

THE DIFFERENT POSSIBILITIES OF EVALUATING A WORK OF ART: CASE STUDY OF THE MONA LISA

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1. Introduction

The purpose of this paper is to highlight the importance of several aspects which are to be considered fundamental in correctly arriving at a final judgement in evaluating a work of art [1-10].

They are:

- respect for the “history” that accompanies the art object;
- correctness of the terminology which, as such, implies concepts and meanings to be observed and followed;
- the methodological path to be used to provide the answer to the specific question that has been put forward, necessarily involving the synergy of different scientific competences with respect to the holistic value of the cultural artefact.

As regards the much debated subject of attribution and authentication of art works, the following points are discussed:

- a) the different evaluations that can be given to a work of art to distinguish the different degrees of certainty in attribution;
- b) the corresponding and complete methodological process of evaluation;
- c) the case study that refers to Leonardo da Vinci’s work, considered to be one of the most prestigious of all time: the “Mona Lisa – Gioconda”, a unique piece in the art world;
- d) a summary of Leonardo’s art that includes the various versions and copies of his works as reported in archival-bibliographic sources;
- e) the synthetic outline of the historical and diagnostic-analytical investigation of the oil painting on canvas, the St. Petersburg “Mona Lisa with columns” conducted in order to obtain the correct attribution, as an emblematic example of what has been highlighted above.

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These topics are discussed in the historical-technical Journal “Conservation Science in Cultural Heritage” in connection with the fundamental importance of interdisciplinarity (7-8, 10).

2. The attribution and authentication of art work

A work of art is characterized by a set of values: cultural, historical, aesthetic, artistic, spiritual, symbolic, social, technical, economic, financial, mercantile which also include aspects of merchandising, authenticity, identity, interdisciplinarity and internationalization. These in turn concern different areas of investigation: historical-humanistic, philological-philosophical-social, technical-economic-managerial, legal-identitary.

There is no doubt, therefore, that in dealing with the numerous and complex problems in the sector of cultural and environmental assets, there is a need for contributions deriving from different scientific experiences and the involvement of different skills, without leaving aside aspects relating to the employment market where the demand is for more a more practical experience and more transversal and entrepreneurial skills.

The above highlights the importance of interdisciplinarity in the protection and enhancement of cultural heritage and is especially true when dealing with the attribution of art works.

In the specific case of art work attribution, the consequent holistic value of the cultural asset is based on the sum value of the individual values; a correct attribution and authentication should therefore establish the corresponding economic-financial-mercantile-market value and ultimately, its price [11].

As regards the reproduction of art, Figure 1 shows the terminology used in the field to distinguish between the different degrees of certainty in the attribution of a work of art [12].

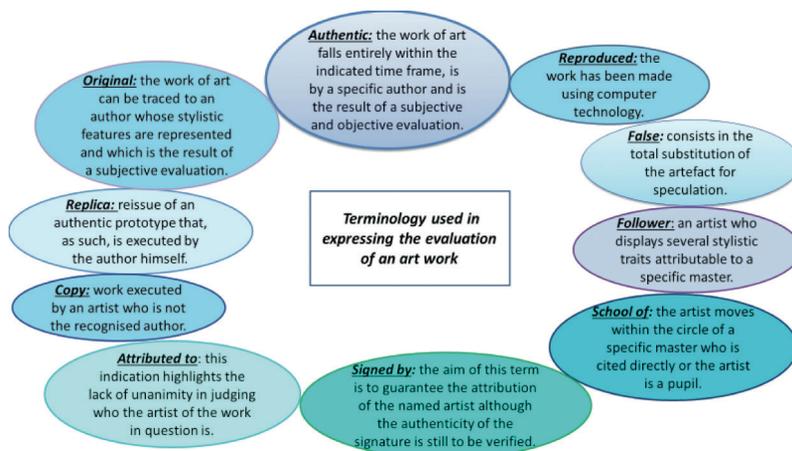


Figure 1. Terminology used in the field to distinguish between the different degrees of certainty in the attribution of a work of art.

In the art market and world of auction houses, the evaluation carried out by an expert is a subjective evaluation, based on an analysis of the historical, stylistic, aesthetic, iconographic aspects and is a visual evaluation of the artefact complemented by the recognized competence of an evaluator. The art expert, therefore, with his personal critical judgment and, on the basis of evaluative comparisons between the artistic qualities of the work in question and his hypothetical “authentic”, decrees whether it is authentic or not, providing his expertise and thus determining the price.

A problem deriving from this result, in the context of this evaluation, is that a prejudice can intervene on the part of the expert, who may be influenced by other considerations such as defending their reputation, financial questions and competence.

Art objects are examined by the experts of the auction houses and their opinions expressed and summarized in a *Condition Report* containing qualitative but not quantitative information.

It is evident then that the current problem concerning fakes and, in general, non-authentic works, is precisely that of ascertaining the authenticity or non-authenticity of a work by means of scientific methods, i.e. the use of appropriate diagnostic and analytical technologies which will result in an objective evaluation.

3. A methodological path towards obtaining a subjective and objective evaluation for the attribution and authentication of an art work

The methodological path includes the following procedural steps [2,11]:

a) A historical anamnesis of the work

The work of art, for which a correctly completed report is written, includes evaluative elements such as the author, period, artistic style, iconography and technical execution.

b) A technical-material-conservative analysis

This will include a description of the morphological elements regarding the surface and stratigraphy, characterization of the materials, the state of conservation (pathologies present, level of degradation, etc.). It should be borne in mind, however, that in investigating the composition of the materials, as stated above, it is important to ascertain their provenance by comparing the data obtained from the analysis of the materials of the work in question and the data obtained from bibliographic sources.

On the one hand, for the “copy” and / or “fake” and / or any of the other categories, the historical-artistic subjective evaluation completed by the diagnostic-analytical objective evaluation provides a unique answer regarding the degree of certainty of the attribution. On the other, for the artefact that has been “reproduced” or realized using computer technology, there is no possibility of providing an answer, since it is now possible to produce a work that is identical to the “original” / “authentic” work in form, color and even “materiality”.

However, this means ascertaining the conceptual and applicative limits that exist in “art ethics and aesthetics”, in the hope that the resulting data and information are in accord.

4. Various versions and copies of the Mona Lisa

It is well known that attributions can be revised over the years and that the frequent heated debates between experts should in fact openly and synergistically lead to a valid scientific discussion. This is based on a system of attribution and authentication that has to balance the initial subjective evaluation, of unquestionable importance, with an equally indisputable objective evaluation which definitively confirms the scientific truth.

Here, then, is how one should proceed in relation to evaluating the versions and copies of the Mona Lisa: an emblematic case also due to the uniqueness of the work, a prototype of the Renaissance genius of Leonardo da Vinci.

A number of Leonardesque versions and numerous copies by pupils and / or followers and / or authors referring to the same subject of the Mona Lisa exist. Therefore, to reach a correct opinion, an accurate archival-bibliographic research was carried out in 2015, based on the intense bibliographic material available, which was complemented not only by historical but also technical data. The findings relating to the corresponding subjective and objective evaluation of these works are not only the result of stylistic and aesthetic analyses, but also technical-material ones, obtained using reliable innovative diagnostic-analytical technologies and carried out by several laboratories¹.

The research led to selecting a number of the best works. However, before examining them and the relative hypotheses regarding attribution, a necessary distinction must be made.

Whether the art works are versions or copies attributable to Leonardo and subject to different evaluation by the experts, it should be noted that the expression "by Leonardo" refers to the fact that experts unanimously agree in their judgement on works referable to Leonardo. On the other hand, the expression "attributed to Leonardo" refers to the non-unanimity of the experts in their judgement. This distinction is evidently valid for any author whose work is to be evaluated where there is a corresponding problem of attribution.

After an archival-bibliographical research the paintings selected were:

- the Louvre Mona Lisa, an oil painting on wood completed in 1517 bearing traces of columns on either side of the picture. For this work the experts' judgement is unanimous, in particular, for some specific parts: the face, the hands, the embroidery.
 - It has, however, given rise to another problem relating to the following interpretations:
 - that the painting initially had columns which were later trimmed to make it fit into a smaller space;
 - that the painting had no columns and the traces present at the edge could have been added by a restorer taking into consideration another version: the Isleworth Mona Lisa.
- the Prado Mona Lisa, an oil painting on wood, executed at the beginning of the 16th century at the same time as the Mona Lisa at the Louvre, set in a Milanese context and stylistically close to the work of Leonardo's pupils, Salai and Melzi;
 - the Reynolds Mona Lisa, an oil painting on wood, the best of the selected works due to its high quality. It was painted at the beginning of the 17th century in Fontainebleau by a French court artist or a visiting artist;
 - the Isleworth Mona Lisa, an oil painting on canvas, portraying a young Mona Lisa with columns and clearly unfinished.

As regards the attribution of the Isleworth Mona Lisa to Leonardo, the Mona Lisa Foundation has retraced the historical events that have accompanied the painting

across the years. It reports how in 1922 the painting underwent an initial evaluation by experts who, on the basis of a thorough stylistic and aesthetic analysis, unanimously agreed that the Isleworth Mona Lisa, i.e. the “Earlier Mona Lisa”, was a “version by Leonardo”, even though some details differed from the Louvre version.

This group of experts had examined the Louvre Mona Lisa at an earlier date in 1913 and therefore already had a good understanding of Leonardo’s artistic technique.

The group was composed of 9 experts:

- Prof. Commendatore Lorenzo Cecconi, Curator of the Academy of San Luca
- Dr. Arduino Colasanti, Former Director-General of Antiquities and Fine Arts
- Dr. Giulio Cantalamessa, Chief Director of the Borghese Gallery in Rome
- Count San Martino di Valperga (Piedmont), for many years Honorary President of the Art
 - Institutes of Italy, and President of the 1911 Exhibition
 - Commendatore Marini, Inspector General and Director-General of the Beaux Arts
 - Prof. Anto Sciortino, Director of the British Academy of Arts in Rome
 - Prof. Adolfo Venturi, well-known art critic and author
 - Mr. Ludovico Spiridon, one of the most prominent art collectors in Italy of his day, and owner
 - of the famous “Leda Spiridon” version attributed to Leonardo, now in the Uffizi
 - Mr. Cesare Segre, well-known collector.

Our archival-bibliographical research [14-15], as previously stated, has examined from a methodological point of view – a point that cannot be emphasised too much – the findings of both the historical-artistic and technical-material analyses. This methodology led to highlighting the distinction between the two “versions” by Leonardo, in other words the Louvre and Isleworth Mona Lisas and their “copies”, the Prado and Reynolds Mona Lisas. In particular, the two authentic versions by Leonardo are from two different periods: the Isleworth depicts a figure from an earlier period (about 11 – 12 years) compared to the Louvre Mona Lisa, which reveals a more refined technique, and is spatially and geometrically of different dimensions.

Consequently, it can be assumed that, in addition to the Prado and Reynolds Mona Lisas, all other successive Mona Lisas are actually copies of one or the other authentic versions, or a combination of both.

5. Considerations on the Isleworth Mona Lisa (the Earlier Mona Lisa)

In reference to the Louvre Mona Lisa and the Isleworth Mona Lisa, though depicting two separate portraits of the same woman, it is appropriate to highlight an aspect that however links both: the Leonardesque meaning of beauty. Leonardo’s oldest portrait of a lady is “Portrait of Ginevra de’ Benci” which, on the reverse, bears the motto: “*Virtutem forma decorat*” (beauty adorns virtue).

It follows that virtue pre-exists and is then adorned by beauty. In the early 1500s, therefore, what had to emerge from a woman’s portrait was not only beauty, but also morality, nobility, chastity, a fear of God, religiosity and, more rarely, culture.

This is what Leonardo is believed to have wanted to portray.

In particular, the following considerations related to the authentication of the Isleworth Mona Lisa (Earlier Mona Lisa) as being another version by Leonardo are related to:

1. The statements made by Vasari in 1550 and 1568 in which he points out that Leonardo had left the painting of the “Lady on the balcony” unfinished, and that the same painting was finished in 1517. The Louvre version had already been completed in 1517 (for Carlo Pedretti and Pietro Marani 1513).

2. Further evidence of the possible existence of another version of the portrait is a pen and ink sketch by Raphael (Raffaello Sanzio). It depicts a young woman on a balcony with columns dating back to around 1504 and drawn while he was in Florence to observe Leonardo’s work. As the compositional elements are unique and do not appear in any other painting, this Mona Lisa must have been near completion when Raphael saw it in 1504.

3. The stylistic and aesthetic analysis and the artistic technique confirm the figure is a younger one and is evident in:

a. the thinner hands and slimmer fingers and, in particular, the more relaxed fore-finger of the right hand;

b. the response to the predominant feature of Leonardo’s portraiture, in other words, the contrast between the warmer tones of the hands and the paler complexion of the face and chest;

c. Leonardo’s interest in geometry which is clearly shown by the “Golden Ratio”; this is connected to Leonardo’s studies on “divine proportion”, an integral part of many of his works, in particular on the human body². At times indeed, he seems obsessed by this aspect: his work on the Isleworth Mona Lisa, for example, is commented on by Frà Pietro da Novellara (ambassador of Isabelle d’Este, an important Renaissance figure). He reports that Leonardo was intensely focused on the geometry which was further accentuated by the effect given by the glazing, a technique he had perfected after 1508;

d. the important relationship between mathematics and art that exists in Leonardo’s work should not be underestimated; its importance is well-documented in numerous letters, papers and notes.

4. The innovative investigative technique on what was not visible and revealed that both the Louvre and Isleworth portraits were painted by the same author; this is in reference to the oil painting technique of using successive layers of glazing which produced transparent veils of colour and shading defined ‘*sfumato*’.

Professor John Asmus of California University and Professor Vadim Parfenov of St. Petersburg Elettrotechnical University [13] have recently applied their well-proven method on various copies of the Mona Lisa, including the two Mona Lisa paintings of the Louvre and Isleworth. The method measures the brushstrokes related to the “sfumato” and the “chiaroscuro” of the faces by analyzing the distribution of billions of pixels of the histograms obtained by multispectral digitization. In this regard, the measurements were directed in particular to the mouth, nose and eyes, as they represent distinctive areas on which artists preferentially use their brushstrokes. They have therefore been defined as “fingerprints”. In the case of the various copies each was distinctly different from another. The exception related to the faces of the Mona Lisa of the Louvre and Isleworth for which Prof. Asmus stated that there is a 99% certainty that these two paintings were executed by the same author.

In this regard, it is also possible to provide a quantitative value for the “sfumato” by instrumentally determining the trichromatic coordinates of the differences in colour of the colored surfaces using a spectrophotometric colorimeter, bearing in mind a chromaticity diagram, in other words: L = brightness (which decreases from the brightest to the darkest portions), h = hue, C * = saturation [15].

This is something intangible in Leonardo's works and the main reason why it is so difficult to copy his paintings.

5. In January 2011, a French engineer, Pascal Cotte, examined the painting using a non-invasive multispectral technique, Layer Amplification Method (LAM), which revealed some preparatory drawings underlying the pictorial film and thus evidencing it is not a direct copy.

6. Another investigative method developed by Joe Mullins in 2012 for the "Regression Project", involved the application of a particular forensic technique to art. The technique confirmed that the portraits of the Louvre and Isleworth Mona Lisas are of the same woman at different ages, the Isleworth being approximately 11-12 years younger than the Louvre Mona Lisa, dating it to about 1505-06 (this is the year calculated after subtracting the 11 years difference from the year the Louvre Mona Lisa was completed in 1517).

7. The support material, hand-woven linen or Reims canvas has the same characteristics as the support used by Leonardo to paint his famous draperies in the context of his 1470 studies.

8. The analytical investigations have ascertained the techniques used in the preparation of the aforementioned canvas support on which a thin layer of hard gypsum was applied, including the applications for the painting, the priming and the colour; they have also identified the complete range of pigments and other media used, highlighting their availability and use since the beginning of the 16th century.

9. Ultimately, Leonardo's palette, the manner and sequence with which he mixed and applied colours closely follow the meticulous instructions he himself wrote in his "Treatise" in the section devoted to painting. It is evident that Leonardo's palette for the Isleworth Mona Lisa remains faithful to his indications and theories and, in this regard, definitive proof is in the presence of the earth pigments, umbers, Siennas

(Fe_2O_3 at 40% + MnO_2 at 15% + $\text{Si} + \text{Al}_2\text{O}_3$) which were used by Leonardo in some of his most important works.

6. On the attribution of the oil painting on canvas: the St. Petersburg "Mona Lisa with columns"

The methodological path followed to reach a final answer regarding attribution was applied to an oil painting on canvas "Mona Lisa with columns" from a private collection (Figure 2).

The examination was aimed at identifying the constituent materials and characterizing the pictorial technique. Its purpose was to identify its execution artistically and provide a reliable answer based on a subjective and objective evaluation.

The study was conducted with the help of a chemist, art historian and restorer as well as a physicist and technician-diagnostician, working together and integrating their skills to lead to one final result.

The historical and diagnostic-analytical investigations were carried out, partly in St. Petersburg in the Museum where the painting was located and, in part, on samples taken from the artefact, in the Diagnostic Laboratory for Cultural Heritage of the University of Bologna (Italy) with the use of portable and non-portable equipment, responding to principles of innovation and reliability and according to the correct methodological path



Figure 2. Oil painting on canvas, St. Petersburg “Mona Lisa with columns”

that must distinguish the complete intervention. Following the investigations and the corresponding findings, some considerations were made on the work in question and a comparison made with Leonardo’s “Mona Lisa” exhibited at the Louvre in Paris. A summary of the results is given below.

- In the case of the St. Petersburg Mona Lisa with columns, the support is a linen canvas with a coarse irregular texture, its size being compatible with the “standard” one that was commonly found from the first half of the 1600s in the Flemish region. The Louvre Mona Lisa is instead on wood.

- The materials used for the preparation, in the case of the St. Petersburg Mona Lisa with columns, can be traced to a German-Flemish practice used between 1620-1680 in a Parisian context. Leonardo, on the contrary, used a preparatory layer made of plaster.

- The colored primer found in the St. Petersburg Mona Lisa with columns was used starting from the second half of the 1500s.

- The dating of the canvas support of the St. Petersburg Mona Lisa with columns to between 1520-1660 and therefore excludes the period of life and work of Leonardo (1452-1519).

It was possible to conclude that the painting of the St. Petersburg “Mona Lisa with columns” represents a copy of the work “Mona Lisa” by Leonardo, referable to a period between 1590 and 1660. However, it is important to highlight the good workmanship, its readability and the expressiveness that emanates from the work, albeit with inadequate brushstrokes and devoid of the thickness in the colours Leonardo typically

used in his landscapes, particularly with regard to the rendering of the background in general, which is of a modest design.

Its execution is, ultimately, of Nordic derivation, specifically German-Flemish, and is influenced by the French school [15].

7. Conclusion

He was a genius but had no knowledge of Latin.

It is well known that Leonardo polemically and proudly defined himself as a *homo sanza lettere* i.e. as having no regular school education and no knowledge of Latin, which was taught to those who undertook a profession in law or medicine and which, at that time, was indispensable to read the classics. For the rest of his life, Leonardo claimed this condition of illiteracy, contrasting the wisdom of the learned with the value of direct *sperientia*, i.e. the ability to investigate nature guided solely by observation.

It is equally true that today, the complete reconstruction of his personal library, created for the first time by an international group of specialists, proves these claims to be false. In fact, he was not educated in the use of Latin, but self-taught himself over the years with the aid of grammar books and dictionaries.

This makes of Leonardo an emblematic example of humility and genius and, as such, a reference for experts whether they be historians or technicians dealing with the process of evaluating, attributing and authenticating a work of art.

This finally brings us back to the title of the editorial in this issue of the Journal: “*The integration of knowledge of the mind, heart and hands in science and life*”.

Notes

- ¹ This refers to the sequence of investigations on the Mona Lisa in the Louvre carried out in 2004 by the “Research and Restoration Center of the Museums of France” included in the studies collected in the compendium “*Au coeur de La Joconde – Leonardo da Vinci décodé*”. The investigations were examined together with those indicated by the National Gallery in London, thus allowing a comparison to be made with other works by Leonardo; it also includes the analytical research conducted by Hermann Kuhn and Maurizio Seracini on samples taken from the Isleworth Mona Lisa, as reported in the publication by the Mona Lisa Foundation “*Leonardo da Vinci’s Earlier Mona Lisa*” [13].
- ² These studies indicate that the human body constitutes the most aesthetically beautiful relationship between the different parts, such as the trunk and legs. The pencil drawing of the Vitruvian Man by Leonardo, is an excellent example.

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Biographical notes

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Summary

The topic of attribution and authentication of works of art is a well known one, and is currently the subject of heated debate. What must be highlighted is the importance of the terminology used to distinguish the different degrees of certainty within the system of art work attribution, and in the context of the different possibilities of evaluating a work of art. It is also necessary to integrate historical-humanistic and technical-experimental skills which should necessarily lead to a subjective and objective evaluation in order to arrive at a univocal scientific truth.

As an emblematic case, also owing to the uniqueness of the work, the *Mona Lisa*, prototype of the Renaissance genius of Leonardo da Vinci, is examined.

At the same time, the versions and copies of the *Mona Lisa* are also studied, basing the examination on in-depth archival and bibliographic research, and taking into account the findings of the historical-artistic and technical-material analyses from a methodological point of view.

The findings have highlighted the distinction between the two authentic versions by Leonardo, i.e. the Louvre *Mona Lisa* and the Isleworth *Mona Lisa* (or Earlier *Mona Lisa*) and the two copies, i.e. the Prado and Reynolds *Mona Lisas*. The latter two, considered to be the most complete and qualitatively better than many others, are in fact either copies of previous *Mona Lisas* or of the two authentic versions. Finally, from an experimental perspective, in order to provide an answer regarding attribution, a precise methodological approach was applied to the painting on canvas "Mona Lisa with columns" (St. Petersburg), establishing that it was a copy, albeit a well-executed one.