DECODING CARAVAGGIO:

Bridging the gap between technical analysis, theory and performance

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Introduction

In January of 2012 I had the distinct pleasure and privilege to copy two paintings by Velázquez in London's National Gallery, a detail of the Rokeby Venus and a copy of his late portrait of Philip IV. The mission was simple: make a facsimile of each using the commercial paints, brushes and canvas I had at my disposal, all while trying to glean some insight into how he had done it. At the time, I did have a general understanding of the materials and pigments he had used, but I was not overly concerned with adhering to any rigid interpretation. Put simply, I was looking from the outside in.

I mention this experience to better explain the nature of my current collaboration with Dott.ssa Beatrice De Ruggieri and Dott. Marco Cardinali and our investigation into Caravaggio's *Judith and Holofernes* at the Palazzo Barberini: in contrast to my experience in 2012, our objective has not been to make a superficial facsimile. Instead, we began the project with their technical analyses of the painting to determine the materials and pigments. Then, using their x-rays, infrared, and ultraviolet imagery, in combination with a first-hand observation of the paining itself, we were able to make better informed decisions on where specific pigments were used, in what quantity and proportion, and in what order the layers of paint were applied.

In essence, we have worked from the inside out, and are asking the fundamental question: to what extent can a technical analysis inform a convincing painting process and how close would the result come to the original when analyzed?

To conduct our investigation, we were granted the extraordinary privilege to spend a total of three days working in front of the painting in the museum: Monday, April 15th, Monday, April 29th and Monday, May 20th, 2024. During that time, two copies were executed. The first copy was painted in one day on a middle value[1] greenish gray ground. The second copy was painted over a darker ground (closer to the inherit value of raw umber) and was executed over a two day period: the first day was the block in of the lights and shadows; the second allowed for an exploration of unifying the lights and shadows with halftones made from glazing.[2]

The final step in our project will be a technical analysis of the copies, then a comparison between those results and the analyses of the actual painting. Our goal is to complete the work by the end of the 2024.

Initial Observations and Discoveries

In anticipation of the project's conclusion, there are several intriguing observations and unexpected discoveries that emerged during the process of executing the copies which merit attention:

I. Lost in Translation: 'Earth pigments'

A technical analysis does not directly result in a list of named pigments. Instead, deductions are necessary to name the color. For example, when mercury is detected, this translates to vermilion; when lead is detected, it is lead white; when manganese is detected, that often means a kind of raw umber. But what happens when iron is detected? Iron means 'earth pigment', but for a painter, that could mean many things. Often when reading a technical analysis about a specific part of a painting, I find myself asking, "What exactly is this 'earth color'? Is it raw sienna? Burnt sienna? Yellow ochre? Venetian red? Or something else?"

Obviously, part of that can be answered by reading the analysis and then looking at the painting to determine if the color of the pigment leans toward a yellow or red. But after making that distinction, would not a rose by any other name smell as sweet? No, it would not. Differences still remain that could have a dramatic impact, as I learned.

The case in point concerns the translation of the color 'red earth' into an actual pigment. Micro-destructive investigations of Caravaggio's paintings indicated that "the flesh tones in Caravaggio's paintings are produced with red pigments (earths, cinnabar and lake) diluted in lead white and suitably mixed to obtain the correct shade through the addition of lead-tin yellow and/or yellow earths."[3]

Based on my own experience, an instinctual interpretation of this name, especially in the context of a skin tone, suggests a color that is brownish in hue and low in chromatic intensity, which in turn points me to a commercially

[1] For the laymen, 'value' indicates how light or dark a color is in relation to a grey scale.. A 'middle value' means a color that falls in the center of that gray scale. In other words, imagine a range from 0 to 10, with 0 equal to black and 10 equal to white. A middle value is a 5.

[2] In oil painting, glazing is the technique of painting a thin, transparent layer on top of a dry layer.

[3] Positano, Matteo et al. "Micro-Destructive Investigations." *Caravaggio, Works in Rome: Technique and Style,* vol. I, Silvana Editoriale, 06 July 2016, p. 321.

common color like 'burnt sienna.' Burnt sienna is a "dark reddish brown iron oxide pigment prepared by burning raw sienna", and gets its name from the Italian city, Siena.[4]

Furthermore, as a practicing painter, I know burnt sienna has a relatively low tinting strength. This means that when mixed with a lead white, it does not dominate the mixture. This quality is most useful in controlling subtle shifts in value, a necessity in the creation of convincing forms and volumes, like the turn of a cheek or the circumference of a forearm.

But 'red earth' could also mean 'red ochre', which, again, does not point to one specific pigment. To demonstrate, the Cameo Materials Database lists the following as synonyms for red ochre: "red ochre (Br.); red earth; earth red; iron oxide red; red iron oxide; Indian red; brun rouge; Roter Ocker (Deut.); minium de fer (Fr.); reddle; Spanish brown; Venetian red, English red; Spanish red; caput mortuum; Indian red; light red; burnt sienna."[5]

So can the technical analysis offer additional clues? Yes. In reference to the pigments used in the ground layers, the analysis revealed the following:

> "These earths are mostly made up of iron oxides with a medium to low degree of purification, less frequent use being made of umber, sienna, green earths, and ochres. In the cases examined, Raman spectroscopy identified red ochre, yellow ochre and green earth, whose primary components are respectively hematite, goethite and celadonite."[6]

Critical here is the connection of red ochre to hematite.

This brings us to the part of the narrative where chance and circumstance play a role in the decision making, as I am sure was also true in Caravaggio's time. In other words, I doubt that Caravaggio always used specific pigments, from a specific location, prepared in specific way, for the entirety of his peripatetic career; instead much depended on geographical location, availability, convenience and budget. Like Caravaggio, I am faced with similar criteria. Unlike Caravaggio, I have not had to live on the run, and have built up over the years a collection of various kinds of unique pigments. As fate would have it, one of these pigments just happened to carry the name "hematite."



Figure 1: A comparison of mixtures between Lead White and Burnt Sienna (left) with Lead White and Hematite (right).

A couple of weeks prior to our first day in front of the painting, I decided to hand-grind some of the hematite pigment and put it to the test, comparing a mixture of it with lead white to that of burnt sienna, mixed with the same lead white (Figure 1). From that experiment, I realized two things:

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[4] Cameo Materials Database, Museum of Fine Arts, Boston, accessed 27 May 2024, < https://cameo.mfa.org/wiki/Burnt_sienna >.

[5] Cameo Materials Database, Museum of Fine Arts, Boston, accessed 29 May 2024, < https://cameo.mfa.org/wiki/Red_ocher >.

[6] Positano, Matteo et al. "Micro-Destructive Investigations." *Caravaggio, Works in Rome: Technique and Style,* vol. I, Silvana Editoriale, 06 July 2016, p. 311.

1. The hematite has even less tinting strength than the burnt sienna, making the subtle shifts in value even more manageable;

2. The hematite is much less 'hot' in terms of color temperature and much less 'red' in terms of intensity, making it an even better ingredient in the mixture of caucasian flesh tones, which are best when balanced between a warm and cool temperature, and are low in chromatic intensity.

As a consequence, I decided to use the hematite, not burnt sienna, as an ingredient to make the base flesh tone mixture for the copies.

II. Quest for the Holy Grail of Flesh Tones: Lead-Tin Yellow Types I and II

There is a legendary quote attributed to Delacroix known within the circles of contemporary figurative painters: "Give me mud and I will make of it the skin of Venus, but you must let me choose the colors that surround it."[7] The intended meaning is simple: no one color equates to flesh and many colors can serve the illusion of 'skin' as long as it is given the proper context. If taken at face value, I imagine this proclamation was also likely meant as a retort to painters who, like me, have convinced themselves that there must have existed a special combination of pigments and process for painting luminous flesh in the 16th and 17th centuries.

However, my searches for the actual source of this attribution come up short and I find no such quote contained within *The Journal of Eugène Delacroix*. Instead I find within it passages that declare a shared fascination with the flesh tones from previous centuries. For example, he writes:

> "It is difficult to say what colors were employed by men like Titian and Rubens to produce those flesh tones which are so brilliant and have remained so, especially those half-tints in which the transparence of the blood under the skin makes itself felt despite the gray that every half-tint brings with it. For my own part, I am convinced that they mix the most brilliant colors in order to produce them."[8]

While it is true I have became more sympathetic to the concept of 'color relativity' and less militant in finding the proverbial 'holy grail' of flesh tones—those 'colors that produce brilliant flesh', as Delacroix put it— I would be slow to argue that my saddle has gone cold; should something whisper evidence of a recipe, I am ready to ride.

Take for example the matter of lead-tin yellow, also known as *giallorino*. In truth, there are two types of lead-tin yellow: lead-tin yellow type I and lead-tin yellow type II. I know this only because of my studies of technical analyses and not because of any former experience with both (due to its lead content, these pigments, like lead white itself, is an increasingly difficult product to acquire). I also know that what distinguishes the two types is that one contains the element antimony (type II) while the other does not.

What I did not know—and herein lies one of the fundamental reasons for enabling this kind of collaboration and engaging in such an experiment—is that there is a difference between the two in terms of color, value, and chromatic intensity. Lead-tin yellow type I is a very light and pale yellow (only slightly darker in value than a lead white), whereas lead-tin yellow type II is darker in value, with a more golden-kind of yellow, making it easier to push a color like hematite toward an orange color.

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[7] I find no credible source for this quote. In fact, I find that many websites quote only the first part, i.e., "Give me mud and I will paint the flesh of Venus," thus stripping it of context and changing the meaning.

[8] Delacroix, Eugène. *The Journal of Eugène Delacroix*. Hacker Art Books, New York. 1980. P. 608. Internet Archive. Accessed 27 May, 2024. < https://archive.org/details/journalofeugened0000dela_s5n7/page/608/mode/2up?q="It+is+difficult+to+say"&view=theater >



Figure 2: Lead-tin yellow, type II. Our supply of this pigment (and others) was generously provided by Kremer Pigmente.

Had I relied only on a description of the chemical make-up of the two types, I might never have understood the difference in practical terms. Instead, I only fully appreciated the difference after getting my hands on both types and then grinding them into pigments in the studio (figure 2).

The result of mixing lead white and lead-tin yellow type II, together with the hematite previously mentioned, was remarkable: a naked-eye comparison of the mixture with the actual painting revealed some near perfect matches with the flesh tones in the original painting (figure 3).

Yes, the age of the painting must be taken into consideration. Yes, oil paint darkens and yellows over time, and the color and value we see now probably was not the color and value that Caravaggio saw when he applied the paint. But this discovery has confirmed my suspicion that Caravaggio's flesh tones were not complicated mixtures and that, indeed, a formula does exist. Dare I claim the 'grail'?

III. The Cook's Apprentice: Education through Observation

Fundamental to understanding a painter's process is the act of trying to reproduce it. Theory is, of course, necessary and welcome, but performance only adds clarity and can readily dispel gratuitous fantasy.

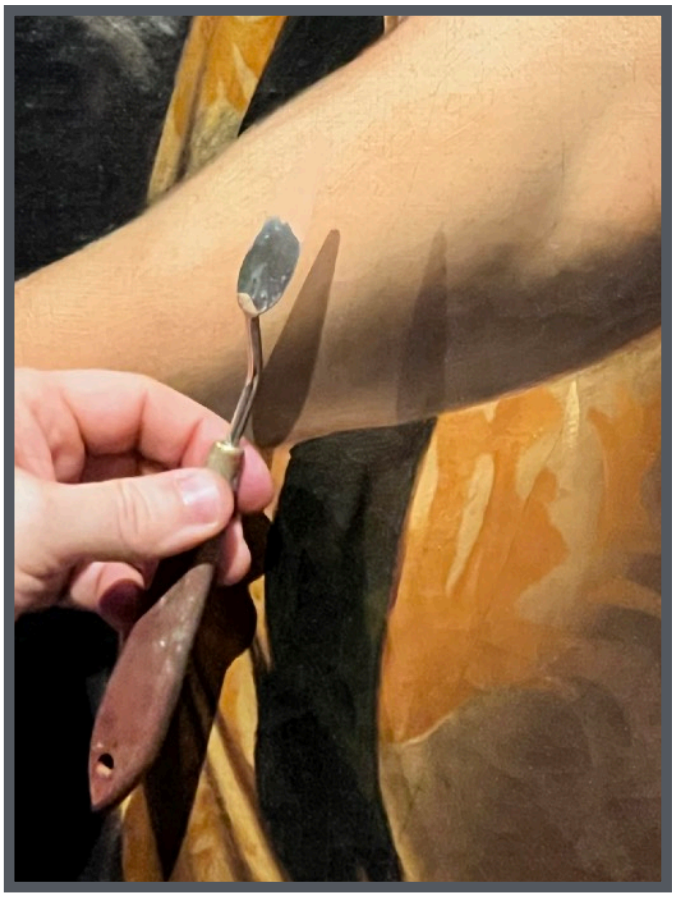


Figure 3: A flesh tone mixture of lead white, hematite and *giallorino* II.

During the process of making the copy, it was evident that Dott.ssa De Ruggieri and Dott. Cardinali were intrigued, and sometimes surprised, by the things I would do while making the copies (like using a large bristle brush to apply the paint or smudging an edge with my finger), just as I was inspired by some of their own insights and observations that triggered ideas I had not considered or expected.

At one point Dott.ssa De Ruggieri and I were speculating on the kind of training Caravaggio would have had that would have paved the way for his understanding of the technique and materials. She said, "I think it's like when you are growing up and you learn to cook... you see how your parents did it." The implication is clear: one learns much through the mere act of observation,

and then instinctually acting upon those observations.

It is well known that Caravaggio spent time with some painters in the early stage of his career in northern Italy, and also spent time in the bottega of the Cavaliere D'Arpino in Rome[9], but my perception of that had always been seen through the lens of a pedagogical exchange, meaning the master says to the apprentice, "first you do X, then you do Z," etc.

Instead, the idea that one can learn a craft without an explicit didactic exchange helps to underscore the educational possibilities that emerge when observation of others is combined with a steady practice of "three heads a day."[10] From that, experience is gained and intuition is honed. The act of painting is as much about learning and discovery as it is execution. As Harrington Mann affirmed in his publication on portrait painting:

> "I have always maintained that there is so much to learn and comparatively so little that can be taught... the practice of painting is so terribly individual that the student can do best by perfecting his technique through his own observation and the study of the masters with whom he finds himself most in sympathy."[11]

In a similar vein, it was only through the act of imitating Caravaggio's technique, with the materials he used, with the painting in front of me, that I was able to dislodge one of those moments of learning:

In preparing to paint the arm with the flesh tone, I determined the top part was made with a bristle brush, about one and a half inches in width, clearly loaded with paint, and dragged down the length of the forearm from right to left, following the contour (Figure 4). This observation not only informed the kind of brush that was needed, but also called attention to the quantity of paint and the quality of consistency that would allow me to drag it accordingly.



Figure 4: Blocking in the light on the first copy: initial brushwork with a large bristle brush and a thick body of the paint.

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[9] Bellori, Giovanni Pietro. *Le Vite De' Pittori, Scultori Ed Architetti Moderni: Co' Loro Ritratti Al Naturale*. Rome. 1728.

[10] Friedlaender, Walter. *Caravaggio Studies*. First Schocken edition, Schocken Books, 1969. P.233. "A marginal note by Bellori in his copy of Baglione (*Vite de Pittorie Scultori ed Architetti)* in the Vatican Library, first page: Macinava li color in Milano, et apprese a colorire et per haver occiso un suo compagno fuggì dal paese in bottega di mess. Lorenzo siciliano rivcoverò in Roma dove, essendo estremamente bisognoso et ignudo, faceva le (teste) per un gross l'una et ne faceva tre il giorno, poi lavorò in casa di Antiveduto Gramatica messe figure manco strapazzate. (canceled) Michelangelo ritraeva tutte le sue figure da un lume medio et le faceva tutte ad un solo piano senza digradarle."

[11] Mann, Harrington. *The Technique of Portrait Painting; a Complete & Detailed Guide to the Handling, Composition & Lighting of Portraits in Oils*. Seeley Service, 1933. P. 21. Internet Archive. Accessed 27 May, 2024. < https://archive.org/details/techniqueofportr0000harr/page/n37/mode/2up?" >

As a result, I realized the paint I had ground by hand leant itself well to what was required, in that it was less thick and more fluid than a commercial mix (though in retrospect I would have had it slightly less 'wet' than what it was). I also realized that any effort to spare the amount of paint I put on my palette would be counter-productive. These realizations made an impression and I think it is important to explain why.

Yes, the statement that a large brush loaded with a large quantity of fluid paint facilitates a rapid and efficient application certainly seems obvious and benign, but it lacks contemporary context.

In other words, it fails to appreciate that most painters today, especially those learning, are on a budget, and good professional paints are to be cherished and rationed; rarely will students have more than 'half a walnut' of each color on the palette. The consequence of this should be evident: limited quantities limit the possibilities. In an art form that ultimately pivots on nuance and subtlety, where small changes can make a big difference, a big change of this nature is a game changer.

I imagine Caravaggio in a painter's studio early in his career: he sees a generous amount of pigment ground into paint on a porphyry slab, then scooped into a large half shell, which is then passed to the master with large brush in hand. You see? Some things were baked into the cake from the beginning.

Conclusion

The purpose of this project has been to take a technical analysis of a painting by Caravaggio, use it as means to inform the materials and process, and then replicate the painting with the intent of conducting a technical analysis on the result. The has, in turn, given us the opportunity to identify and bridge the gap of literacy and comprehension that exist between an art historian's technical analysis and a practicing painter's ability to put that information to effective use in the process of making a painting.

These initial observations and discoveries make it clear that there is much, much more that can be done in this field and should encourage a proliferation of these kinds of collaborations.

This experience has brought me as close as I think I can get to being an observer in the kitchen of Caravaggio. I am now tasked with the joy (and terror) to take this knowledge and make something from it.

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About the Author

Timothy Joseph Allen is professional oil painter who has lived and worked in Rome, Italy for more than twenty-five years. In 2010 he founded the art school, PADASOR (acronym for the Painting And Drawing Art Studio Of Rome) and continues to work as the director and an instructor. Since 2006 he has been a part of the adjunct faculty at The American University of Rome.

For more about him and his work, please visit: www.americanartistinrome.com







Clockwise, from above: the author with the final painting; Raul Portella at La Bottega dell'Artista (Ditta G. Poggi) in Rome, Trastevere stretching the canvas in the spring of 2023; the initial ground layer was completed in the PADASOR painting studio in the fall of 2023; hand-ground lead white; the author with Dott. Marco Cardinali (left) and Dott.ssa Beatrice De Ruggieri (right).



