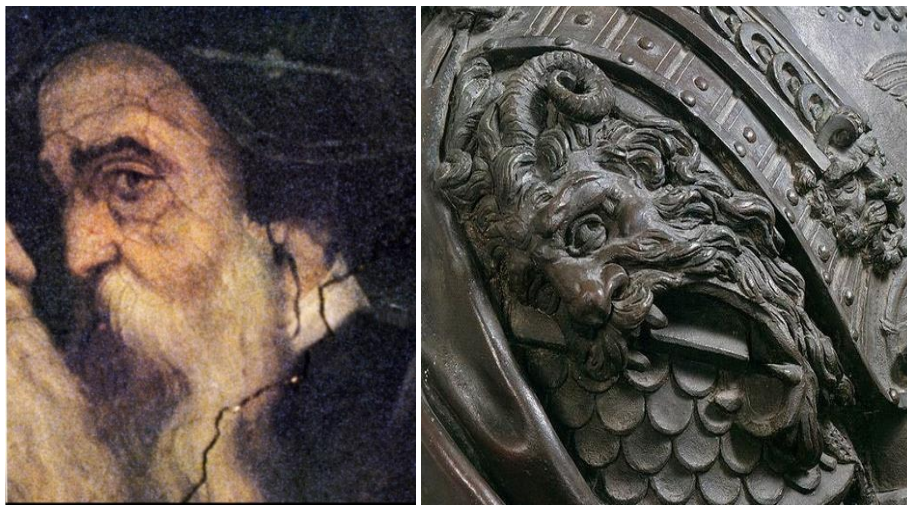

Figure 2. Left: Vasari, Giorgio (1511-1572) "Cosmo I di Medici among court sculptors, architects and engineers", 1563. Fresco. Palazzo Vecchio, Florence. Detail: Portrait of Benvenuto Cellini.
Right: Cellini, Benvenuto. "Bust of Cosmo I", 1545. Bronze, 110 cm. Bargello Museum, Florence. Detail: Cellini's portrait .

Only three out of the aforementioned fourteen characteristics can be used for the biometric identification of individuals portrayed in works of art: face geometry, hand geometry and ear shape (Biancofiore, 1998). That said, hand geometry and ear shape are unreliable parameters because, in most cases artists have not pursued anatomic accuracy in the depiction of those parts of the body.

There are two different ways to recognize a portrayed individual:

"Instantaneous identification", i.e. the classifying of the presented face in one step, the instant "capture" of all its characteristics, and "Successional identification", i.e. the recognition of the person is a result of an extensive analysis of his individual facial parameters. This type of identification is more typical of investigations carried out by forensic experts (Khaziev, 2004; Khaziev, 2005).

It is instantaneous identification that is usually practiced by an ordinary viewer to identify portrayed persons in works of art. This type of identification is similar to the way we recognize people in our daily life. However, whereas in meeting with another person a whole set of his characteristics (such as gait, posture, voice, appearance, and scent) are taken into account by our mental apparatus. The majority of these characteristics are missing from a work of art. This is why the human brain does not, as a rule, possess enough information for instantaneous identification in that case.

Any subjective depiction or creative representation of a portrayed sitter is always unavoidably determined by the artist's personal perception of the model's appearance and character. The artist's mind cannot help interpreting in its own way and, therefore distorting the external and internal characteristics of the portrayed model. This explains why, in the eyes of an outside observer, a sitter's appearance in a work of art always differs from the original and other portraits of the same model. In addition, the degree of a portrait's similarity depends in a great deal on the artist's skillfulness, techniques and the materials he used.

Moreover, the artist's craft by its nature consists of the skill of creating an illusion. It could be an illusion of a three-dimensional object on a flat surface, or the visual properties of living nature of inanimate matter. An artist always intentionally uses sophisticated tools in purpose to 'deceive' the viewer (Gombrich, 1984). The phenomena of handmade visual illusion in its different aspects is examined by E.H. Gombrich (1984) in his work "Art and Illusion".

Successional identification, in difference to instantaneous one, involves objective and scientifically proved methods of comparison of an individual's facial biometric parameters with the facial parameters of an identified reference (bench-mark).

Objective comparison of facial parameters is what is required by a scientific method of face-biometrical identification.

Materials and Methods

The first known successional method of identification by anthropological comparison was developed by the French criminalist A. Bertillon (1893) during the 19th century. When measuring the anthropological parameters of convicts, such as height, head size, arm, finger and foot length, A. Bertillon (1893) found that the shape, colors and size of some body parts may coincide in different individuals, but different people can never have the same parameters of four or five members of their body at once (Kaluszynski, 1985; Kirwin 1971; Mandel, 1996). On the base of this hypothesis, A. Bertillon (1893) developed his method of identification. Bertillon's comparisons (or "Bertillonage") may include collations of facial parameters, such as nose size and shape, eye shape, mouth shape and size, the form of brows and foreheads.

Bertillonage does however, have a few substantial shortcomings, which limit its use in identifying the subjects within art works. First of all, the method does not correspond to the measurement theory criteria. A. Bertillon's (1893) technique does not offer exhaustive representation of an individual's facial features in mathematical values and, as a result of that, remains undesirably dependent on the researcher's subjective perception and description. Secondly, A. Bertillon's (1893) comparisons depend heavily on the quality of the compared images. A third shortcoming of the

method is the difficulties when comparing facial elements of a sitter, portrayed from different angles. This explains why, though "Bertillonage" was well known and successfully used in forensic practice for a hundred and twenty years already, scholars of art on a large scale have not practiced it.

Another method alternative to the Bertillonage, was developed in the early 1990s by the French forensic expert and anthropologist Raul Perrot. R. Perrot was a head of the Anatomic Anthropology and Paleonthology Laboratory at the Human Biology Department of Claude Bernard University Lyon 1. His method was developed at the request of French judiciary authorities (Perrot, 1996).

Until 2005 Perrot's skills and know-how were used exclusively in order to identify corpses and criminals from a number of suspects in the investigation of serious crimes such as murders (Perrot, 2001), armed holdups (Perrot & Desbois, 2008) and bank robberies (Perrot, 1996). In 2007 Raoul Perrot successfully applied his method for the identification of portrayed individuals. He described the methodology and know-how of his experience in the article "Biométrie faciale et expertise d'œuvres d'art" (Perrot, 2007). Since then, the Lyon's Laboratory has performed examinations of works of art on a regular basis (Perrot, 2011).

Perrot's method of anthropological identification is founded on the study of individual proportions of a human skull, because the geometrical parameters of each human skull are always unique. Perrot's identification methods proceeds by measuring angle and distance ratios between several key anatomical points determined on the human face (Perrot, 2007).

The angles and ratios defined by these key points do not change with age of subject. In addition, the angular view of the portrayed face plays no role in the anthropological parameter comparison provided according to the method of Raul Perrot (Perrot, 2005).

Photographs and video images of criminals are usually taken from different angles, in different weather and light conditions, so their quality is not always good. That is why the method of expert assessment has been designed in such a way as to minimize the dependence of comparison results on the quality of the image or facial details (Perrot, 1996). R. Perrot takes no account of the shape of certain facial elements, such as the nose, the eyes, the chin, the ears or the lips. Identification is based solely on the structure and proportions of the skull.

As any other method, Perrot's know-how has its own imitations in fields of application. The biometric parameters of faces under comparison by the Perrot method are represented as an arithmetic mean of the values of angles and indicators. In other words, every person's individuality is expressed by a mathematical number. This number may accidentally coincide for people that are totally unlike one another. The chance is very small, but the probability exists. In addition, it is known that there are many people who look much like one another and have similar skull structure. So, for purposes of biometric identification through facial anthropological parameter comparison there needs to be sufficient grounds for selecting subjects to be compared.

As in any physical experiment, comparisons between two images by Perrot's method may involve a degree of error and inaccuracy. For example, in accordance with the theory and forensic practice of the Laboratory Perrot, 100% to 90% similarity between photographic or video images is considered sufficient to conclude that the persons in them are undoubtedly identical. Yet, this rule applies to photographic, i.e. so-called "objective portraits" and may not necessarily be applied to handmade, so-called "subjective portraits", as photograph pictures preclude the factor of an artist's subjectivity.

When comparing subjective portraits, the probable scale is a lot higher than 10% found between 90% and 100% of similarity. In accordance with Perrot's practice, subjective portraits with 60% similarity (or higher) may be deemed identical. That is why, when two subjective portraits are compared using Perrot's method, a positive conclusion about a sitter's identity must be verified with the A. Bertillon (1893) method and backed up with historical and stylistic analysis. It is only if art criticism and the A. Bertillon (1893) tests do not contradict the findings based on Perrot's method that a final positive conclusion can be made.

However, any shortcomings of Perrot's method can be minimized, if the comparison is made not between two, but among three or more different portraits. If the results of multiple comparisons do not contradict one another, they can be accepted as accurate.

For the above reason, probable presentations of Cellini's face found in his works (Cellini, 1998; 2010;), works of researchers (Podzemskaya, 1997; Pope-Hennessy, 1985) and also in oeuvres of his contemporaries artists are not only compared with the reference portrait of Cellini by Vasari, but also among themselves in the framework of the current study.

For purposes of biometric identification of Benvenuto Cellini's face through anthropological comparison 12 works of art were selected, each given a two-character code:

A1: Vasari, Georgio (1511–1572). "Cosimo I de' Medici surrounded by his sculptors, architects and engineers", 1563. Fresco. Palazzo Vecchio, Florence. Detail: Benvenuto Cellini's portrait. (Fig. 3)

A2: Cellini, Benvenuto. "Perseus rescuing Andromeda", 1553. Bronze, relief. 81 x 90 cm. Loggia dei Lanzi, Florence. Detail: man with his arm raised. (Fig. 3)

A4: Cellini, Benvenuto. "Perseus", 1553. Bronze. 320 cm. Loggia dei Lanzi, Florence. Detail: mask on the back of Perseus's head. (Fig. 3)

J1: Cellini, Benvenuto. "Jupiter", 1553. Bronze. 98 cm. Pedestal of Perseus. National Museum, Florence. (Fig. 4)

B1: Cellini, Benvenuto. "Bearded man", 1540-43. Paper, graphite, 28.3 x 18.5 cm. Royal Library, Turin. (Fig.4)

B2: Cellini, Benvenuto. "Bust of Cosimo I", 1545. Bronze, 110 cm. Bargello Museum, Florence. Detail: anthropomorphic head on the Duke's right shoulder armour plate. (Fig.4)

S1: Cellini, Benvenuto. "King Francis's salt seller", 1540. Gold, enamel. Detail: "Ocean". Art History Museum, Vienna. (Fig. 5)

G1: Cellini, Benvenuto (?). "Portrait of a bearded man in a red cap", 1560 (?). Oil, cardboard pasted to canvas, 61 x 48 cm. Private collection, Paris. (Fig. 5)

P1: Bordone, Paris (1500–1570). "Portrait of a jeweller", 1540 (?). Oil on canvas, 98 x 80.5 cm. Alte Pinakotheke, Munich. (Fig. 5)

P2: Bordone, Paris. "Lovers or Spouses", 1525 (?). Oil on canvas, 81 x 86 cm. Pinacotheque de Brera, Milan. (Fig.6)

D1: Allegrini, Francesco. "Portrait of Benvenuto Cellini", 1762. Engraving after drawing by Zocchi, Giuseppe. 29.5 x 19.2 cm. Versailles and Trianon, France. (Fig.6)

K1: Unknown artist. "Portrait of Benvenuto Cellini painted on porphyry". Oil on porphyry. Diameter 8.5 cm. Musée national de la Renaissance, Château d'Écouen, France. (Fig.6)
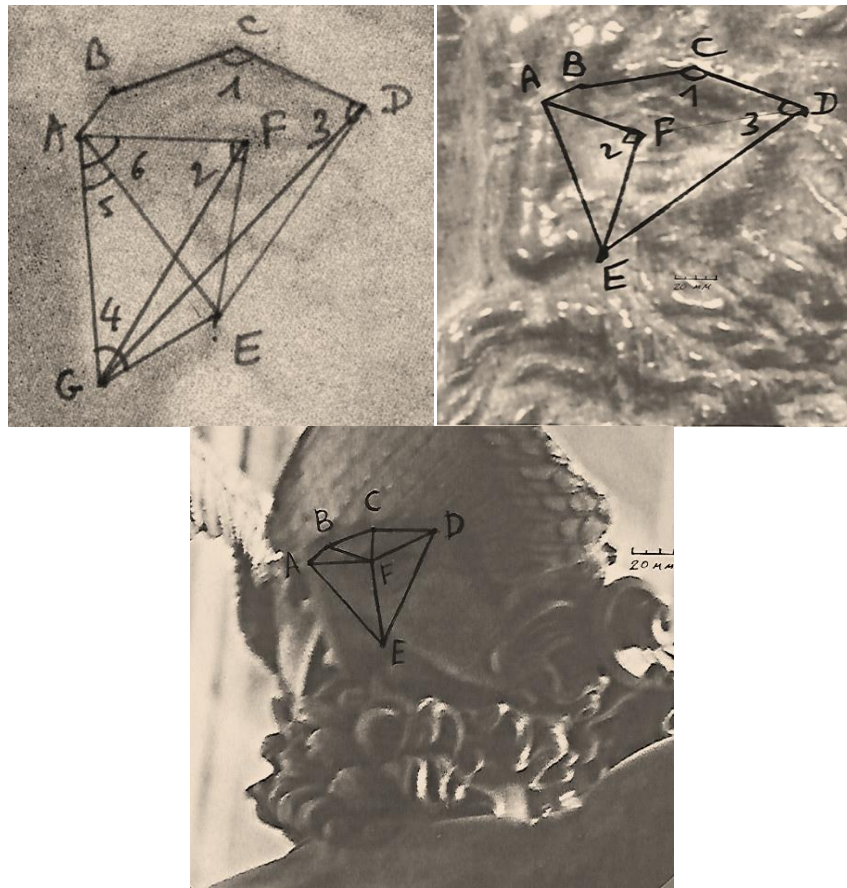
Figure 3. Left: A1 - Anatomic points placed on the portrait of Cellini by Vasari. (Vasari, Georgio (1511–1572). "Cosimo I de' Medici surrounded by his sculptors, architects and engineers", 1563. Fresco. Palazzo Vecchio, Florence. Detail: Benvenuto Cellini's portrait).
Middle: A2 - Anatomic points placed on the presumed portrait of Cellini (Cellini, Benvenuto. "Perseus rescuing Andromeda", 1553. Bronze, relief. 81 x 90 cm. Loggia dei Lanzi, Florence. Detail: man with his arm raised).
Right: A4 - Anatomic points placed on the presumed portrait of Cellini on the head of Perseus. (Cellini, Benvenuto. "Perseus", 1553. Bronze. 320 cm. Loggia dei Lanzi, Florence. Detail: mask on the back of Perseus's head).

Figure 4. Left: J1 - Anatomic points placed on the face of Jupiter by Cellini. (Cellini, Benvenuto. "Jupiter", 1953. Bronze. 98 cm. Pedestal of Perseus. National Museum, Florence.).
Middle: B1 - Anatomic points placed on the presumed self-portrait of Cellini (Cellini, Benvenuto. "Bearded man", 1540-1543. Paper, graphite 28.3 x 18.5 cm. Royal Library, Turin).
Right: B2 - Anatomic points placed on the presumed portrait of Cellini on the left shoulder of the bust of Cosimo I. (Cellini, Benvenuto. "Bust of Cosimo I", 1545. Bronze, 110 cm. Bargello Museum, Florence. Detail: anthropomorphic head on the Duke's right shoulder armour plate).
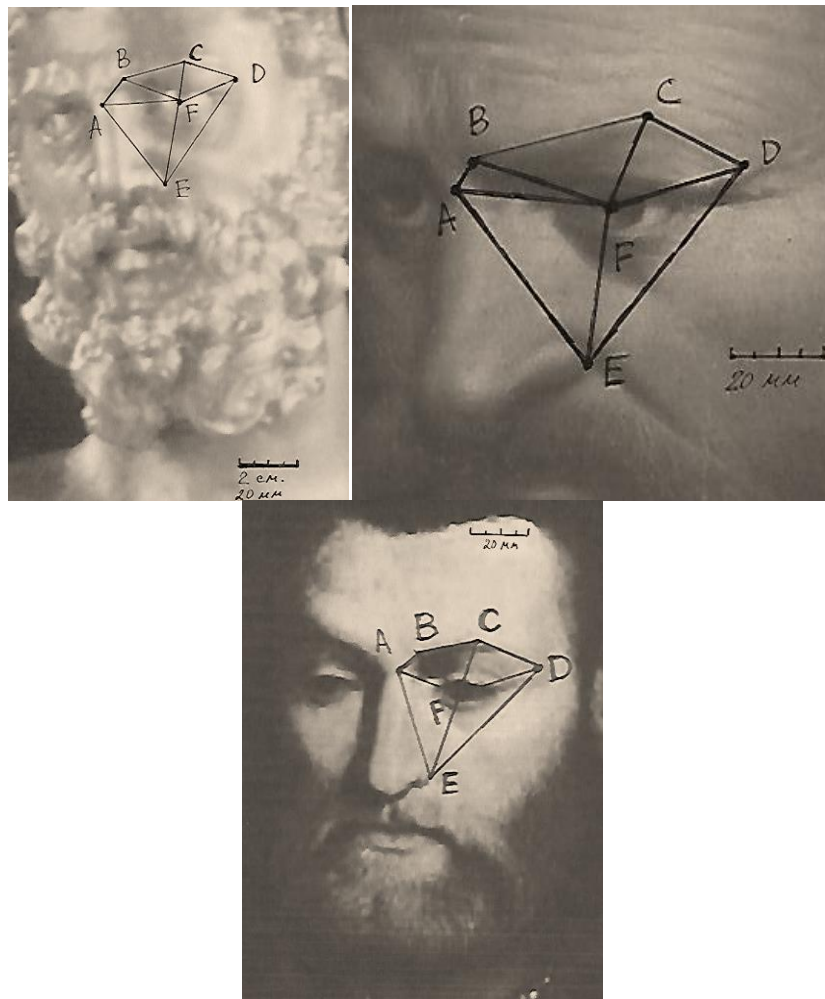
Figure 5. Left: S1 - Anatomic points placed on the face of Ocean by Cellini. (Cellini, Benvenuto. "King Francis's salt seller", 1940. Gold, enamel. Detail: "Ocean". Art History Museum, Vienna).
Middle: G1 - Anatomic points placed on the presumed self-portrait of Cellini (Cellini, Benvenuto (?). "Portrait of a bearded man in a red cap". Circa 1560. Oil, cardboard pasted to canvas. 61 x 48 cm. Private collection, Paris).
Right: P1 - Anatomic points placed on the portrait of jeweller by Paris Bordone (Bordone, Paris (1500-1570). "Portrait of a jeweller", 1540 (?). Oil, canvas, 98 x 80.5 cm. Alte Pinakotheke, Munich).
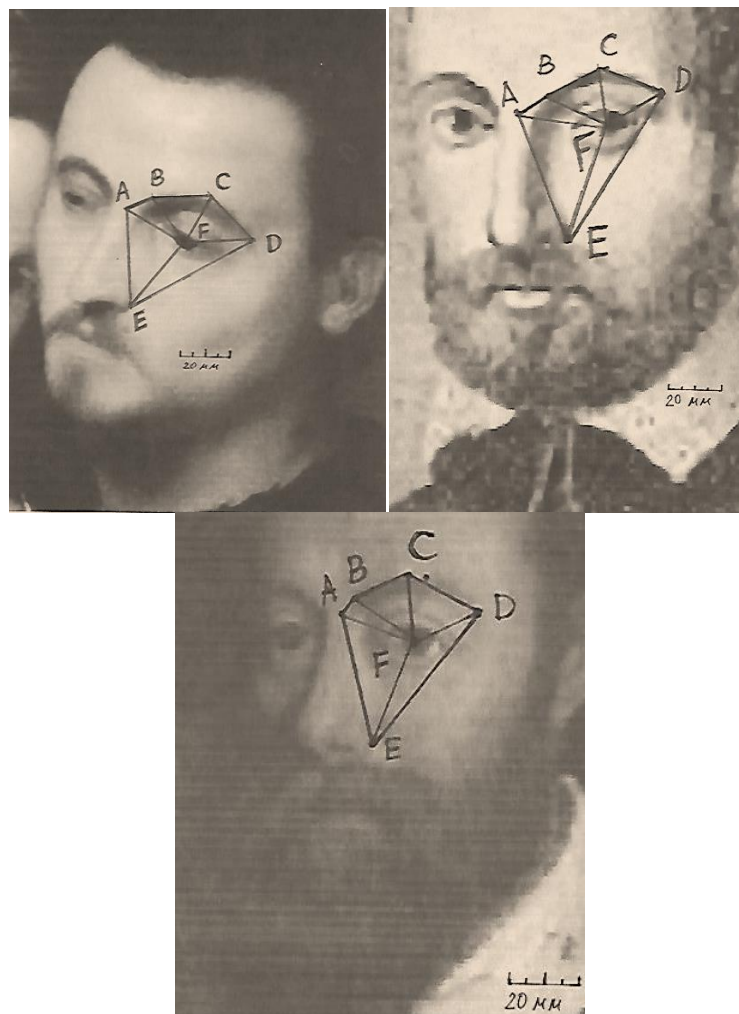
Figure 6. Left: P2 - Anatomic points placed on the face of "Lover or spose" by Bordone. (Bordone, Paris. "Lovers or Spouses", 1527. Oil, canvas. 81 x 86 cm. Pinacotheque de Brera, Milan).
Middle: D1 - Anatomic points placed on the portrait of Cellini by Allegrini (Allegrini, Francesco. "Portrait of Benvenuto Cellini", 1762. Engraving after drawing by Zocchi, Giuseppe. Paper, 29.5 x 19.2 cm. Versailles and Trianon, France).
Right: K1 - Anatomic points placed on the presumed portrait of Cellini (Unknown artist. "Portrait of Benvenuto Cellini painted on porphyry". Porphyry, oil. Diameter 8.5 cm. Musee national de la Renaissance, château d'Écouen, France).

In each of the selected portraits the following six anatomic points were marked: root of the nose - point A; eyebrow start - point B; eyebrow top break - point C; eyebrow end -point D; pupil - point F; nostril and cheek junction - point E.

Results and Discussions

The points marked are shown in Fig. 1 – 4. The scale of the image is shown in every figure. The anatomical points determine the length of line segments shown in Table 1.

Table 1. The length of line segments between anatomical points, in millimetres

	A1	A2	A4	J1	B1	B2	S1	G1	P1	P2	D1	K1
AB	8	21	9	13	5.5	45	11	8	8.5	11	12	6
BC	17	57	18	22	10.6	13	35	39	22	23	22	17
CD	18	59	22	19	17.7	10.5	17	24	19	25	25	22
DE	34.5	127	45	50	27.9	19	50	55	54	55	66	49
AE	29.5	88	40	39	21.7	16	41	48	39	39	52	38
AF	22	50	22	26	14.3	13.5	31	34	22	27	33	21
FE	23	70	30	30	17.6	12.5	31	35	30	33	45	32
BF	18.5	41	17	24	10.8	11.5	25	32	20	23	25	21
CF	16	47	12	21	8.05	11	23	22	20	21	22	20
DF	12	79	25	25	17	9	27	30	29	27	25	21

Based on the known segments, ratios are calculated with the formulae shown in the right-hand column of Table 2, in line with Perrot's method. The ratios found in this way are called indicators. The total sum of the indicators relating to each work of art is shown in the line "Total".

Table 2. Indicators

	A1	A2	A4	J1	B1	B2	S1	G1	P1	P2	D1	K1
AFx100/FE	957	71.4	73.3	86.7	81.3	108	73.3	97.1	73.3	81.8	73.3	65.6
ABx100/DE	23.2	16.5	20	26	19.7	23.7	26.7	14.5	15.7	20	18.2	12.2
BCx100/CD	94.4	96.6	81.8	115.8	59.9	123.8	110	162.5	115.8	92	106.2	77.3
CDx100/AE	61	67	55	48.72	81.6	65.6	57.1	50	48.7	64.1	48.1	57.9
BFx100/DF	115.6	51.9	68	96	63.5	104.6	100	106.7	67	85.2	100	100
CFx100/BF	64.9	114.6	70.6	87.5	74.53	76.3	61.9	68.8	100	91.3	106.2	95.2
DFx100/CF	133.3	168.1	208	119	211.2	122.2	161.5	136.4	145	128.6	113.6	105
Total	588.1	586.1	577	579.7	591.7	624.2	590.5	636	565.5	563	565.6	513.2

The segments of lines connecting anatomical points form angles. The values of angles in degrees are shown in table 3. The sum total of all angles for each work of art is shown in the line "Total".

Table 3. Angles formed by line segments

	A1	A2	A3	A4	J1	B1	B2	S1	G1	P1	P2	D1	K1
BCD	136	145	156	160	142	142	118	148	138	148	135	132	130
AFE	83	95	79	95	88	82	83	79	88	91	82	78	89
CDE	80	60	60	64	82	60	87	75	79	69	79	79	80
DFE	120	118	104	107	137	107	114	122	114	129	130	138	136
DEA	72	67	85	67	60	77	83	73	77	62	65	54	53
EAB	106	97	90	90	122	91	99	105	110	115	115	55	128
ABC	150	163	150	160	134	169	156	142	136	154	155	172	152
Total	747	745	724	743	765	728	740	744	742	768	761	708	768

The angles and indicators are biometric parameters characterizing an individual's face as represented in each of the images selected for comparison.

The values of the parameters found in accordance with Perrot's method are added up for each work of art. Sums total of the parameters relating to each image:

D1: 565.6+708 = 1273.6   K1: 513.2+768 = 1281.2   B1: 591.7+728 = 1319.7

A4: 577+ 743 = 1320   P2: 563+761 = 1324   A2: 586.1+745 = 1331.1

P1: 768+565.5 = 1333.5   S1: 590.5+744 = 1334.5   A1: 588.1+747 = 1335.1

J1: 579.7+765 = 1344.7   B2: 624.2+740 = 1364.2   G1: 636+742 = 1378

Further biometric comparison is carried out by subtracting the summary parameters of the works under comparison and dividing the result by 14 (the total number of parameters: seven angles and seven indicators) in order to compute the mean arithmetic value. As an example, when comparing the images G1 and A2 it is necessary to subtract 1331.1 from 1344.7, and to divide the difference by 14. The resulting value is then rounded off to one decimal sign after the point. (1344.7–1331.1)/14 = 1

Table 4 shows the results of comparative computations. The result of the comparisons between two works of art will be found on the intersection of the column and the line relating to each image. They are expressed as factors ranging between 0 and 10, on a scale where zero corresponds to full, or 100%, identity, and 10 corresponds to complete inconsistency between biometric ratios, or to 0% likeness.

Table 4. Comparison results

	D1	K1	B1	A4	P2	A2	P1	S1	A1	J1	B2	G1
D1		0.5	3.3	3.3	3.6	4.2	4.3	4.4	4.4	5.1	6.5	7.5
K1	0.5		2.3	2.3	3.1	3.6	3.7	3.8	3.9	4.5	5.9	6.9
B1	3.3	2.3		0.0	0.3	0.8	1	1.1	1.1	1.8	3.2	4.2
A4	3.3	2.3	0.0		0.3	0.8	1	1	1.1	1.8	3.2	4.1
P2	3.6	3.1	0.3	0.3		0.5	0.7	0.8	0.8	1.5	2.9	3.9
A2	4.2	3.6	0.8	0.8	0.5		0.2	0.2	0.3	1	2.4	3.3
P1	4.3	3.7	1	1	0.7	0.2		0.1	0.1	0.8	2.2	3.17
S1	4.4	3.8	1.1	1	0.8	0.2	0.1		0.0	0.7	2.1	3.1
A1	4.4	3.9	1.1	1.1	0.8	0.3	0.1	0.0		0.7	2.1	3.1
J1	5.1	4.5	1.8	1.8	1.5	1	0.8	0.7	0.7		1.4	2.4
B2	6.5	5.9	3.2	3.2	2.9	2.4	2.2	2.1	2.1	1.4		0.98
G1	7.5	6.9	4.2	4.1	3.9	3.3	3.17	3.1	3.1	2.4	0.98	

Comparison results may be stated as percentages in accordance with the substitution procedure (Perrot, 2007) as shows in Table 5.

Table 5. Comparison results stated as degree of likeness in percentages

	D1	K1	B1	A4	P2	A2	P1	S1	A1	J1	B2	G1
D1		95	67	67	64	58	57	56	56	49	35	25
K1	95		77	77	69	64	63	62	61	55	41	31
B1	67	77		100	97	92	90	89	89	82	68	59
A4	67	77	100		97	92	90	90	89	82	68	59
P2	64	69	97	97		95	93	92	92	85	71	61
A2	58	64	92	92	95		98	98	97	90	76	67
P1	57	63	90	90	93	98		99	99	92	78	69
S1	56	62	89	90	92	98	99		100	93	79	69
A1	56	61	89	89	92	97	99	100		93	79	69
J1	49	55	82	82	85	90	92	93	93		86	76
B2	35	41	68	68	71	76	78	79	79	86		90
G1	25	31	58	59	61	67	69	69	69	76	90	

Comparison of all 11 images with Cellini's reference portrait (A1) revealed a degree of facial geometry likeness between each of them, on the one hand, and the reference image, on the other, within the range of 55% to 100%. Apart from biometric likeness to the reference face (A1), a similarly high degree of likeness was found in

comparing the images of Cellini among themselves (Randall, 2005; Sorotkina, 2011; Morghen, 2015).

The comparison of the mask from the back of Perseus's head (A4) (Fig. 1 Right) with the only 'officially acknowledged' (Pope-Hennessy, 1985) portrait of Cellini in the Palazzo Vecchio fresco (A1) (Fig. 2, Left) revealed 89% likeness between their facial ratios. It means that what is depicted on the back of Perseus's head is Cellini's face. The popular legend retold by Pope-Hennessy is thus confirmed: the mask on the back of the head is indeed the sculptor's self-portrait. The biometric ratios of A4 are closest to those of the Turin sketch (B1) (Fig. 7, Right): their facial parameters are characterized by maximum, i.e. 100%, likeness. It is probable that the sculptor used the Turin sketch as a model for Perseus's grotesque mask.

Figure 7. Left: Cellini, Benvenuto. "Bearded man in a red cap" (Self-portrait), circa 1560. Oil, paper glued to canvas. 61 cm by 48 cm. Private collection.
Right: Cellini, Benvenuto. "Bearded man" (Self-Portrait), circa 1543. Paper, graphite, 28.3x18.5 cm (1540-1543) (?) Royal Library, Turin.

In the Turin sketch (B1) (Fig. 7, Right), Benvenuto is depicted approximately at an age of 43-45. Consequently, this drawing was not made earlier than 1543 and hardly later than 1550, although there is a date, 1559, written in ink on the back of the paper sheet (Pope-Hennessy, 1985).

When examining the self-portrait on the back of the statue's head, (Fig. 1, Right) one notices a few characteristic features of Cellini's face: what draws attention in the first place are the eyes, which are set close to the bridge of the nose. This optical effect is probably due to Cellini's rather wide cheekbones combined with his long and thin nose. That eye-catching feature of Benvenuto's face is observable in his other portraits—for example, in the Turin sketch and in the "Portrait of a Jeweller" by Paris Bordone (P1) (Fig 8, Middle). The 'jeweller's' wide and high cheekbones look like foundations for his almond-shaped eyes which are set close to the bridge of the nose. (The degree of likeness between the mask A4 (Fig. 1. Right) and Bordone's portrait P1

(Fig. 8, Middle) is 90%.) The phenomenon of closely set eyes is less obvious, though noticeable, in Cellini's face in Bordone's painting "Lovers or Spouses" (Fig. 8, Left).

Figure 8. Left: Bordone, Paris. "Lovers or sposes", circa 1525. Oil on canvas, 81 cm x 86 cm. Pinacoteca di Brera. Milan .
Middle: Bordone, Paris (1500-1570). "Portrait of a Goldsmith", circa 1540. Oil on canvas 98 cm x 80.5 cm. Alte Pinakothek, Munich.
Right: Allegrini, Francesco. "Portrait of Benvenuto Cellini", 1762. Engraving, 29.5 cm x 19.2 cm. After a sketch by Giuseppe Zocchi. Versailles and Trianon, France.

A second characteristic of Cellini's appearance, as follows from Perseus's mask, is his almond-shaped eyes with a round lower eyelid.

The shape of the eyes in the mask is the same as in the Turin drawing and Bordone's portrait. In all the other images examined, the sculptor attempted to embellish and 'ennoble' his appearance by slightly increasing the interocular distance, beautifying the eyelid shape and diminishing the size of the cheekbones. This attempt at

idealizing his facial features is most evident in the portraits S1 "Ocean" and J1 "Jupiter" (Fig. 9). While preserving the biometric ratios of his face (the likeness of S1 and A1 is 100%, and the likeness between G1 (Fig. 7, Left) and A1 (Fig. 2, Left) is 93%), Cellini 'improved' some details: the noses, eyebrows and cheekbones, and 'corrected' the lower jaw. Both in S1 and J1 (Fig. 9) the shape of the eyes and the general face outline are extremely idealized.

Figure 9. Left: Cellini, Benvenuto. 'The Salt Cellar of King Francis", 1540. Detail: Ocean. Kunsthistorisches Museum, Vienna.
Right: Cellini, Benvenuto. «Jupiter», 1553. Bronze, 98 cm. Base of "Perseus". National Museum, Florence.

Another remarkable feature attracting the viewer's attention are his frowning eyebrows. This detail is repeated in Cellini's self-portrait on the bust of Cosimo (B2) (Fig. 2, Right), in the Turin drawing (B1) (Fig. 7, Right), in the painted portrait from a private collection (G1) (Fig.7 Left), in the relief "Perseus Rescuing Andromeda" (A2) (Fig. 1, Left), and even in the highly generalized and idealized images of Ocean (S1) and Jupiter (J1) (Fig. 9).

The facial expressions of Cellini's self-portraits reveal obvious similarity to that of David by Michelangelo, with frowning eyebrows and an intense look. (Fig. 10) "...perfect beauty of his hero are animated with the menacing power of his spirit and his fiery, threatening temperament which Italians have termed "terribilità" "(David of Michelangelo, 2015).

Figure 10. Buonarroti, Michelangelo. «David», 1504. Marble, 517 см. Florence.

Two pictures of Cellini by Paris Bordone are of interest, (P1) and (P2) (Fig. 8, Left and Middle). The degree of likeness between P1 and the reference image A1 is 99%, while that between P2 and A1 is 92%.) The canvas entitled "Lovers or Spouses" (P2), dated circa 1525, depicts Benvenuto approximately at age 25 (Fig. 8, Left). As of today, this picture is Cellini's earliest known portrait. The date of the canvas and the age of Bordone's model correspond to Cellini's age at the time. Apart from the general ratios in young Cellini's face determined by his skull structure as painted by Bordone, one can note a thin and elongated nose with a small swelling at the end, a distinct characteristic shape of the eyes and a slightly protruding lower lip.

The painted image G1 (Fig. 7, Left) whose degree of likeness with P1 is 69%, reveals the same individuality of the sculptor's face. The slightly protruding lower lip, probably owing its shape to the incorrect position of the mandible, is visible well enough, if slightly masked by the beard. An outstanding mandible and lip are also noticeable in the Turin portrait (B1) (Fig. 7 Right) and in Bordone's later canvas "The Portrait of a Jeweller" (P1) (Fig. 8, Middle) made around of 1540. On the whole, young Benvenuto's chin, (P2) (Fig. 8, Left) is not yet covered with a thick beard and looks insufficiently developed relative to the size of his cheekbones, nose and forehead. These disproportions of his appearance may have caused Cellini to wear a beard throughout his adult life.

Conclusions

There are detailed depictions of Cellini's hand in "Lovers or Spouses" (P2) and "Portrait of a Jeweller" (P1) (Fig. 8 Left and Middle). Cellini's left hand is shown from a similar angle although the two pictures are divided by a span of 15 years. In both portraits Cellini's hands are definitely similar in terms of their shape, size and gesture.

One other noteworthy detail of Cellini's portraits, as far as biometric identification is concerned, are his ears. Benvenuto's ears have a rather complex shape, but their images are identical in both paintings by Bordone.

Another noticeable attribute is the long and thin nose of the sitter. This characteristic feature of Cellini's face is repeated in all of the sculptor's portraits examined, with no exception. An especially prominent nose was sculpted by Cellini himself in his grotesque self-portrait on the armour of Cosimo the First (Fig. 2, Right). The sculptor apparently considered his nose as the most distinct feature of his face. It

is perfectly identical in shape both in the painted portrait G1 (Fig. 7, Left) and in the Turin sketch B1 (Fig.7, Right). Although the degree of skull ratio likeness between G1 and B1 is only 59%, the noses are practically identical, as are shapes of the eyes and a few other features, especially the shape of the lower eyelid, the protruding lower lip and frowning eyebrows.

The degree of likeness of facial features between G1 (Fig.7, Left) and the reference image A1 (Fig. 2, Left) is 69%. In his article, "Biométrie faciale et expertise d'œuvres d'art", Raoul Perrot reported the results of his comparisons between that image and Vasari's picture of Cellini. In difference with this study, made on the basis of six anatomical points, Dr. Perrot provided his comparisons based on seven key anatomical points and came to the conclusion, that the degree of likeness between the picture of Cellini in Vasari's tondo and the painted portrait of Cellini is between 70% and 75% (Perrot, 2007). A similar degree of likeness is found when comparing the image G1 with those by Bordone (P1, P2) (Fig. 8, Left and Middle) and the idealized image of the "Ocean" (S1) (Fig. 9). There is a higher degree of likeness, 90%, between G1 and J1.

The painted oeuvre from Paris (G1) (Fig. 7, Left) is undoubtedly a picture of Cellini because his characteristic facial details, such as the shape of nose, eyes, protruding lower lip and eyebrows, are perfectly identical in shape and proportion to those of the Turin sketch (B1) (Fig. 7, Right). They also agree with the self-portrait on Cosimo the First's shoulder, and are in no contradiction with Bordone's images or with the reference image by Vasari. However, although Cellini is recognizable in this painting (G1), the portrait is a highly idealized depiction of his face. The artist did his utmost, almost on the limits of the reasonable, to ennoble Benvenuto's real-life appearance, which seems to have been depicted most truthfully and accurately in Paris Bordone's "Portrait of a Jeweller".

The etched portrait of Cellini by Allegrini (after sketch of Zocchi) (D1) (Fig. 8, Right) stylistically look like a loose copy of Bordone's "Portrait of a Jeweller" (P1) (Fig. 8, Middle). This portrait of Cellini, alongside with the porphyry portrait from Ecouen (K1) is the subject of the feature studies.

Disclosure statement

No potential conflict of interest was reported by the authors.

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