

SCIENCE AND JUDGEMENT BY EYE IN THE HISTORICAL IDENTIFICATION OF WORKS OF ART

by
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Introductory remarks

This essay reworks the more theoretical sections of the paper delivered at the Authentication in Art congress at the Louwman Museum in the The Hague on 7th May 2014¹ It does not include the two case studies drawn from Leonardo da Vinci: the controversy over the two prime versions of the *Madonna of the Yarnwinder*; and the attribution of the *Salvator Mundi*, which made its public debut in *Leonardo da Vinci. Painter at the Court of Milan* at the National Gallery in London in 2011.² The paper was an attempt to bring some ordered thinking into how we judge the status of the varied kinds of evidence that can now be brought to bear upon the attribution of old master paintings. It focused particularly on the often conflicting claims of connoisseurship and scientific analysis. I did not attempt to offer a historical review of the criteria used for attribution, which was the subject of other papers in the conference. Nor am I here anticipating potential new techniques, such as analysis by computer vision.

I am advocating that we replace the term “connoisseurship” with “judgment by eye”, unless we are dealing with attribution within a specific historical context. I do so for two reasons. The first is that “connoisseurship” has increasingly come to carry negative associations - identified with a self-proclaimed (and often class-based) elite whose skills are insulated from systematic scrutiny. The second and more important is

¹ Thanks are due to Milko den Leeuw and Nicholas Eastaugh, the guiding lights of the initiative that lead to the congress, and Evert Louwman who hosted the event in his magnificent museum. Some of the material had been presented at the European Union conservation conference under the umbrella of the CHARISMA project in Florence on 6th March 2014, and in a public lecture at the Department of Art and Archeology in Princeton on 15 April 2103. I am grateful to Nicholas Eastaugh and Jilleen Nadon for th their constructive comments on this paper.

² For the *Madonna of the Yarnwinder* see M. Kemp, “From Scientific Analysis to the Renaissance Market: the Case of Leonardo's *Madonna of the Yarnwinder*”, *The Journal of Medieval and Renaissance Studies*, XXIV, 1994, pp.259-74; and M. Kemp and T. Wells, *Leonardo da Vinci's Madonna of the Yarnwinder. A Historical and Scientific Detective Story*, London, 2011. For the *Salvator Mundi*, see Luke Syson in *Leonardo da Vinci. Painter at the Court of Milan*, London, National Gallery, 2011, pp. **; and a forthcoming book by M. Kemp and M. Dalivalle. A complimentary approach via abductive reasoning is provided by Douglas Walton, “An Argumentation Model of Forensic Evidence in Fine Art Attribution”, *AI & Society*, 28, 2013, pp. 509-30. Walton uses the example of the *La Bella Principessa*, attributed to Leonardo. See most recently, M. Kemp, *Leonardo da Vinci. Ritratto di Bianca Sforza, “La Bella Principessa”*, exhibition catalogue, Palazzo Ducale, Urbino, 2014.

that “judgment by eye” signifies skills that extend to any arena in which subtle judgments need to be made about complex and often slippery visual evidence. Looking at computer-generated images of a distant galaxy or X-rays of a breast tumour involve judgment by eye to no lesser degree than scrutinizing visual evidence about a work of art. In the case of the scientific examination of paintings by such techniques as X-radiography or infrared reflectography judgement by eye in art and science intersect in an intimate manner. Judgement by eye embraces all those factors, physiological, psychological, cognitive and personal that are involved in and direct our acts of seeing.

What we conceive to be the most relevant and powerful methods of judgment by eye rely upon a series of tacit assumptions about what is significant in the making and viewing of a particular work of art. I will begin with a brief philosophical excursus on causal explanations, visual evidence and the standpoint of the observer. This will be followed by some thoughts on falsifiability.

An excursus on causes and the stance of the observer

The example that I used some years ago is a car crash.³ A car has skidded off a road at a bend and damaged itself (but not the driver) by striking a tree. A series of experts seek an explanation. The most important, at least financially, is the representative of the insurance company, who is interested in finding reasons not to pay out. He or she notices that a tread on one of the tyres is below the legal limit. This is therefore the “cause” of the crash, and the driver’s insurance claim is invalidated. A local authority road engineer notes that the camber of the road at the bend is sloping in the wrong direction and that the tree could not be in a worse position for anyone coming of the road at that bend. A meteorologist explains that there was a very light shower a few minutes earlier and that there had been no rain for the previous fortnight, making the road skiddy. A psychiatrist characterises the driver as a risk-taker who tends to drive dangerously fast. The driver claims that a cat ran out in front of him, causing him to swerve. And so on. There are also a series of more general causes, such as the fact that wheels are round and can roll fast, and that petrol and air combine to make an explosive mixture.

None of these causal explanations is demonstrably wrong and it is likely that one of them alone is not sufficient. It is possible that *all* of them were necessary for the accident to happen. Each of the observers will select and prioritise different kinds of evidence depending on their standpoint.

If we take this notion of the standpoint of the observer into works of art, we can see that a comparable variability of seeing applies. Someone concerned with the sociology of art will be interested in such aspects as the economic transaction that brought it about and the social “message” of the work – overt or covert. A feminist may concentrate on the way that gender is handled in a painting, as when a female nude is presented for a male voyeur’s gaze. The iconographer undertakes a close analysis of its symbolic and allegorical content in the context of relevant texts. The style historian (if such a thing still exists) characterises it within broad procession of stylistic developments. The monograph writer sees each work as a manifestation of

³ M. Kemp, “The Taking and Use of Evidence, with a Botticellian Case Study”, *The Art Journal*, XLIV, 1984, pp. 207-15. The argument is adapted from the philosopher Bas van Fraassen.

the artist's individual production and creative personality. The connoisseur delights in the aesthetic qualities of the painting. The owner (or even the museum curator) takes a pride in possession that grants a special aura to the picture in her or his eyes. The auctioneer or dealer will seize upon those characteristics that will be most efficacious in the act of selling. The conservator will focus on the condition, looking closely as nasty re-paints. Someone who discovers a painting and is the first to publish it will search out those things that best support the attribution. The press will look for whatever creates a "story". And so on. This is not to say that each observer is necessarily blind to the visual qualities that the others highlight, or that one way of looking is more right than another, but it is true to say that each will see in a way coloured by their interests and observational skills.

The central message of these simplified examples is that seeing is a very selective and malleable business. It is not arbitrary – everyone saw the crushed front of the car and knew that an accident had occurred - but what is seen within a framework of explanation is powerfully shaped by what the observer wants to see and what we are looking for, given our set of interests.

A personal anecdote will serve to illustrate this point. I recall in a biology class at school that we were dissecting rats. We had previously tackled mice and other animals. The master, Dennis Clark, who was an outstanding teacher, asked us to find the rat's gall bladder. When, after a decent interval, he enquired about our success, I was one of the first to put up my hand. I rather fancied myself as a dissector. "It's a funny thing", he said, "rats do not have gall bladders". It was relatively easy for him to falsify our observations by showing that we had contrived to translate some feature within the rat's abdomen into the desired gall bladder.

The status of observation and explanation in terms of refutability

Potential falsifiability is a key aspect of any process of observation and explanation. In this I am drawing upon Karl Popper, the philosopher and theorist of scientific methods - without necessarily endorsing all aspects of his stance on science. Popper laid down a series of propositions, including:

It is easy to obtain confirmations, or verifications, for nearly every theory - if we look for confirmations....

A theory which is not refutable by any conceivable event is nonscientific.

Irrefutability is not a virtue of a theory (as people often think) but a vice.

Every genuine *test* of a theory is an attempt to falsify it, or to refute it.

Testability is falsifiability; but there are degrees of testability: some theories are more testable, more exposed to refutation, than others...

Confirming evidence should not count *except* when *it is the result of a genuine test of the theory*...

Some genuinely testable theories, when found to be false, are still upheld by their admirers — for example by introducing *ad hoc* some auxiliary assumption, or by reinterpreting the theory *ad hoc* in such a way that it escapes refutation.

Such a procedure ... rescues the theory from refutation only at the price of destroying, or at least lowering, its scientific status.⁴

⁴ Karl Popper, *Conjectures and Refutations. The Growth of Scientific Knowledge*, London, 1963, pp. 343-4.

Amongst the procedures that can be applied in attribution, some are subject to falsification *on their own terms* and may serve definitively to falsify an attribution, such as pigment analysis. Others are definitely not falsifiable *on their own terms*, most notably traditional connoisseurship. This means that any attempt to place connoisseurship on a scientific basis must necessarily fail. This is not to say we should only be permitted to utilise arguments that can be subjected to hard falsification, but it does affect the status of non-falsifiable techniques in any process of argumentation.

To Popper's falsification I would add my version of Ockham's razor. This is the *lex parsimoniae*, which states that the hypothesis with fewest assumptions and is most consistent with the evidence - i.e. the most parsimonious – is to be preferred. When too many qualifying (and untestable) theories need to be aggregated to save a hypothesis, the hypothesis itself should be questioned, as with Copernicus's questioning of the mechanisms invented to save the Ptolemaic system. The most parsimonious explanation might not be right, but it is the only systematic way to proceed. Too often art historians aggregate a elaborate and arbitrary mish-mash of secondary arguments that look clever and serve the needs of their preferred attribution but have no secure status in any systematic process of argumentation, since they escape refutation in themselves and, if inverted, cannot falsify the attribution.

Constructive and Permissive Arguments

The kinds of evidence and explanation that can be subject to various degrees of falsification can be grouped under two headings: constructive and permissive. By constructive I mean those that add positively and accumulatively to the case being made for a specific attribution. By permissive I am signalling those that present no obstacle to the attribution being made, i.e. they offer a *nil obstat*. These two types of argument are regularly confused and even conflated in processes of attribution.

I will use three tables to give a sense of the hierarchies involved, looking first at characteristics of a painting that are subject to scientific analysis. I am not trying to present a comprehensive list of scientific techniques in any of the tables. Rather I am giving examples that will allow others to be considered in terms of their place in the hierarchies. By "strong falsification" I mean that the scientific evidence is transparent and fully testable. It also offers strong falsification for attributions. In general we can see that the scientific evidence is generally weak for constructive arguments and strong for the permissive ones.

There is inevitably some schematisation involved in drawing up the the table, not least because scientific techniques, including pigment analysis, cannot wholly exclude some degree of judgement by eye. We are not dealing with certainties when technology is applied to the scientific analysis of works of art. By "scientific analysis" I refer to those techniques of examination that deploy science via technologies to define the physical and/or chemical nature of the artefacts.

CONSTRUCTIVE Contributes additively to the accumulation of positive evidence (Strong falsification for ones in blue but weak for constructive arguments)	PERMISSIVE <i>Nil obstat</i> – contributes subtractively to remove obstacles. (Strong falsification for all in blue)
Condition helps to understand present appearance	Condition helps to understand present appearance
Support generally not specific to the artist	Support OK for the artist, period place...
Pigments rarely specific to the artist	Pigments OK ...
Binders rarely specific to the artist	Binders OK ...
Layers occasionally specific to the artist	Layers OK ...
Priming occasionally specific to the artist	Priming OK ...
Process of execution <i>pentimenti</i> , underdrawing, underpainting etc. of a kind specific to the artist – but requiring a lot of judgement by eye	Preparatory procedures <i>Consistent with expectation</i>

The next table is devoted to aspects of scientific analysis in order of specificity to the act of attribution to a named artist. Those that are most specific involve the highest degrees of judgement by eye when interpreting the images. They are ordered according their degree of malleability, with the most malleable at the top.

In this and the following table, I am using the terms “scientific” and “art historical” in a conventional way without intending to signal that they can be isolated in the actual practice of attribution – and certainly not to suggest that the application of scientific

analysis necessarily delivers more certainty than art historical evidence. In the actual practice of art history, its isolation from scientific analysis is all too common.

“SCIENTIFIC” (indicative not comprehensive)
Multi-spectral and other scanning methods to disclose <i>images</i> in lower layers (large volumes of complex visual information but difficult to read and needing much judgement by eye)
X-rays (difficulty of reading. Many layers at once. Much judgement by eye)
I-R, especially reflectograms (not always easy to read but good for underdrawings. Moderate or high level of judgement by eye)
U-V (informative about re-touchings but limited applicability. Moderate level of judgement by eye)
False colour analysis (Moderate level of judgement by eye)
Analysis of binder(s). (Moderate to high level of judgement by eye)
Optical analysis of layers by cross-section samples (Moderate to high level of judgment by eye)
Carbon dating (crude for specific attributions and only offering a <i>nil obstat</i>)
Pigment analysis of various kinds (generally offers only a <i>nil obstat</i>)

The third table deals with the criteria that are more traditionally “art historical”. Again the most malleable are at the top. Here I have added standard kinds of evidence relating to provenance and documentation that are highly constructive. The terms “outside” and “orbital” warrant some explanation. “Outside” refers to evidence from other fields of expertise that are relevant to the attribution, such as costume. “Orbital” refers to the contextual factors in the period and more specifically within the artist’s career. For example, in looking at the newly discovered *Salvator Mundi* we can show there are elements in the optical characterisation of the hand and head that correspond to Leonardo’s analyses of the eye and light. The transformation of the customary orb

into a rock crystal sphere of the heavens corresponds to Leonardo’s documented interests. Any new attribution will ideally play an *active* role in our characterisation of the orbital factors that shape our understanding of the work in its contexts.

“ART HISTORICAL”
overall judgment by eye (general impression)
detailed judgements by eye (e.g. brushwork)
wide current consensus of judgment by eye
chronological persistence of consensual judgment by eye
supporting evidence from content
supporting evidence from “outside”, e.g. costume
integration into and leverage on the “orbital factors” of the historical context, including the artist’s life and works.
primary documentation
provenance
provenance and documentation wholly integrated

Judgement by eye

As we have stressed, judgement by eye plays a key role in key scientific techniques. Although the most constructive of the kinds of art historical evidence, documentation and provenance, do not rely upon judgement by eye, it is common that this kind of evidence is not available or is less conclusive than we would wish. In many cases judgement by eye necessarily provides the actual starting point, before other kinds of investigation are undertaken. This is often the situation when a previously unknown or unrecognised work first emerges with specific claims attached to it.

Let us try to formulate some propositions about judgement by eye in a somewhat Popperian manner.

Attribution that is reliant on judgement by eye may be described as an intuitive hypotheses that has substantial implications and consequences.

The *implications and consequences* range from the financial value of the item to its effect on the context of orbital factors into which it is being inserted. A significant implication is that the work will actually look different once an attribution has been mooted (whether or not it is accepted), since the visual object is now located in a context of overt and specific comparisons. The attribution will affect our view of the artist to a greater or lesser degree. The attribution may well affect the attributor in personal and professional terms. The reputation of the attributor affects how the attribution is regarded, as does the operation of petty professional jealousies and rivalries. The current ownership of the work and how it emerges into the public domain tends to affect how it is viewed. The owner (private or public) will certainly be affected. The *implications* will feed back into how we view the attribution. There is a great deal of “noise” in this two-way process of implications and consequences.

At its best and most disinterested, judgement by eye aspires to non-arbitrary subjectivity.

By this I mean that the subjective judgement can be set within a framework of rational argument, accumulated knowledge and relevant experience, not least with respect to visual comparisons. But in itself a hypothesis of attribution that relies wholly or primarily on judgement by eye must necessarily remain provisional, given the malleability of acts of seeing and the lack of any internal process of falsification.

The hypothesis of attribution is given non-arbitrary support to varying degrees by orbital associations and outside evidence.

The hypothesis of attribution may be supported permissively by scientific evidence. It may in some cases be supported constructively by scientific evidence.

The hypothesis of attribution may be supported constructively by primary documentation and provenance. When primary documentation and unbroken provenance coincide, confirmation is strong (though never 100% watertight, particularly for those who wish to dissent).

The hypothesis of attribution is subject to strong falsification by primary documentation and provenance.

The hypothesis of attribution is subject to strong falsification by scientific evidence (which is itself falsifiable).

Conclusion

Attribution is by its nature a hybrid process that utilises arguments that are incommensurable in method.

Judgment by eye is malleable in the light of multiple interests.

Judgement by eye is falsifiable only by factors outside itself.

The visual techniques, “art historical” and “scientific”, that are most specific in the process of identification are those that are the most malleable.

We should strive to recognise the effective *status* of different kinds of evidence and argument, not over-claiming and/or granting a monopoly to any one type of argument unless it offers hard falsification. We should recognise whether evidence is constructive or permissive. We should remain perpetually alert to the malleability of our seeing, and to the varied personal and contextual factors that operate selectively in what we claim to see. Above all we should be more modest and prudent in our personal investments in our acts of seeing.