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“500 Shades of Grey”: Aspects of Conservation Concerning the Technical Examination and Treatment of a Grisaille Painting.

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When contemplating shades of grey in monochrome paintings, there are visual properties which create complications for those attempting to react and treat the problems which habitually accompany them. The terms ‘Grisaille’ or monochromatic paintings are oxymoronic as they are reductive yet complex in context, construction, and conservation. Literary sources are few and far between, resulting in a loss of recorded knowledge in conservation regarding this problem. This article forms part of a larger project which investigates practically and critically in relation to a selection of literary sources to inform conservation knowledge and practice in relation to monochromatic, and more specifically, ‘grisaille’ paintings. By doing so, it aims to contribute to the working body of literature and practice relating to the conservation of monochromatic and colourfield artworks. Disparities between monochrome paintings and polychromatic paintings overtly highlight how the restrictive lack of colour causes impairments and oftentimes frustrations when attempting to apply visual treatment to the painted surface. By focusing on the predominantly aesthetic concerns, which are triggered by light sources, my research encounters how grisaille paintings are largely affected by optical effects (such as illusions or metamerisms), as well as physical differences (i.e. the construction of the paint layers, Rayleigh’s Law, and coatings such as varnishes.).¹

Through my own subjective interaction and treatment of a grisaille painting (Fig. 1., ca. 17th century), I have encountered some of the anecdotal concerns raised by those who frequently work on monochrome paintings.² Largely, these concerns are visual, and include topics relating to a difficulty processing losses and matching shades of grey when retouching the artwork. By being proactive in pursuing information about the labelling of monochromatic artworks and the concerns that conservators have with treatments, this article is an amalgamation of first-hand research conducted into the gap of information on grey and its disquieting effects on conservators. Some of the ideas reflected upon in this article are the product of culminated practical observations found during the application of treatments, as well as some of the conclusions drawn about how we process and assign labels to these types of paintings. By using the case study as a proactive way to compartmentalise and compare largely unexplored issues relating to monochrome paintings, an opportunity to glean new information about



Figure 1. Unknown, *Grisaille Painting, after treatment*, c. 17th century, private collection. Photograph by the author, 2020.

topics, such as defining grey and how this affects the vision of a conservator, has produced some insightful results. However, this is very much an exploratory area of research and is by no means definite in its conclusions. By producing a first-hand understanding of the treatment of grisaille paintings and addressing the broad range of topics, the objective of this article is to help invite further discussions from conservators and non-specialists alike.

The case study painting is privately owned and has an unknown artist, making provenance very difficult to establish. Therefore, the project centred around what can be inferred by the motifs presented in the scene, and scientific understandings taken from testing the materials used in the painting's construction.³ There is anecdotally a common thought that such artworks are being overlooked due to their intricate construction, bypassing the potential for insightful studies on monochromatic artworks outside of a purely art historical discipline. The article provides some discernment into the body of conservation work that aims to critically assist in the development of information regarding how monochromatic artworks are profiled. However, I must disclaim that this article will not feature detailed methods used in conservation practices to be mindful of ethical implications.⁴

Practically speaking, the case study painting mentioned throughout this article assisted in honing a large amount of primary evidence and information about how we treat monochrome paintings. This was done so through enacting a comprehensive

treatment plan. This meant entirely conserving the overall piece in every necessary conceivable facet to ensure it is in a safe and stable state for display. The treatment of the painting provided practical insights into why these paintings can be so arduous to work on, collecting more substantial evidence than the subjective responses often provided by fellow conservators. Although the case study painting is crucial in providing primary observational findings, it will not be the focal point of the article. However, the treatments are important in the resulting outcomes of how shades of grey are perceived anecdotally as being far more difficult to work on than that of their polychromatic counterparts.

Whilst working on the painting and understanding shades of grey, there were restrictions and difficulties regarding the number of samples taken from the case study grisaille painting for methods such as Gas Chromatography-Mass Spectroscopy (GC-MS) and cross sections to prevent unwarranted deterioration.⁵ This is due to the paint layers (from the ground layer to the surface) having a very stable *craquelure* for the age of the painting.⁶ As a result of this, there were some ethical hesitations when removing large quantities of samples from the painting. Consequently, the minimum amount of paint samples was removed to prevent any unnecessary vulnerabilities or damages from occurring. There may be fewer ethical concerns in removing samples if the painting's paint layers were less stable, yet taking the smallest amount possible is always preferable in any instance.

By identifying environmental and technical variables, the project attempted to link up a series of difficulties related to working on greyscale artworks. Through observing, recording and explaining some of the practical treatment issues, the observations made during my treatment of the painting provided a platform for knowledge of technical traits to be somewhat broadened in conservation through testing theoretical and personal knowledge in a practical studio space. The opportunity to correlate conservation issues with grey itself as a colour was central to the work conducted, producing a variety of results.⁷ The current methods for shade and colour-matching were researched, alongside new and upcoming ways in which the greyscale or similar colour matching technologies are being updated. This meant looking at the primary cause of difficulties conservators face when approaching the retouching process: the direct cause of the conservator's annoyance, our own eyes.

OPTICAL ASPECTS

Often monochromatic paintings are avoided by conservators due to the lack of colour or shade differentiation. This is due to visual limitations that effect the aesthetic sympathy of the conservator if something were to go wrong during treatment: a concern that if we cannot see the problem initially, it might not become rectifiable after altering the visible appearance. Before attempting to treat the case study with an awareness of the potential risks to the integrity of the painting, research into optics and how human sensation creates sight was necessary to help enhance my

understanding of how to improve upon my practical work. This led to testing some retouching methods, coatings, textures and paint media to work out which choices would work best at visually reintegrating losses without compromising the appearance of the case study.⁸

HUMAN PERCEPTION

The processing of grey shades or tints is a perceptual quandary and a physical one. Is this just hard to process because there is a lack of receptor for grey in human eyes, or are there other factors which make it too difficult to visually process? Grey is a naturally occurring phenomenon which cannot be statistically explained, even though it can be visually processed.⁹ As an achromatic colour – which is an oxymoronic term perfectly describing the “colour” – it is in reality a saturation or a shade of another colour on the visible light spectrum. It is a form of human sensation whereby the optic nerves stimulates a response from the brain to fill a space where the colour cannot be processed.¹⁰ This response is filtered by the human eye, which contains a limited number of photoreceptors called cones which in turn respond to 3 main colour values: Red/Blue/Green.¹¹ Grey itself is mainly processed by the rod cells, producing what we see as a greyscale, helping us to differentiate shade and light.¹² This means that during the retouching process, if a shade is too light or dark, it becomes instantly visible to the person viewing the painting (Fig. 2) as it is filtered as a shade, rather than as a colour.¹³ It is particularly obvious in the example of Figure 2, which was due to a change in the lighting used to during the first attempt at retouching. The light change relates to the concept of metamerisms, an area in conservation with a requirement for further research.¹⁴ But, is this difficulty with retouching due to human perception or a metameric effect in most cases?

Human perception innately alters from person to person due to its subjective nature. Consequently, the use of other more reliable and objective avenues for testing colour are helpful when trying to process grey. A spectrophotometer, for example, can plot the shade of grey in a colour space, processing the grey as a tint of another colour, or as a neutral value grey (with a reading of 0).¹⁵ However, it can only be used as a comparative source, as it is purely there for evidence of where on the colour spectrum the sample grey can be plotted (i.e. if it is a warmer or cooler tone). Achromatic colours recorded on a spectrophotometer aids shade determination, giving an indication of which colours may be added to produce the correct tint. Yet as this is a digital method, it cannot be used in practical conservation treatments as a visual aid for colour matching.



Figure 2. Detail of lower-right section of case study. Area where retouching failed to blend; later corrected. Photograph by the author, 2020.

DEVELOPMENT OF THE GREY MEASUREMENTS AND COLOUR THEORY

A lack of standardised methods in conservation for determining grey shades still remains an issue for conservators. As there are few options for testing shades of grey practically besides the use of neutral greyscales, digital methods can be adapted and implemented to help with the issue. Other than through the use of neutral greyscales for shade matching. As there is little visual sympathy when retouching a monochromatic painting, spectrophotometry may be implemented to gain an understanding of the changes of the digital $L^*a^*b^*$ colour values of the artwork.¹⁶ Still, this cannot be plotted in a colour space, as it is purely just a comparative source gauging the change in what is optically viewed and the how that alters when the saturation of the painting changes. The *saturation* of a surface alters the colour, deepening the appearance of it.¹⁷ When varnishing a painting, the final retouching would be made incredibly apparent if the saturation is wrong, due to a change in the sheen of the surface.¹⁸ A good display of balanced saturation is the retouching on the case study, showing the final varnish layer and how the retouching is less apparent (Fig. 3). Through using spectrophotometer readings and comparing in paint choices, I was able to mimic the area of loss to make it less obvious when viewing the painting. As a result of this successful treatment, devices like portable spectrophotometers were proven to be advantageous, but a visual diagram could be equally as useful in situ for a conservator who requires more visual information.



Figure 3. Example of image retouching in the case study. Left: before saturating pigments; middle: after first application of a binding medium; right: after final varnish layer application. Photograph by the author, 2020.

Conservators have a shortage of tangible visual aids to help with the retouching process for greyscale paintings. However, if a printed diagram were to be used, the colour of the tangible printed diagram would minutely alter with each set of printing, not being quite as helpful as one may hope due to the inks required when printing (altering the shade and hue of the diagram). If grey were to be visually described, it would originate as a bright hue, darkening the colour until it reaches black, which is not technically a colour, so, like grey, it can be defined as an achromatic colour. In reality, grey is often a tone of every other colour, yet a neutral shade of grey is an achromatic colour as it does not come from another pigmented colour. Bright colour becoming an achromatic colour presents the difficulty of matching greys perfectly: it is a ‘colour’ which comes from every polychrome colour. Achromatic colours can be difficult to visually process, as they are quite literally a shade or tint of another colour, so having something like a spectrophotometer helps to aid conservators in determining how to produce the specific shade. It is similar to an optical illusion, which makes the process of matching the colour almost impossible unless environmental variables were consistent.

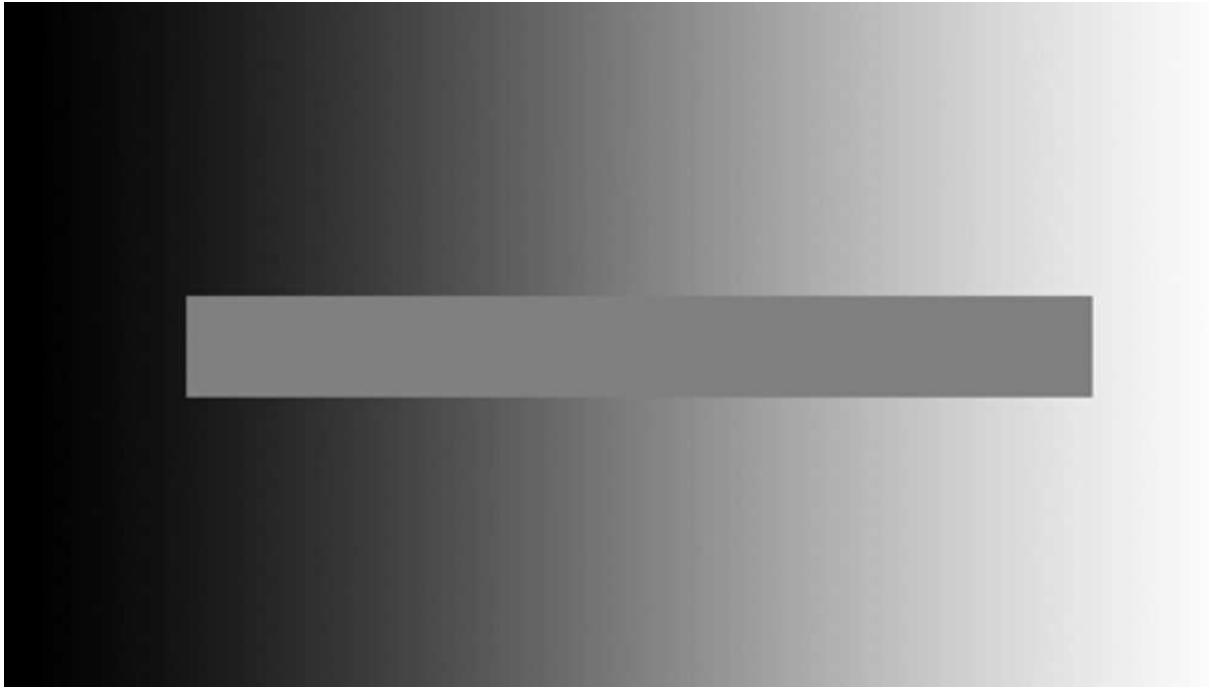


Figure 4. Sample test optical illusion of greyscale and the optical perception of grey as a colour. Image created by the author, styled after the bar illusion example, 2020.



Figure 5. Sample test optical illusion of greyscale affecting human perception. The gradient is removed, showing the bar is a single shade of grey. Image created by the author, 2020.

OPTICAL ILLUSIONS

Optical illusions are both beneficial and problematic for conservators. Issues that visually cause difficulties specific to monochromatic paintings are present in optical illusions. This series of examples perfectly raises some of the faults presenting hurdles during the retouching process amongst other treatments conducted. By applying some of this transferable knowledge during treatment of the case study, there was an improvement in the integration of areas of loss. Here is an example of how optical illusions produce chromatic abstraction, tricking the mind into believing that it sees something which is not actually there. The bar presents a tonal change from one end of the spectrum to the other. However, whilst the grey bar in the image above looks like a gradient of different shades of grey, going from a light grey to a dark grey, it is not actually the case. It is only perceived to *look* that way. The reality is that the grey bar is one solid colour, and the perception of your brain has tricked your eyes through sensation with another colour optical illusion. This is a prime example of the difficulties of looking at monochromatic artworks. It may appear to be the opposite or cohesive in its parts, but when segments are isolated, all that can be seen is what the eye is tricked into perceiving by the mind. Reducing the shade differentiation of the eye means that the conservators are sometimes unable to process certain shades of areas due to this biological issue. Admittedly, there is a firm hope that this would be the case for non-specialists too, encouraging the view that if a conservator cannot see it, nor can those who are viewing it without a trained pair of eyes thus hiding the damage in plain sight.

Another example of chromatic abstraction can be observed in the example of Adelson's illusion (Fig. 6). Adelson's work revolves around lightness and perception, and this can be extrapolated when working on monochrome paintings. To quote Adelson directly: "A grey surface in the sunlight may have much higher luminance than it has in shade, but it still looks grey", showing that lighting affects the shade of grey, but not the appearance of the colour itself.¹⁹ Adelson's illusion emphasises another phenomenon of human perception: lightness constancy.²⁰ This is the theory that neutral colours, such as grey, when in isolation on a blank screen will appear to emit light, yet when these objects are placed against a different surrounding, this effect disappears.²¹ This is why squares A and B appear different, even though they are the same. The perception of a shadow creates a misgiving that Square B is darker; yet the opposite is true. This is helpful information as it is difficult to achieve 'chromatic balances', denoting the human eye's ability to view where tonal contrasts occur, which abruptly visually pull apart the image. To trick the eye, the sensation of colour invariance must be achieved: this is where the grey values do not appear to change over a wide range of luminance. Lighting alterations are a crucial variable in this, as changing the light source helps to establish if colour invariance is achievable.

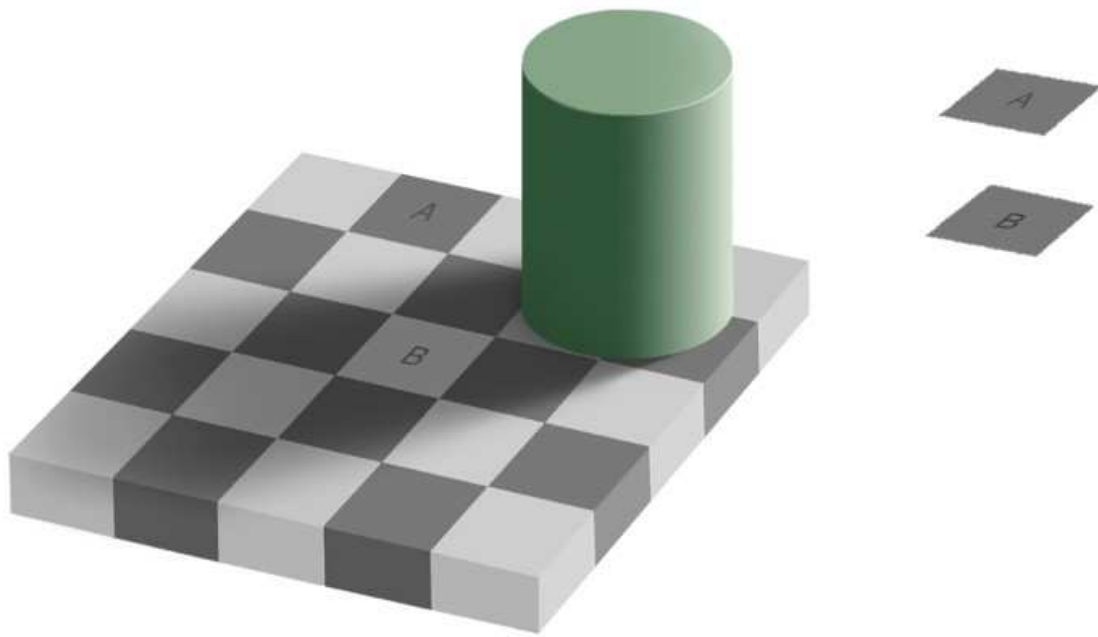


Figure 6. Adelson's Chessboard Illusion, showing perception of chromatic abstraction, alongside the isolated actual appearance of the shade of A & B squares. © Edward H. Adelson, 1995.

Contrarily, chromatic abstraction may not always occur whilst working on monochromatic paintings, especially with early twentieth-century monochrome paintings. These modern artworks are often simplistic and are produced in geometric designs which are similar to the illusions presented. This can be helpful as when the textures of the painting can be matched, lightness constancy may be more effective in hiding inconsistencies in the shade when retouching.²² In contrast, this can also mean that if lighting changes were made apparent, any shade differentiations would be perceptible, even with a level surface. This makes it difficult to fully integrate the loss and blend in the results to trick the eye.

Another sensation which occurs when viewing shades of grey is 'colour constancy', whereby the brain alters the colour viewed, correcting the colour under varying light sources to compute the shade.²³ An example of this is Professor Kitaoka's illusion of grey strawberries (Figs. 7, 8), where the brain corrects the appearance based on a memory of the correct colour of the strawberries when in actuality they are grey.²⁴ The brain comprehends the experience with the objects viewed, altering the colours to produce something of a likeness to what it should cognitively appear as. This can be useful for conservators when choosing a method of retouching. The appearance may alter how the viewer will see the artwork when retouched. Hence, as long as shade and forms appear cohesive in appearance (which works with Brandi's thoughts on retouching), the painting will not be detracted from, even if the colour is slightly wrong.²⁵ However, this is not something which could be extrapolated into with



Figure 7. Professor Akiyoshi Kitaoka, *A Bowl of Strawberries Illusion*, Ritsumeikan University. © Akiyoshi Kitaoka, 2020. <http://www.ritsumei.ac.jp/~akitaoka/index-e.html>



Figure 8. Enhanced detail from Figure 7.

minimalistic or abstract paintings as they present the opposite of a figurative form. Optical illusions, colour theory, and other studies on colour perception and lightness constancy when extrapolated into conservation help provide a rounded interpretation as to why optics are important to conservators. Much like the optical illusions, conservators need to be aware of the impacts light, eyesight, and environmental effects hold over the appearance of a monochromatic artwork. This would assist topical discourses on subjects such as retouching methods and the impact on sight when working on monochromatic paintings. By learning about and comparing the treatments of monochromatic paintings to optical illusions and effects, I was able to predetermine certain results during the treatment process. Practical adaptations were made during the treatment for variables such as lighting, pigments used, and ways in which certain treatments were performed. By doing so, I was able to pre-empt most of the expected pitfalls that are anecdotally referred to by conservators. By implementing these changes, my practical tests on samples visibly improved when consciously accounting for variations in colour perception and the light. Through testing, the final attempt appears to convincingly conceal areas of retouched losses previously visible on the case study.

METAMERISMS AND LIGHT SOURCES

A metamerism is when two colours that are *not* the same appear to be the same under certain lighting conditions.²⁶ This is not the same as chromatic abstraction, which is caused by psychological sensations producing sight, whereas a metamerism is a deception created by environmental alterations which results in a change in perception. This is something which played a large role in how I worked on the case study. By using a constant neutral light source, there was a lower chance of metamerisms and a better ability to reintegrate the image when retouching it. Metameric effects were a concern when treating a monochromatic painting due to the capability of certain media producing unwanted results. There was also a concern that when the painting was placed under different light sources, it visually could change the colour of a retouched area. This problem was encountered during earlier testing, whereby it made the loss very obvious to the viewer due to a lack of colour. This was accounted for by consistent use of a constant light source and working under a daylight, whilst also consistently using the same retouching and filling materials.²⁷ This is more bothersome with contemporary paintings as they stylistically do not contain lots of figurative details and are often minimalistic in style, thus making it harder to mask any alterations made to the original surface. Metamerisms are something which must be accounted for, but changes in light sources would be nearly impossible to fully control as there are extraneous variables which would impact on this. Nonetheless, other variables are more likely to impact directly on the conservator, as sight affects what is visually processed without any awareness that it is occurring.

This means that what the conservator may visually process is not what is really in front of them and therein lies the problem.

WHAT IS GREY?

Cinerous, grey, mouse-colour, neutral, a colloidal silver, achromatic, gris, grauwe, ashen.

These are all terms for grey, a colour without a definable 'colour'. Grey itself is oxymoronic in its appearance; there is no one manner in which to produce grey, it is a shadow of what we process visually as colour. Mixing black and white to produce a neutral grey value is the clearest understanding of it. The term 'grey' was first used in 700 A.D, giving a title to something which is an achromatic phenomenon.²⁸ So, to best understand the construction of the painting and what the observer is visually seeing, it must first be contemplated what grey is. In addition to the terms listed above, medieval treatises on colour generically refer to grey paintings as "painting in black and white", as grey was not itemised as an autonomous colour at that particular point in history.²⁹ Grey is often referred to as 'mouse colour' in older texts, which is another avenue of etymological interest in conservation.³⁰ This particular example of a grey label is often bypassed from a decline in contemporary use.



Figure 9. Shades of Grey, diagram made by the author, 2020.

THE TERM GRISAILLE AND ITS ETYMOLOGICAL ISSUES

When first interacting with grisaille as a term, it is defined as a "Painting technique by which an image is executed entirely in shades of grey and usually severely modelled to create the illusion of sculpture".³¹ This is one of a multiplicity of definitions of the term grisaille, which date back to the thirteenth century.³² Unpredictably, paintings were not included in this definition until the seventeenth century, which is around the date of production of the case study. The case study was difficult to assign a definite label to at the beginning of working on it, which is why other potential labels for grey artworks are of interest. From paintings and medieval stained glass to enamelling and architectural drawings, the word now encapsulates the entirety of monochromatic artworks within its large breadth of meaning. This vague terminology is a concern when trying to achieve accuracy and precision when attempting to allocate any form

A technical diagram outlining the large number of uses of the term *Grisaille*.

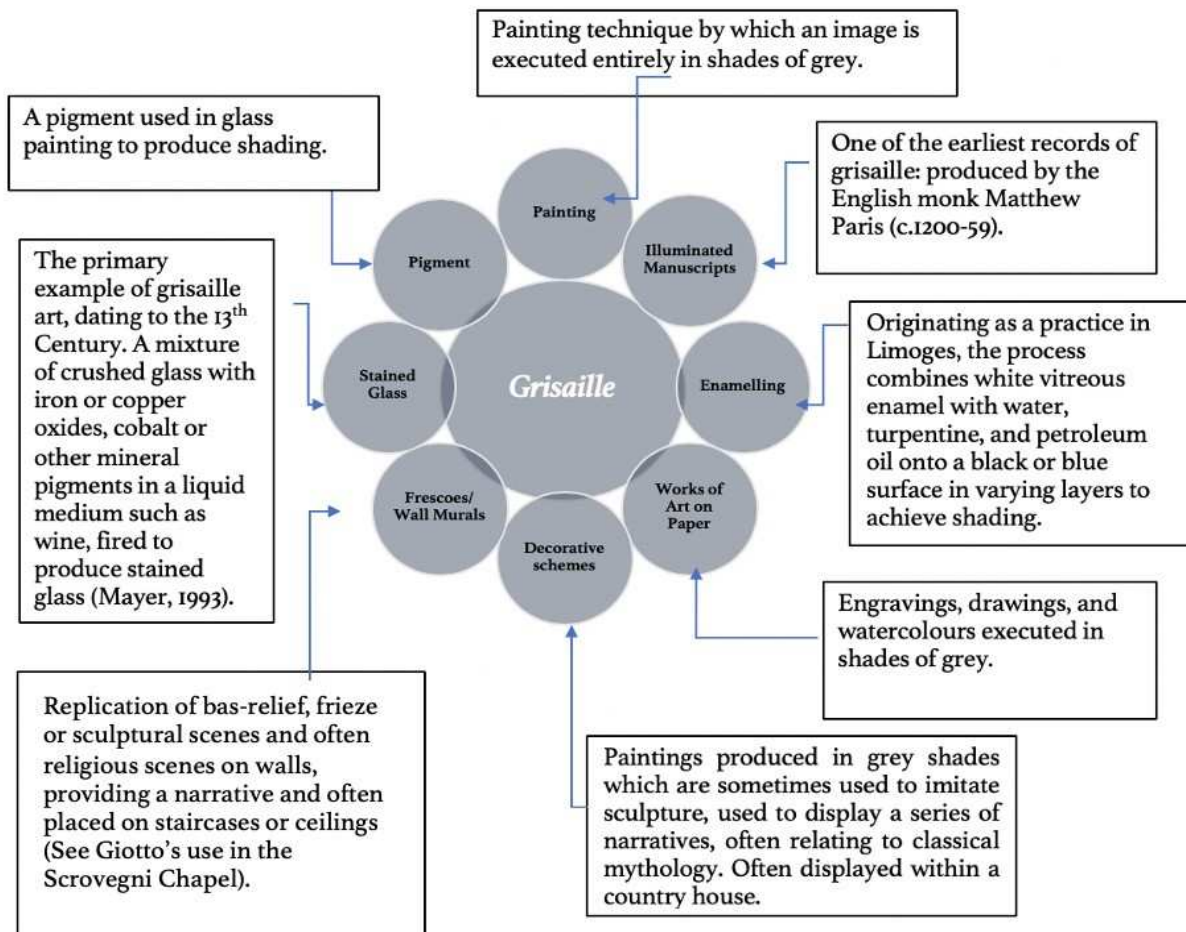


Diagram 1: A visual diagram of the term *Grisaille* and the assorted definitions, diagram made by the author, 2020.

of provenance or context to the painting. There is a variety of reasonings behind producing a *grisaille* painting, dependent on the contexts of the artist, time and place. Whether it was to display prowess in technical skills such as accuracy, showing no need to hide behind colour, or to replicate sculpture in a form which does not require the need to occupy space (a good example of this is the grand staircase in Powis Castle in Powys, Wales), it is a nebulous term which is placed throughout history to envelop and reduce paintings using a palette consisting of grey.³³ Due to the large breadth of materials and histories the term covers, there must be a consideration about the accuracy of labels ascribed to these monochrome artworks. As the artworks are often problematically labelled within database systems, making it harder to determine the appropriate methods for treatment.

Although the generic answer is that it provides a simple principal term, it can also be misleading both materially and historically. The etymology of this term differs over time and branches out into other artistic disciplines besides painting. The term itself did not appear in accordance with paintings until the seventeenth century, when it

emerges circa 1625 in a commissioning letter to Peter Paul Rubens.³⁴ In reference to paintings, it is now used to describe a monochrome painting that is solely comprised of shades of grey, irrespective of style, medium, and age. It may also be used as a dead layer or monotone painting below the surface of a polychromatic layer in order to provide shading and depth.³⁵ Consequently, the term itself may not be applicable to certain forms of monochrome artworks due to their methods of construction.

Grisaille as a technical term is a far later expression than some of the paintings which it is ascribed to. The lack of chronological use makes this term harder to define stylistically, as it encapsulates a large range of art practices as can be viewed in Diagram 1. The term is more closely associated with the decorative arts, works of art on paper, ceramic enamelling, and has been retrospectively adapted to be used to account for an expansive number of paintings. The production of a particular form of monochromatic painting may differ from another as the technical applications of a painting may vary depending on the age of the painting.

This essay is certainly not the first text to outline the concerns with utilising grisaille as a technical term in a conservation setting without consequence. There are varying technical reports which bemoan the use of such an inexplicit and measureless term in an academic capacity.³⁶ Though it may seem like grisaille is a useful term in an overarching manner, the finer details are missing from what a grisaille painting essentially is, other than comprised of shades of grey.

A hyponym like grisaille has become devoid of actual information. It lacks conclusive evidence defining what it means other than something which is produced in exclusively shades of grey. There are other preferable terminologies that can be viewed in Figure 14, which refer explicitly to certain periods, materials, and techniques providing definitions which are an improvement on using ‘grisaille’.³⁷ The lack of published scholarly discourse on the term makes it less appealing when used in a technical or scientific capacity, and there is an underwhelming amount of information on its precise definition. There can be more than five definitions of what grisaille is, as shown in Diagram 1, visually presenting how the term is too simplistic and far-reaching for accurate applications in conservation. The retrospective use of the expression makes the well-established term difficult to isolate with regards to style due to its frivolous usage.

ASSIGNING A TERM TO THE CASE STUDY

Conveying the correct term as a descriptor to the case study was complex, as a previous restoration attempt dubbed the case study as a “monotone”.³⁸ When analysing the construction of the painting, a dark brown resin was found throughout

in addition to paint layers indicating that the construction of the piece deviated slightly from the traditional Flemish and French grisaille techniques.³⁹ The case study does conform to traditional grisaille methods, but the presence of copal instead of a traditional clear coating makes it complex, as this resinous material is brown in colour altering the overall shade of the painting to a warmer tone.⁴⁰ The copal was not removable, and adaptations to colour palette choices were made whilst retouching the painting, such as warm brown and red tones were implemented, in addition to a more neutral grey. By adapting the treatments based on the presence of the copal, it prevented any chromatic abstractions and the resin helped to locate a term which best suited the painting.

The painting does contain the following characteristic traits of a grisaille. It was likely to have been produced in the seventeenth century, stylistically French, and it is constructed with a dark or black ground layer working upwards in varying opacities of a lighter grey shades.⁴¹ These traits can be seen in the cross sections sampled from varying tonal areas of the case study (Figs. 11-13), displaying a dark black pigment as the principle ground layer, working up in lighter and darker shades to achieve depth and tonality.⁴² This preferred French term does share common values regarding the case study as it is comprised of shades of grey, however the presence of copal diverges the painting away from the traditional construction, and makes the term *verdaccio* more appealing with Cennini's explicit citing of yellow pigments to make the grey warmer in appearance.⁴³ Nevertheless, grisaille is a better choice due to the age and style of the painting when considered alongside how it has been produced. Both the art historical and technical applications can be matched to the original use of the term grisaille in France, but this not the case for all monochromatic paintings. Herein lies the need for a discourse about how to define and assign terminology to greyscale paintings, as they are quite literally a 'grey area' within conservation research.

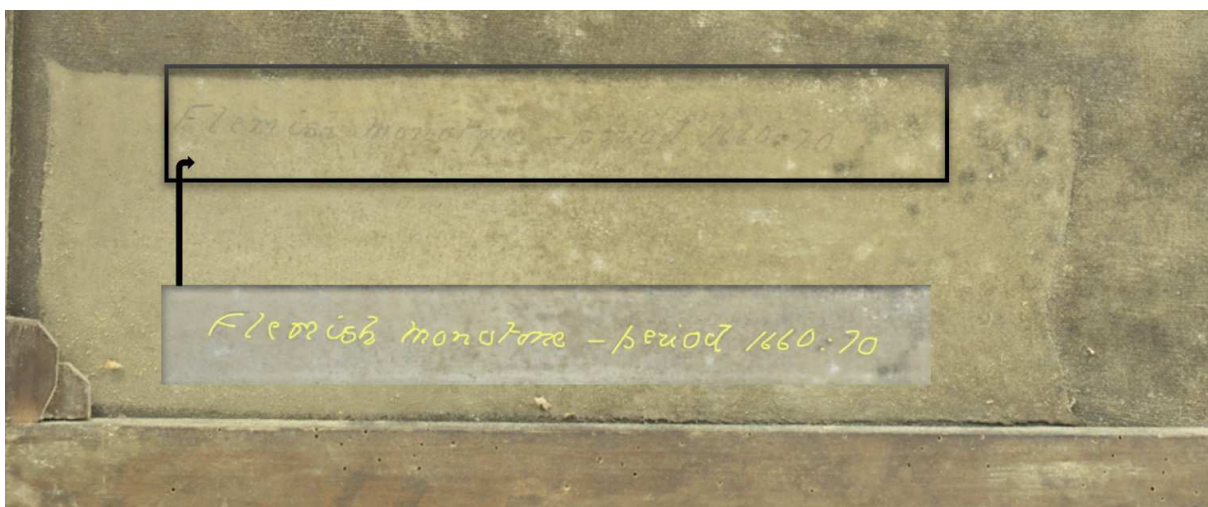


Figure 10. Detail of patch on verso of the case study, 'Flemish Monotone about 1660; 70'. Photograph by the author, 2020.



Figure 11. Cross-section taken from female deity's cheek, photographed under LEICA Microscope, light grey (sample taken after varnish removal and before a contemporary varnish application). Photograph by the author, 2020.

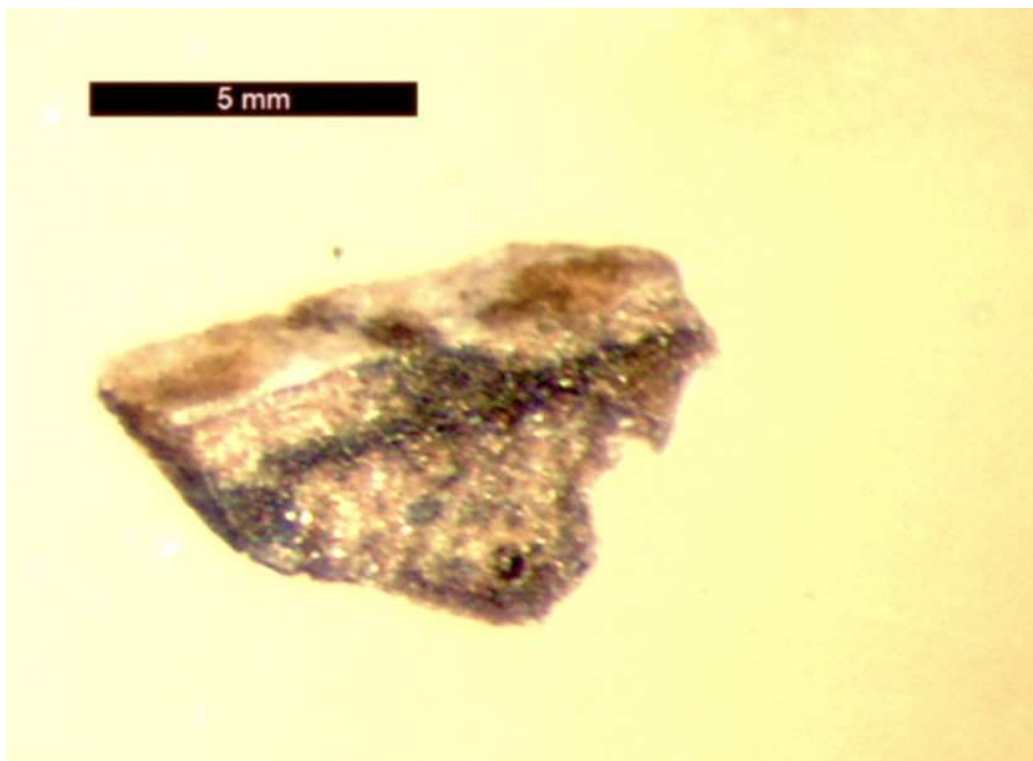


Figure 12. Cross-section taken from the patron's armoured right arm, photographed under LEICA Microscope, mid-tone grey (sample taken after varnish removal and before a contemporary varnish application). Photograph by the author, 2020.



Figure 13. Cross-section from dark area surrounding the lion. Photographed under LEICA Microscope, dark tone grey (sample taken after varnish removal and before a contemporary varnish application). Photograph by the author, 2020.

A TIMELINE OF PLAUSIBLE ALTERNATIVES

Although grisaille is used in a widespread capacity throughout a variety of art-based disciplines, there are other suitable options for labelling artworks which are monochromatic, displayed in Diagram 2.⁴⁴ The following timeline does include the term grisaille, whilst providing plausible alternatives which may be more accurate and appropriate to a given date, style, or technique which may be more accurate in its description of an artwork.

HOW DO WE USE THESE TERMS?

The vast majority of these terms can also be applied to polychromatic paintings as a form of technique below the colourful surface layer. However, there is a potential to use them in another inference: as a helpful form of descriptor of the historical period from which they originate when referring to greyscale paintings. For instance, a fifteenth-century painting could be a 'verdaccio' if it also contains warm tone pigments and if a contemporary painting is constructed in the same way, it could plausibly be defined as a monotone, creating more suitable terms referring to their date of production. Contrarily, it could be posited that the material construction of the painting could dictate how they are labelled. If a contemporary painting contains black, white and yellow pigments it may be more prudent to label it as being a

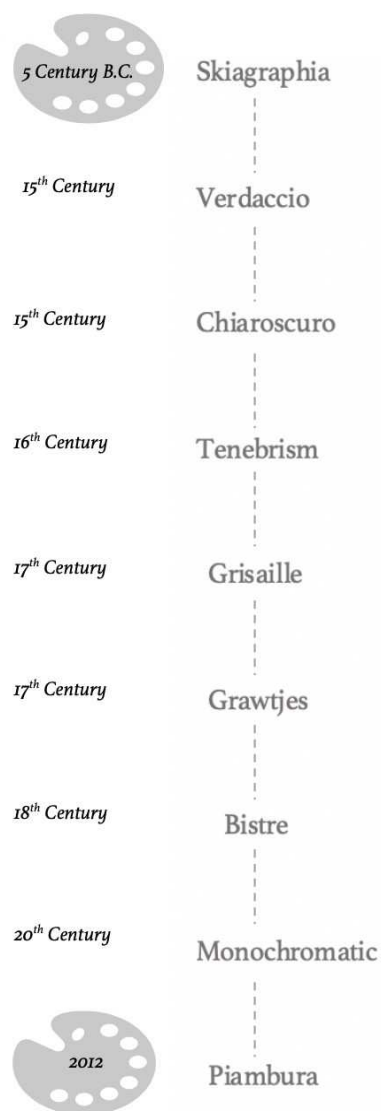


Diagram 2. Chronological display of uses of terms relating to greyscale painting. Diagram made by the author, 2020.

verdaccio due to the material analysis of what it is made from. Although terms can be used in various ways, there is a potential for them to be chronologically inaccurate.

But this should at least provide more comprehensive understandings reminiscent of what a painting may be described as in terms of its materiality, rather than simply labelling it a “grisaille” whilst being ignorant about the lack of specific definitions. This project is an attempt to instigate examinations on the contemporary conservation terminology used by conservators, providing a discourse to potentially increase an interest in using accurate terminology, replacing wordier or more generic labels.

MOVING TO MONOCHROME AND DEFINING THE CASE STUDY

Monochrome is a recent term brought into modern vocabulary in the early part of the last century. It has proven to be the contemporary choice of replacement for grisaille and a useful, accessible, and equally broad-reaching term. By implying that it is comprised of a single colour without suggesting anything too specific, there are more applications for this label. This is both useful and problematic much in the same way grisaille is. It can be accessible without the need to itemise exactly what the painting is aesthetically or materially, but this term still restricts the information you may process from labelling it as monochrome.

When referring to the case study painting, using the timeline of terminology above, grisaille may at first appear to be a suitable choice of term for the case study. It is French stylistically, comprised of shades of grey, and the overall appearance ties into the decorative schemes often referred to as grisaille. However, after conducting thorough practical tests on paint samples using EDX (Energy Dispersive X-radiography) (Fig. 14, for example), the natural resin copal was found, which alters the visual appearance of the painting, making it appear visually warmer in tone.⁴⁵ With this evidence, *verdaccio* may be better suited to the painting instead as it utilises a material which intentionally alters the colour of the painting to appear warmer

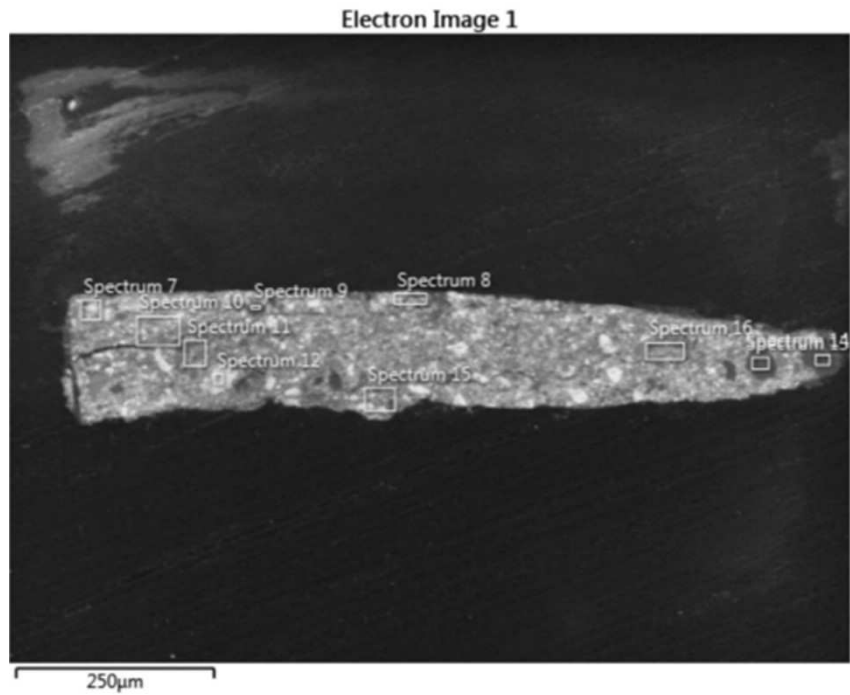


Figure 14. Sample 2 (pile of armour in central foreground) of grisaille painting under EDX. Photography by author with assistance from Jessica Wilson, at Northumbria University in relation to the Conservation Department.



Figure 15. Benedetto Caliari, *An Allegorical Figure of Music (?)*, c. 1565-1575, Victoria and Albert Museum, London. CAI.166.

tonally, so this may alter classification of the case study as a grisaille painting. A good example of Verdaccio is Benedetto Caliari's *Allegorical Figure of Music* (c. 1565) (Fig. 15), which is also labelled as grisaille according to the V&A museum database. This image displays a warmer brown tint to the image that is not traditionally associated with the grisaille technique.

CONCLUSION

Based on the breadth of findings and research into working on monochromatic easel paintings, the treatment of the grisaille paintings requires refinement in how the application of treatments are carried out on monochromatic works like the case study. Although generally paintings are subjective, and each case is treated uniquely, there are further steps which may improve upon how monochrome paintings are handled, removing some of the anecdotal anxieties voiced by conservators fixing them. The case study helped to centralise and determine that there are both visual and environmental causes which can be adapted around, improving upon conservator's treatments.

As the main defining feature of a grisaille painting is the evident lack of colour, and since there are no colours to guide the brain's perception of the context, reliance on other minute details besides the colour as an indicator for objects must be investigated. This is evidently a sentiment considered by certain artists such as Bridget Riley, who wanted to "eliminate the suggestiveness of paint" and "did not want to interfere with the experience of what could be seen", that the paintings were "devoid of such incidentals" (referring to the materials used in her iconic black and white paintings produced in the 1960s).⁴⁶ This contemporary contextualisation of the production of a black and white painting further emphasises the ever-developing role of monochrome: to present the most simplistic and readable artwork, without the enticement and help of colour to produce a restrictive meaning. These attitudes are echoed by myself in my conservation practice after working on the long-term project. The case study samples helped to test whether environmental and visual variables would have any impact on the process of fixing the artwork due to its limited colour palette. The findings of the samples taken directly impacted on the materials and methods used in the process of handling the painting. The areas with serious loss or tearing were found to require a black filler in the ground layer of the painting, matching what was observed in the cross-section analysis. Where possible, the use of stable lighting and lightfast materials should be used to replicate these techniques. By using reversible materials, there is an opportunity to eliminate the concerns about chromatic abstractions. As if anything were to go wrong, the area can be re-worked or reversed and re-attempted to safeguard to original paint surrounding the vulnerable area.



Figure 16. Detail from the case study, lion passant in lower-left area of the painting. Photograph by the author, 2020.

Through conveying terminology regarding the issues relating of colour constancy and lightness constancy, discourses on optics relating to painting conservation would be advantageous and would relate to the debate regarding aesthetics and image reintegration. An instance of this in the case study was the lack of ability to see the lion passant (lion sat reposed), integrated into the dark scenery of the grisaille (Fig. 16). This was due to choices of shading and the issue of lightness constancy, altering visual perception making it difficult to initially separate the animal from the similar shades of the surroundings, creating a minute optical illusion. Would altering the shade of the lion to make it more visibly apparent be ethically unsound? These issues with grey are practically oxymoronic; the lack of colour causes difficulty when attempting to discern details, yet one of the major uses of grisaille paintings is to show prowess with precision and detail without the requisite for colour. Consequently, where is the conservator's ethical place to stop? If the shades blend together visually, creating a loss of definable details, should those details be enhanced so that they can be visible to the viewer?⁴⁷ This loss of detail may be why most examples of grisaille and monotone paintings are sculptural or patterns and are produced on a larger scale. Whereas the case study is smaller, making it appear more compact in its placement of details (thus more complex to visually deconstruct).

The case study painting produced the opportunity to look at why monotone artworks are so ambiguous in their uses and construction throughout history. They are relatively new to the spotlight of academic interests and discourses, with minimal

amounts of research conducted into the processes of production, making it intensely difficult to process definitions and to understand their uses in more than a reductionist series of statements. Yet from working on the case study and by researching monochromatic paintings, it presented the concern that they are often more difficult to categorise due to the lack of colour and discipline uniformity in their production. The terms which are in contemporary use are imprecise and require a reevaluation to provide a useful series of technical definitions which can then be used to assign descriptions to monotone paintings. By helping to establish a clear series of criteria to the terminologies offered in this article, this may help to aid the handling of this vocabulary in a conservation environment. This is done so by helping to further define grisaille rather than using it in its current capacity as a hyponym. The understanding and discipline transference of certain terms concerning perception and optics would be useful for conservators as highlighted by the list provided earlier on in this article. This would help to comprehend why it is that visually, monochromatic artworks are sometimes aesthetically challenging to both the art historian and the conservator. By updating and using terms which are more distinct to each case of monotone painting, there is an opportunity to explore how the profession can create discourses on how to work on these artworks with their visual difficulties, compiling some of the anecdotal information into qualitative data.⁴⁸

With further research into methods of spectral analysis and developments into visual aids for conservators, the time taken to process these greyscale images is likely to decrease. If optics were to be further researched with the specific intent for use in conservation, it would make these arduous monochromatic paintings less taxing to work on. Through developing an understanding of how we can make conservation of these paintings far more accessible is important as they are often circumvented because of a lack of understanding.

¹ Rayleigh's Law, sometimes referred to as the Turbid Medium Effect is whereby a change in the ground (base) colour alters the appearance of the successive paint layers above it due to the change in the refractive wavelengths of light, thus altering the appearance of the shade of colour.

² The article came to fruition through a complete overall treatment of a circa seventeenth-century monochromatic painting, undertaken during the final year of my master's degree.

³ There will be no art historical provenance discussed in this article as the painting is owned by a private client.

⁴ All treatments and experiments conducted on the monochrome case study were done so by myself, a qualified easel painting conservator, in a safe environment with the appropriate materials and safety measures.

The Institute of Conservation, "ICON Code of Conduct" (2014), accessed 23/07/2020,

https://icon.org.uk/system/files/documents/icon_code_of_conduct.pdf; Nigel Copsey, "Code of Ethics and Rules of Practice" (2020), accessed 23/07/2020,

http://www.nigelcopsey.com/reports/training/training_ukic_ethics.pdf; Titika Malkogeorgou, "The ethics of conservation practice: a look from within", *Conservation Journal* 52 (Spring 2006), accessed 23/07/2020,

<http://www.vam.ac.uk/content/journals/conservation-journal/issue-52/the-ethics-of-conservation-practice-a-look-from-within/>; Chris Caple, *Conservation Skills: Judgement, Method, and Decision Making* (Abingdon: Routledge, 2012).

⁵ GC-MS is an analytical method that combines the features of gas-chromatography and mass spectroscopy to identify different substances in a sample test. Within art conservation, it helps to establish types of paint, binding materials and varnishes amongst other things. Cross-sections are small fragments of paint which have been cast into an edge of epoxy resin and sanded down to the sample itself. The sample can then be viewed under a microscope and various light sources such as ultraviolet light. This allows for analysis of the paint layers, helping to identify what the materials may be.

⁶ *Craquelure* is a network of fine cracks in the paint and/or varnish layer of a painting.

⁷ Grey is considered several things, from an 'achromatic colour' to a hue of another colour, as there is no agreed defined answer and is therefore a Gaussian distribution of sorts. A "Gaussian distribution" is also referred to as a normal distribution, whereby the mean, mode and median are all equal values. As grey is a hue of every other colour, yet it appears to be its own "achromatic colour", it is difficult to process precisely what it is.

⁸ In this instance 'paint media' refers to the pigments and binding mediums such as oils used.

⁹ The human eye can only process the wavelength frequency of 380-750 nanometres when processing colour. Grey is a colour which is not within this wavelength- so the colour we process cannot be defined, making it a phenomenon, much like white, black and pink lights. See: Wayne Wright, "Perception, Colour, and Realism", *Erkenntnis* 73, 1 (July 2010): 19-40; Jonathan Hogeback, "Are Black and White Colours" (2020), accessed 20/07/2020, <https://www.britannica.com/story/are-black-and-white-colors>; Mark Gottsegen, *The Painter's Handbook: A Complete Reference* (New York: Watson-Guption Publications, 2006); David. H. Brainard, "Sensation and Perception: Colour Vision Theory", in *The International Encyclopedia of the Social & Behavioural Sciences*, ed. Neil. J. Smelser and Paul. B. Baltes (Amsterdam: Pergamon Press, 2001); David. H. Brainard et al., "Bayesian Model of the Human Colour Constancy", *Journal of Vision* 6 (2006): 1267-1281.

¹⁰ F. Dambrosio, D. Amy, and A. Colombo, "B-mode color sonographics images in obstetrics and gynecology; preliminary report", *Ultrasound Obstet Gynecol* 6, no. 3 (Sep. 1995): 208-215. Although this report was produced for medical purposes and to improve upon clinical diagnosis skills, the paper helped to preliminarily establish that the human eye can only process a limited 8-16 shades of grey. This is transferable to how conservators may have to adapt to process the shades of grey when consulting a painting comprised of grey.

¹¹ J. K. Bowmaker and H. J. Dartnall, "Visual pigments of rods and cones in a human retina", *J. Physiol* 298 (Jan. 1980): 501-511.

¹² Pantone, "How Do We See Colour?", accessed 20/02/2020, <https://www.pantone.com/color-intelligence/articles/technical/how-do-we-see-color>. Rods are mainly used for night vision, which is why we perceive black, whites and grey at night as cones cannot process colour without a certain amount of light. Ralph Evans, *Introduction to Colour* (New York: Wiley, 1948).

¹³ Retouching is the process by which an area of loss is filled with a filling material and then painted over using a paint which is reversible. The method seen in Figure 2 is called the pointillist technique, using minute dots of varying shades to trick the eye into blending the shades together to fill the area effected by loss.

¹⁴ Metamerisms are discussed further on in the article.

¹⁵ A Minolta CM2300d spectrophotometer was used to test the painting, as it is handheld and better suited for tests on the surface of an easel painting. A good example of other uses for a spectrophotometer include use under ultraviolet light. Barbara Stuart, "Ultraviolet-Visible Spectroscopy", in *Analytical Techniques in Materials Conservation*. (Hoboken, New Jersey, USA: John Wiley & Sons, Ltd, 2007), 157-161.

¹⁶ L^*a^*b saturation is defined through using a CIELAB colour space. G. Hoffmann, "CIELAB Color Space" (2019), accessed 24/07/2020, <http://docs-hoffmann.de/cielab03022003.pdf>.

¹⁷ Gaël Obein, Kenneth Knoblauch, and Françoise Viénot, "Difference scaling of gloss: nonlinearity, binocularity, and constancy", *Journal of Vision*. 4, 9 (Sept. 2004): 711-720.

¹⁸ The sheen of a surface ranges from matte to gloss.

¹⁹ E. Adelson, "Perceptual Organisation and the Judgement of Brightness", *Science Magazine* 262 (1993): 2042-2044.

- ²⁰ Alan. L Gilchrist, "Lightness Constancy", in *Sage Encyclopedia of Perception*, ed. E. Bruce Goldstein (London: Sage Publications, Inc., 2010).
- ²¹ Hans Wallach, "Brightness Constancy and the Nature of Achromatic Colors", *Journal of Experimental Psychology* 38, 3 (1948): 310–324.
- ²² Sylvia Pont and Jan Koenderink, "Split Off-Specular Reflection and Surface Scattering from Woven Materials", *Applied Optics* 42, 8 (2003): 1526-1533.
- ²³ Joshua Gert, "Color Constancy, Complexity, and Counterfactual", *Noûs*, 44, 4. (Dec. 2010): 669-690; Christa Neumeyer, "Comparative aspect of color constancy", in *Perceptual constancy: why things look as they do*, ed. Vincent Walsh and Janusz Kulikowski (Cambridge: Cambridge University Press 1998), 323-351.
- ²⁴ Fiona Macpherson and Umut Baysan, "Grey Strawberries", in *The Illusions Index*, ed. Fiona Macpherson (University of Glasgow, August 2017), accessed 01/07/2019, <https://www.illusionsindex.org/i/grey-strawberries>.
- ²⁵ Cesare Brandi, *Teoria del Restauro* (Turin: Einaudi, 1963). The entirety of Brandi's text discusses his preferred methods of retouching.
- ²⁶ "What is Metamerism?" X-rite (Pantone), accessed 20/02/2020, <https://www.xrite.com/service-support/what-is-metamerism>; S. J. Edwards, "Throwing Light on Metamerism: Quantifying the Change in a Colour Match Caused by Change of Illuminant", *Leonardo* 22, 2 (1989): 215-218; Fiona Macpherson, "Cognitive Penetration of Colour Experience: Rethinking the Issue in Light of an Indirect Mechanism", *Philosophy and Phenomenological Research* 84, 1 (2012): 24-62; Sarah Staniforth, "Retouching and Colour Matching: The Restorer and Metamerism", *Studies in Conservation* 30, 3 (August 1985): 101-111.
- ²⁷ This helps to mimic natural light without the adverse effects of UV.
- ²⁸ Aloys Maerz and Morris Paul, *A Dictionary of Color* (New York: McGraw-Hill, 1930), 196.
- ²⁹ See Robert Grosseteste's *De Colore* (c.1220) in *The Writings of Robert Grosseteste Bishop of Lincoln (1235-1253)*, ed. S. Harrison Thomson (1940; Cambridge: Cambridge University Press, 2013), 93-94; M. Teasdale Smith, "The Use of Grisaille as a Lenten Observance", *Marsyas. Studies in the History of Art VIII* (1957-59): 43-54.
- ³⁰ Aloys Maerz and Morris Paul, *A Dictionary of Color* (New York: McGraw-Hill, 1930). Color Sample of Mouse: Page 53 Plate 15, Colour Sample C6. "Mouse" Oxford Dictionary, 1989 ed., accessed 18/06/2020, <https://www.oed.com/oed2/00152513>.
- ³¹ Emily Rodriguez, Virginia Gorlinski, and Michael Ray et al. "Grisaille" (February 2016), Encyclopaedia Britannica (Encyclopaedia Britannica inc.), accessed 20/07/2020, <https://www.britannica.com/art/grisaille>.
- ³² Ralph Mayer, *The Artist's Handbook of Materials and Techniques*, 5th ed. (Middlesex: Penguin Books Ltd., 1991), 46, 644.
- ³³ Lelia Packer and Jennifer Sliwka, *Monochrome: Painting in Black and White* (London: National Gallery Company, 2017).
- ³⁴ Cited in Marjon Van Der Meulen, *Rubens' Copies After the Antique: Catalogue*, Vol. II, (Belgium: Harvey Miller Publishers, 1994), 192. The result of that commission is the "Apotheosis of Germanicus" copy after an Antique Cameo, oil on canvas, 100.7 x 78cm, Ashmolean Museum, Oxford, inv. A1169.
- ³⁵ Gerald Ward, *The Grove Encyclopedia of Materials and Techniques in Art* (Oxford: Oxford University Press, 2008), 262-266.
- ³⁶ David Freedberg, Aviva Burnstock, and Alan Phenix, "Paintings or Prints? Experiens Sillemans and the Origins of the Grisaille Sea-piece: Notes on a Rediscovered Technique", *Print Quarterly* 1, 3 (1984): 148-150.
- ³⁷ These terms include but are not limited to; *monochrome*, *tenebrism*, *bistre* and more recently, *Piambura* styled paintings. These terms are more aligned with historical or technical details which provide more information that grisaille.
- ³⁸ This is referenced in the patch found during technical examinations of the painting (Fig. 10).
- ³⁹ The dark brown resin was found to be copal, a natural diterpenoid resin, through samples tested using GC-MS. R. J. Blackinton, "Some Optical Problems of the Paint, Varnish and Lacquer Industry", *Engineering and Science Monthly* 8, 5 (1945): 3-14.
- ⁴⁰ R. H. Lafontaine, "Seeing Through a Yellow Varnish: Compensating Illumination System", *Studies in Conservation* 31, 3. (Aug. 1986): 97-102.
- ⁴¹ Flemish and French grisaille painting techniques are both analogous in the techniques of construction.
- ⁴² Julia Lundman, "Flemish Oil Painting", *Medium Magazine* (Nov. 2015), accessed 21/07/2020, <https://medium.com/@julialundman/flemish-oil-painting-with-sadie-j-valeri-closed-grisaille->

[db961772dcc3](#); Lelia Packer and Jennifer Sliwka, *Monochrome: Painting in Black and White* (London: National Gallery Company, 2017); Ralph Mayer, *The Artist's Handbook of Materials and Techniques*, 5th ed. (Middlesex: Penguin Books Ltd., 1991), 186-187.

⁴³ Cennino Cennini, "Come si lavorano in vetro, finestre", in *The Book of the Art of Cennino Cennini*, trans. Herringham. (Australia: Allen & Unwin, 1930). Several extracts of the translated copy were referenced in relation to grisaille as a process, label and underlayer. This is an early record which defines both grisaille and verdaccio.

⁴⁴ Diagram 2: Cohen, A. (2010) *Art in the Era of Alexander the Great*. Cambridge: Cambridge University Press, 336. Tenebrism is a world directly taken from the Italian 'tenebroso', meaning darkened or obscured. Caravaggio's body of work could be described as using tenebrism or 'molto tenebroso' (very darkened). G., Vasari. *The Lives of the Artists*, 1550. Trans. J. Conaway Bondanella, and P. Bondanella. (Oxford: Oxford University Press, 2008). Cited in Marjon Van Der Meulen. (1994): 192. Aloys Maerz and Morris Paul. *A Dictionary of Colour*. (New York: McGraw-Hill, 1930): 190. "Adrian Gottlieb Introduces the Piambura," in *Fine Art Connoisseur* 9,2. (April 2012): 15.

⁴⁵ EdX or Energy-dispersive X-ray is used to provide additional information about what a sample is comprised of. More explanation of how this works is detailed in the link below.

"EDX Analysis with a Scanning Electron Microscope (SEM): How does it work?" (2020), accessed 23/07/2020, https://www.thermofisher.com/uk/en/home/global/forms/industrial/edx-analysis-sem.html?CID=2019-MS-Phenom-MatSci&utm_source=Comms-Blog&utm_medium=EM+Blog&utm_campaign=2019-MS-Phenom-MatSci.

⁴⁶ Jo Crook and Tom Learner. *The Impact of Modern Paints*. (London: Tate Gallery Publishing, 2000), 6-10.

⁴⁷ Of course, this should be assessed on a case-by-case basis, and the lion was not retouched in any capacity and left in its original appearance.

⁴⁸ Due to time constraints and networking, this data could not be extrapolated for the project but is certainly something which was considered throughout the process.