

Light of the World: Shifts in the Meaning of Light through the Early Modern Period

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Abstract

The massive population decrease in Europe due to plague in the fourteenth century led to more flexibility in terms of social status, as well as a rise in the interest in learning and availability of education. With this, as well as the rise of humanism and calls for religious reform, people began to rethink explanations of phenomena in the natural world and the centrality of religion to daily life. As scientific theories were explored and proven throughout the seventeenth and eighteenth centuries, the reconciliation of science and art can be tracked in the means by which artists used light as a metaphor, shifting from religion to science. This paper will focus primarily on the shifts in meaning of light in the art of Europe, primarily that of Italy, Spain, and England from the pre-modern period through the eighteenth century, considering the impact of the plague and social shifts in the period.

The massive population decrease in Europe due to plague in the fourteenth century led to more flexibility in terms of social status, as well as a rise in the interest in learning and education. With this, as well as the rise of humanism and calls for religious reform, people began to rethink explanations of phenomena in the natural world. Leonardo da Vinci is an excellent, if well documented, example of the crossover of scientific inquiry and art in the Renaissance, but Hans Holbein's 1533 homage to navigation and religious upheaval in *The Ambassadors* can also be held up as an example of the increasing primacy of learning and science in art. As scientific theories were proven starting in the sixteenth and picking up speed by the eighteenth centuries, the reconciliation of science and art can be tracked in the means by which artists depicted light. Through these depictions can be traced not only a reconnecting of science and art but also a rethinking of the place of science in Western thought.

The impact of the plague on shifts in thought and social mobility, while just one factor in the rise of humanism and the Renaissance, has to be considered when looking at the change in the way artists use the symbolism of light from the Renaissance through the Enlightenment. While it is clear that changes in culture, science, and thought, in addition to other social changes were already underway as feudalism declined in the later Medieval period, those changes pick up speed in the period after 1353, the years following the first major outbreak of the Black Death.¹ After that period, even with the population loss from the disease, trade rapidly recovered, as did the Italian banking industry, albeit with room for new major banking houses, such as that of the Medici in Florence. By the end of the fourteenth century, Italian banks were even more firmly established in the Northern European trading centers such as Antwerp, and Florence, for example, had regained its place as the leading center of production for wool cloth. Beyond trade and banking, scholars, priests, and political leaders had redoubled their efforts to find original manuscripts from the ancient world and Early Medieval period in monasteries throughout the continent, and more books are being translated, written, copied, and shared as knowledge became an important trade good.

In many ways, the beginnings of the Renaissance can, and perhaps should, be traced to the Spanish Reconquista, beginning in 722 and ending in 1492 with the conquest of Granada by Isabella and Ferdinand, wherein the Christian rulers of Castile and Aragon completed the reconquest of al-Andalus.

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It is certainly from the libraries of Toledo and Córdoba that works by Aristotle, Galen, Euclid, Ptolemy of Alexandria, and others returned to Europe, where they had previously only been rumors.² It is also at this point that a whole collection of work by Medieval Islamic scholars, work which often expounded on the scholarship of the ancient world, also came into Europe. Scholars such as Ibn Rushd, better known as Averroes in the West, helped to preserve many of the important texts of the ancient world, often through their commentaries on the work, which, upon entering the consciousness of European scholars, expanded not only knowledge of the ancient world, but critical thinking about rhetoric and dialectics.³ The impact of Averroes can be seen in his inclusion in the left foreground of Raphael's fresco *Philosophy (The School of Athens)* from the Stanza della Segnatura in the Vatican.

Light in Medieval Art

The meaning of light in medieval art was typically religious in nature: the light of God, signifying both divine inspiration and Heaven. Much of this can be attributed to Abbot Suger of St-Denis in the 12th century, who is often credited with the invention of the Gothic style. Suger wanted to create a style based on the "upward-leading" theology of Dionysus the Areopagite, often called the Pseudo-Dionysus, who Suger believed was St-Denis the patron saint of France. "Theologians called this the anagogic (upward-leading) approach. The beauties of a church, then, should be mere aids "from the material to the immaterial," transparencies between us and God the 'Father of the lights' and Christ 'the first radiance' revealing the Father to the world."⁴ This significance continues into the Renaissance, with light typically reflecting the theological concerns of Christianity. The recently rediscovered *Salvator Mundi*, attributed to Leonardo da Vinci,⁵ with the prominent reflection in the glass orb held by Christ is an example of this. The way that the artist was trying to make the orb completely realistic, which fits with da Vinci's interest in optics, also reflects the shift in the manner in which artists were beginning to think about light. He seems to have emphasized, at least early in his career, that he was more engineer than artist, which reflects the impact of Humanism on the thoughts of artists, thinkers, and others in the 15th and 16th centuries.⁶ Like many of his time, da Vinci used explorations of the world around him, human bodies, water currents, how light moves through glass, as a means to understand the natural world in a more scientific manner than previous generations.

The Black Death of 1347-1353 impacted all aspects of European society in the 14th century. It is estimated that one-third of the total population of Europe died in this epidemic, and the disease killed people of all social classes and professions.⁷ Up to 1347, it can be argued that European society had a rigid class structure, even if the hold of feudalism was slipping steadily, but after 1353, there seems to be more social mobility. It is in the period just before the onset of the plague that the Medici move into Florence from the Tuscan countryside, and begin to establish their banking empire.⁸ These shifts affect artists as well, and it is in the period immediately after the plague that artists' names are preserved in large numbers. Before that time, there are few artists' names found in the historical record. By the beginning of the 15th century, Cennino Cennini published *Il Libro dell'arte*, one of the first major treatises on painting. In this book, Cennini even lists Giotto as the one who "changed the art of painting from the Greek to the Latin (manner), and brought it into the modern (style)."⁹ This treatise also goes into detail on the technical aspects of creating paintings and drawings, including paintings on panel and frescoes. Cennini also included in this treatise instructions for how an artist should live, eat, and behave.¹⁰

The subtle shifts in naturalism that began to be seen in art before 1347 have been documented, especially with regards to the work of Giotto di Bondone. In works such as the *Lamentation* in the Arena Chapel in Padua, there is a beginning of an attempt to create effects of light and shadow. Giotto attempts the creation of a mood through the use of a darker shade of ultramarine, creating the sense of night, and situates the scene in a landscape in which there is some spatial recession. Once Giotto attempts to situate his scenes in a particular time of day and location rather than a generic Biblical space, more and more artists attempt to use light to give more than a sense of divinity. Pietro Lorenzetti's *Deposition*, painted in the early fourteenth century for San Francesco in Assisi, also reflects this interest in more naturalistic lighting. The scene clearly takes place in front of a dark blue background, implying a truth to the Biblical story that there was an eclipse at the moment of Jesus's death, and the sky went dark.

It is also at this point that artists attempt to place their scenes in believable, known landscapes. This will ultimately lead to Ambrogio Lorenzetti's secular masterpiece in the Palazzo Pubblico in Siena, painted between 1338 and 1339. Here, Lorenzetti not only recreates the surrounding landscape and city of Siena but also attempts to use light as a means to create the effects of sunlight on the rolling hills outside the city in *The Effects of Good Government in Countryside*. The landscape of *The Effects of Bad Government in the Countryside* is much darker, not only because of war and the smoke of the fires but also because of the use of light as a metaphor for the bad government.

This is a direct contrast to the brightness of the city and country in *Good Government*, where the light here is still serving a symbolic function, but it is less divine than political.

The impact of Humanism

It is in the period after 1353 that the rise of Humanism picks up speed. Scholars, with the motto *Ad fontes*, begin to look back to copies of ancient treatises and reinterpret and redistribute them.¹¹ These sources were from Greek, Roman, and Hebrew scholars from antiquity, some of which had been reintroduced to Western Europe through Al-Andalus, or Islamic Spain. This rise is reflected in the increasing naturalism in art, and the clear influence of Greco-Roman art. Many of the artists of the trecento and quattrocento were as interested in these ancient sources as the scholars and philosophers. It is possible that, when Donatello was in Padua working on *Gattamelata*, his studio was a meeting place for the humanists that were in the city.¹² Certainly, Donatello would not have been the only artist for whom this was the case, especially given Giotto's naturalism and Cennini's own treatise on art.

This interest is reflected in the possibly apocryphal story of Brunelleschi and Donatello poking around the ruins in Rome. Brunelleschi used the Pantheon as inspiration for his dome of the cathedral of Florence, climbing to the roof of the ancient structure to examine how it was made.¹³ It is possibly these forays in Rome that led to Brunelleschi's rediscovery of linear perspective, which gave artists a new method of reflecting depth in paintings. This was expanded upon by Leon Battista Alberti in his treatise *On Painting*, published originally in Latin as a manual for painting.¹⁴ Alberti also created this book as a means to use science to explain the optics of painting and light, even going so far as to bring in the Vitruvian Man, the proportions expound by Vitruvius in the first century. Book 1 of *On Painting* is dedicated to the importance of understanding shadows, light, and the effects of this on the eye as a means to explain the science of painting. For quattrocento painters, this science was as crucial as the design of the work of art. Both went together to create what was considered good art. It is important to recall that the definition of "'art,' or 'ars,' possessed a much broader connotation of practice and experience and was used in the case of the mechanical arts to refer to the work of the human hand; 'science' meant theoretical knowledge that could be ascertained with certainty, usually by deductive means."¹⁵ Part of this idea of the connected nature of art and science was the manner in which science and the natural world were studied in the late medieval and early Renaissance period. Alberti completed his doctoral studies at the University of Bologna, one of the leading universities in Europe. As part of his studies, he would have "applied mathematical analyses to the ever-changing appearances of the material world studied by the natural sciences."¹⁶ This curricula shows the connected conception of art and science in the quattrocento, a conception that had a deep influence on the art and artists of this period, and the Renaissance as a whole. One could argue that the interconnectedness of art and science throughout the Renaissance had a direct impact on the shifting meaning of art beyond that period. Alberti felt that it was essential to study light and shadow to create good compositions.¹⁷ This was part of the understanding of the joined nature of science and art, which were seen as two halves of the same whole at this time.

The use of atmospheric perspective in the paintings of the quattrocento also reflected this new interest in Classical naturalism, with artists attempting to show the manner in which the human eye sees objects at a great distance. The effects by which objects or other elements in a landscape seem hazy when viewed from a distance have to do with the moisture content of the air, in addition to pollutants in the atmosphere, and the passage of the wavelengths of the spectrum of light through the moisture and pollutants. This effect was known since antiquity, but it was in the Renaissance when artists began to codify the effects, as when da Vinci stated in his writings on aerial perspective: "You must diminish the sharpness of those objects in proportion to their increasing distance from the eye of the spectator."¹⁸ This can also be seen as using light, for that is an integral part of atmospheric perspective as part of science. Tommaso di Ser Giovanni di Simone, better known as Masaccio, used this to great effect in his frescoes in the Brancacci Chapel of Santa Maria del Carmine in Florence. *The Tribute Money* shows the mountains in the back of the scene with a hazy gray light around them, reflecting the haze we would naturally see if we were looking at this scene in reality. Masaccio used atmospheric perspective as another means to express the depth and reality in his painting, reflecting the absorption of the ideas of Brunelleschi and Alberti by the other artists of quattrocento Florence. Here the light is natural and scientific, not divine, even if the subject matter of the work is religious in nature.

The use of atmospheric perspective can also be seen in Uccello's three-part *Battle of San Romano*, which also reflects the growing interest in secular, contemporary scenes. *Battle* clearly takes place in the countryside around Florence, much like Ambrogio Lorenzetti's earlier *Good and Bad Government* is located in the countryside of Siena.

Uccello used linear perspective to create the main concept of depth in the piece, but the haziness of the landscape in the far background of the battle scene represents the incorporation of the observations of the realities of human sight to highlight the realism of the scenes being painted. Piero della Francesca's portrait of the Duke and Duchess of Urbino shows that this interest in showing landscape and objects in the distance in a naturalistic manner that reflects optical reality expanded beyond Florence into the rest of Italy. Their three-quarter length portraits were placed in front of a vast countryside, meant to represent the land controlled by the Duke and Duchess, highlighting their wealth and power. Much of the background landscape is painted using atmospheric perspective, not only to reinforce its distance from the powerful rulers being painted but its size as well and della Francesca's knowledge of the latest in painting styles and ways of showing realism and light in art. Humanist artists began to use this interest in showing the natural world as people saw it, and their patrons also wanted to see this in the paintings they commissioned. Andrea Mantegna's paintings for the studiolo of Isabella d'Este reflect this mutual interest in showing science, learning, and Classical mythology and history in the art of the quattrocento. *Parnassus*, one of these paintings, is an image of Mars and Venus on the mountain sacred to Apollo and the Muses, the Greek gods of poetry, music, and the arts, who are seen dancing and playing music in the foreground of the painting. Again, the landscape in the background, meant to be seen by the viewer as existing in the far background of the piece, is painted using atmospheric perspective. This shows Mantegna's knowledge of technique, as well as both his and his patron's interest in humanism and the latest ways in which to incorporate learning and science into art.

Another place the shift in light can be seen is in the reflections painted by Jan van Eyck. His beautifully detailed works include reflections in objects like pearls and gold, or, as in *The Madonna and Child with Canon van der Paele*, the armor of St. George, standing behind the Canon. The ostentatious love of minute details reflects the renewed interest in seeing the natural world in art as it actually would look. *Man in a Red Turban* also reflects this interest, especially in the quality of light and reflection in the eyes of the man, possibly van Eyck himself. The eyes of the figure look wet and reflect the light in the room in which it was painted, a startlingly real depiction which also plays off van Eyck's tendency to paint each hair on a fur collar or coat separately. But he was not the only Northern Renaissance painter to paint with such obsessive detail. The portraits of Hans Memling also reflect the interest in showing people, places, and objects without overlooking the smallest detail. Memling's portrait of Tommaso Portinari includes the subject's five-o'clock shadow, while his diptych *Madonna and Child with Martin van Nieuwenhove* includes both a double mirror reflection, one of which is a convex mirror ala van Eyck in the *Arnolfini Portrait*, where the artist and his assistant are reflected in the convex mirror behind the two main figures, and a detailed study of the effects of light and shadow on velvet. The velvet of the sleeves and bodice of the shirt van Nieuwenhove wears shimmers with reflections of the light, light that comes both from the windows of the room and the figures of the Madonna and Child who have clearly miraculously appeared as he was praying. It is in the convex mirror painted behind the Madonna and child that the viewer can see the windows in the room that would have been in front of the three main figures, and so are the major sources of the natural light in the scene.

The interests of van Eyck dovetail with the growing interest in optics reflected in the notebooks and paintings of da Vinci. In fact, da Vinci felt that shadows and light were essential to creating a good painting, as well as to perspective.¹⁹ He used angles to show the effects of light striking objects. "If the body is larger than the light, the shadow resembles a truncated and inverted pyramid, and its length has also no defined termination. But if the body is smaller than the light, the shadow will resemble a pyramid and come to an end, as seen in eclipses of the moon."²⁰ This emphasis on eclipses shows the links for da Vinci, following with Alberti, between science and art. It also linked to his studies on optics, which defined many of his theories on painting. He used both the optical experiments of Alhazen (Ibn al-Haytham), the eleventh-century Arabic mathematician, and the camera obscura, a device that allows a reversed reflection of the scene outside to pass through an aperture, to explore his theories on optics.²¹ In these studies, da Vinci was trying to understand not only the manner in which the eye sees but also the best way to depict what is seen on the two-dimensional surface of a painting. For him, light was an essential element of painting, drawing, and science, which were all intertwined, and was all necessary for creating compositions that reflected the natural world.

Titian, the sixteenth-century Venetian painter, brought into a number of his pieces the diffused light of Venice as it reflected off the canals. His *Portrait of the Doge Francesco Venier*, with its reflection of the city outside the window behind the Doge and the diffuse reflections on the silk of his robes and the cloth of honor behind him, carry forward Titian's use of the shimmering Venetian light in his paintings. Even his mythological scenes, meant to be seen as taking place outside of Venice, reflect this shimmering, soft light, such as in his *Danaë*.

Venetians often used this soft light in their paintings, such as can be seen in Paolo Veronese's *Last Supper (Feast in the House of Levi)* where the diffuse light of the background of the work focuses the attention of the viewer on the elaborate scene in the foreground, which is filled with figures and architecture.

Light in Catholic Reformation Art

Light in Catholic Reformation art, a period often referred to as the Counter-Reformation, remained focused on it as a divine presence. The Council of Trent, held on and off in Trent, in Northern Italy, between 1545 and 1563, was called by Pope Paul III and continued by Popes Julius III and Pius IV. It set the standards for Catholic art, and restated that art should be didactic, ethically correct, decent, and accurate; parallels between Old and New Testament events were to be emphasized; art should appeal to emotion rather than reason.²² Gian Lorenzo Bernini's stagecraft in the Cornaro Chapel of Santa Maria della Vittoria in Rome with his *Ecstasy of Saint Teresa* uses this divine light with dramatic effect. The window behind the main sculpture highlights the metal arrow in the angel's hand and the gilt rods coming down from behind the proscenium, adding to the dramatic ideal of divine light. The painting of heaven above also highlights the divine light of God, adding to the drama of the scene, and the appeal of art to emotion. Michelangelo Merisi da Caravaggio, better known as Caravaggio, used tenebrism, or dramatic effects of light and dark to highlight the Biblical scenes he was painting, such as in *The Calling of St. Matthew* from the Contarelli Chapel of San Luigi dei Francesi in Rome. Here, the shadowed figures of the tax collectors contrast sharply with the highlighted forms of Jesus, Peter, and St. Matthew, the only figure seated at the table who is fully lit. Caravaggio's extreme light source is not evident in the painting, unless one considers the placement of the painting in the chapel, next to the altar, making the light seem to be coming from the altar itself, but it is clearly meant to be seen as taking place in the dingy back room of a tavern. His use of light, then, is a return to the divine, a means to highlight the holy figures in the work of art.

Spanish Baroque painters also followed the dictates of the Council of Trent. Both Francisco de Zurbarán and Diego Velázquez painted scenes of the crucifixion that employed Caravaggio's tenebrism as a means of highlighting the drama of the central tenet of Christianity. Velázquez even made Christ seem as if he was glowing with divine light while on the cross. Zurbarán's paintings of saints, such as *Saint Serapion*, used tenebrism, similar to that of Caravaggio, as a means to depict divine light in order to focus the viewer's attention on the Counter-Reformation painting of a saint whose legend states he was killed during the Crusades of the medieval period. All of this highlights the fact that the Catholic Church rejected the science of the age promulgated by Copernicus, Kepler, and Galileo, and so many of its artists reverted back to light as a symbol of the divine rather than science and knowledge.²³

Another artist who embodies this continued use of divine light in Counter-Reformation art is Doménikos Theotokópoulos, better known as El Greco. Originally trained as a Greek Orthodox icon painter on the island of Crete, El Greco's art shifted in tone and style after he came to Western Europe, first in Italy in both Rome and Venice and finally in Toledo, where he would spend much of the rest of his career. Light in his paintings is generally understood to be more ethereal, especially considering his connections to the spiritual reform movements in Spain in the late sixteenth and early seventeenth centuries.²⁴ In works such as *The Miracle of Christ Healing the Blind*, one can see the beginnings of the shift to the diffuse light to Venice and the emphasis on the use of believable spatial recession. But, it is with works painted in Toledo that this comes into full focus. *Christ Carrying the Cross* highlights the influence of ideas of reform in Toledo, but also the use of light as emphasizing the divinity of Christ. Because El Greco shunned the use of a background in the work, the glow of Christ helps to ensure focus on the central figure of Christ with the cross, linking with the dictates of the Council of Trent as well, which emphasized the importance of art as a means to solidify the teachings of the Catholic Church. The figures of religious personages in many of his paintings seem almost to be glowing, emphasizing the connection between light and divinity seen in earlier Christian art.

The Protestant Reformation and the meaning of light in art

The true shift in the use and meaning of light in European Renaissance painting can be seen after Martin Luther's alleged nailing of his *95 Theses* to the door of the church in Wittenberg, which set off a complete paradigm shift in the culture of Western Europe.

In touching off the Reformation, he also began the process of moving the Latin Church, and religion in general, from its central position in society. Many Protestant sects were iconoclastic in nature, and so religious art was often removed from its position within the church building, and from homes as well.

For Luther, and for many Lutheran artists, any religious art created by a Christian artist was meant to be seen as a personal confession of faith.²⁵ Therefore, Protestant religious art was less about divine inspiration, and more about personal faith, in keeping with Protestant ideas on the personal nature of that faith. Therefore, light could not signal divinity in the manner in which it had previously.

Throughout the sixteenth century, a number of Northern artists shifted their focus to genre scenes as opposed to religious works as a response to this iconoclasm. Pieter Bruegel the Elder is considered to be a master of this, and light in his paintings is diffuse and more realistic to the light of the Brabant region of what was then Flanders, where he lived and worked. Works like *The Parable of the Blind Leading the Blind* do not use light as a means of critiquing religion but instead use symbolism and proverbs. The light in this painting is naturalistic. Now, it is not the Christian God who is giving inspiration, rather the focus is shifted to the personal relationship with God and the folly of blindly following the Catholic Church. It is in Bruegel's *Netherlandish Proverbs* that one can see the Protestant use of the Catholic emphasis on divine light as a means of lampooning the idea. To the lower right of center is a scene of a person who needs to be read as dressed as Jesus seated on a throne with a glowing crown being worshiped by a person in a monk's cowl. This particular scene can be read as an indictment of the perceived idolatry of Catholicism by more iconoclastic Protestant sects.

Another Northern artist who also embodied Protestant ideals was Hans Holbein the Younger. His portraits use light to highlight the features and personalities of the sitters. The shift to science becomes clear in his paintings as well. *The Ambassadors*, commissioned by Jean de Dinteville, ambassador to England from France, is a double portrait of Dinteville and his friend, Georges de Selve, who was also a diplomat. Although there are a number of interpretations of this painting, including the overt references to the Reformation, such as the lute with the broken string, the hymnal open to a Lutheran hymn, and the crucifix in the upper corner, the upper shelf of the table between the two men contains objects such as a sextant, celestial globe, and quadrant. These almost certainly refer to the increase in global exploration, as they are all tools used in navigation at the time, the beginnings of the Age of Exploration. These tools were part of the increasingly scientific ideals of this exploration, where Europeans came to the Americas, India, Africa, and Asia and collected objects, animals, plants, and people, ostensibly for scientific study. These studies led to the cultural relativism of Montaigne and the burgeoning interest in scientific classification. Holbein used light here as a means to highlight both the still life on the shelves of the table and the men, which, even with the crucifix, anamorphic skull, and the cosmatic diagram on the floor, a reference to the Catholic Church's geocentric interpretation of the universe, is a subtle shift away from the conception of divine light.

Light as Knowledge

Baroque artists in Protestant countries also used tenebrism and light, often to highlight either divinity or science. This can be seen in the art of a number of Dutch artists of this period, including Rembrandt van Rijn. Works like *Christ Preaching*, also known as the *Hundred Guilder Print*, use light to highlight the central, holy figure, an element continued through each state of the print known as *The Three Crosses* as well. But, in works such as *The Anatomy Lesson of Dr. Tulp*, the light is used to emphasize the new knowledge being shared about the inner workings of the human body. Even the famous *Militia Company of District II Under the Command of Franz Banning Cocq*, better known as *The Night Watch*, uses light to highlight the new middle class of the soon-to-be-formed Dutch Republic.

The later Dutch Baroque artists such as Jan Vermeer expanded on the use of light as a symbol of knowledge in works like *The Geographer*. Here, the light comes through the window, serving as the inspiration for the scientist working at the table. The map of the Dutch Republic on the back wall highlights the national pride felt after the signing of the Treaty of Westphalia in 1648. Vermeer had a tendency to use light as an "unexpected, unearned blessing."²⁶ Dutch landscape paintings of this period also reflected the national pride of the new republic. Here, the light is meant to reflect the actual diffuse light of the play of the sun through the clouds over the landscape of the Netherlands. Jacob van Ruisdeal's *Windmill at Wijk bij Duurstede* reflects the use of light as natural, the diffuse sunlight through clouds of the Netherlandish landscape, but also as a means to highlight national pride.

Dutch moralizing art of this later Baroque period uses light to focus the viewer's attention to the conception of morality, which, although attached to religion, is separate from it as well. Judith Leyster's *The Last Drop (The Gay Cavalier)* uses tenebrism to highlight the dangers of drinking and smoking from a Dutch Calvinist point of view. But, this is less focused on light as divine, and more on the light of morality. The skeletal figure holds the candle, which seems to be the main source of the extreme light and shadow of the work, creating a morality tale of the dangers of drinking and smoking in a conservative, Calvinist society.

Many painters of the vanitas still lifes of the period, such as Maria van Oosterwyck, used light in a similar fashion. Vanitas, which refers to the transient nature of life and the inevitability of death, was symbolized in paintings through the use of symbols of death and decay such as flowers in various states of bloom, skulls, and gnawed or spoiled food contrasted with symbols of earthly wealth like jewels and coins, all of which can be seen in van Oosterwyck's example. These were meant to remind the viewer of that which was truly important and would allow them to live a good life, a notion that was very prescient in a Calvinist nation where the doctrine of predestination was stressed.²⁷

Light and Science in the Seventeenth and Eighteenth centuries

The other thread running through the seventeenth century was the rise of science, a process that began in the fourteenth and fifteenth centuries, but which picked up in the 1600s. As the theories of Copernicus, Kepler, Newton, and Halley began to be accepted, and countries began to create scientific societies, such as the Royal Society in England, the manner in which people thought about the world and their place in it also shifted. It is from this perspective, perhaps, that the light of Vermeer's paintings can be best understood. Light was now no longer a mysterious avatar of a deity, but a scientifically explained phenomenon. Using Vermeer's *Geographer* as an example, the light coming in from the window serves to highlight the subject's work. It also serves as his inspiration for the continuation of his scientific studies.

Scientists and artists were also accompanying the various explorers as they traveled further into the Americas, Asia, India, and Africa. Although this is something that happened from the beginnings of European exploration and colonization of these continents, now the objects and drawings sent back were being classified within the constructs of the expanded ideas of biology, botany, and other natural sciences. Maria Sibylla Merian may be the most famous of these, especially her study of the plants and insects of Suriname, *Metamorphosis of the Insects of Surinam*, published in Dutch and Latin in 1703.²⁸ These sorts of highly detailed prints were as much for the armchair scientist as the serious one, with lavish, often hand-colored illustrations. It is also important to understand Merian's book within the context of the Dutch sugar plantations in Suriname.²⁹ Merian famously cataloged the life cycle of caterpillars in Germany, reflecting an interest in the minutiae of the natural world. Science, especially after Linnaeus created his classification system, was all about cataloging the natural world, and artists were happy to assist with detailed illustrations of the flora and fauna of the world. This continued the links between science and art that were established in the Renaissance with artists and thinkers like Alberti and da Vinci.

The Enlightenment and the meaning of light

By the eighteenth century, especially with the advent of the philosophical hotbed known as the Enlightenment, the meanings of light within most Western art had changed. As European societies became more secularized, and religion became secondary to identification with a nation-state, artists became much more focused on light as either science and knowledge or a moralistic tool. This was helped along by the philosophes and their focus on learning, education, and knowledge as a tool for all to use. Denis Diderot, the driving force behind the French *Encyclopédie*, was also one of the leading art critics in Paris, who championed the style better known as Bourgeois Realism over the Rococo. Artists who painted in that style, such as Jean-Baptiste-Siméon Chardin, used light as a formal element, highlighting his often moralistic subjects. Works such as *Still Life with Glass Flask and Fruit* show his mastery of reflections on diverse surfaces such as the silver cup and the glass flask. His more moralizing works such as *Boy Building a House of Cards* use light to focus your attention on the double meaning of the house of cards since it is both a literal house of cards and a metaphor for doing something which will not succeed. Chardin's placement of the boy in front of the window highlights his desire to focus his message on transitory actions. Chardin's contemporary Jean-Baptiste Greuze used light in a similar manner. It can be a means of showing textures and differences in materials, such as in his portrait of Benjamin Franklin, or it might be a metaphor for his moralizing message, as in *The Broken Vessel*. Here the viewer's attention is focused on a young woman in a lavish, yet disheveled dress who holds a broken pitcher to symbolize her lost virginity.

Paintings from the French Revolution also reflect the growing ties of light to politics as well as science. Jacques-Louis David's *Oath of the Tennis Court* reflects the interest in documenting an actual event but using light to frame the viewer's understanding of the meaning and importance of that event. This is even more clear in David's *Death of Marat*, which reframes the assassination of the revolutionary Marat in terms of religion, ironic given the atheistic nature of the First Republic in France, using the drama of the raking light to make Marat a martyr for the Revolution.

David also positions Marat so that he is both alive and dead, making sure the viewer understands both the finality of death, but also the heroic nature in which Marat accepted his own death, something emphasized by the raking light on his face.³⁰

In England, artists such as Joseph Wright, of Derby, were using light to focus the viewer's attention on the expansion of science and industry. In works such as *A Philosopher Lecturing on the Orrery*, light is used to highlight the importance of science in the increased understanding of the solar system. *Experiment on a Bird in an Air Pump* highlights the light of science over the natural light of the moon. This painting could also be seen as linking science with the vanitas tradition of Dutch art, especially since the glass vacuum used in Wright's painting is old-fashioned and out-of-date by 1768, the year in which this was painted.³¹ In both, the focus is on learning and knowledge for all present. In the painting *An Iron Forge*, the light is a reference to industry, and the industrialization of England, the first country to begin the Industrial Revolution. This is a reflection as well of Derby, one of the most industrialized parts of England in the eighteenth century. Wright also could be read as glorifying the worker and the working class, especially in works such as *An Iron Forge*, which represent the height of technology in the late eighteenth century.³²

Many of the philosophes were also Deists, meaning they saw God as a watchmaker, who set the world in motion and then stood back, allowing people to make choices between Heaven and Hell on earth. Some were also atheists, removing the conception of God entirely from their thinking. This secularization, especially in the growing middle class, is reflected in the arts, and can also be seen as an aspect of the rise of the primacy of science. William Hogarth's series based on English morality were entirely geared to this class and was based less in religion than in ideas of class and politics. Wright of Derby can also be discussed in terms of these ideas as well. Many of his paintings focus on science and industry instead of religion, and even his portraits simplify the information given to the viewer. This is especially clear when his paintings of forges and blacksmith shops are studied. Wright included detailed studies of the tools used by these workers as well as their shops, bringing their families into the images as a means of showing an elevation in status due to their work.³³

This shift can also be seen in the pre-Revolutionary art of the American colonies, especially the portraits of the New England elite by John Singleton Copley. His portrait of Paul Revere focuses as much on the dramatic reflections of light on the silver coffee and teapots he produced as on the man himself, shown deep in thought in the portrait. Copley's painting of *Watson and the Shark*, painted at the height of the American Revolution, also reflects Copley's interest in light, as well as his attempt to create a painting of a realistic shark.³⁴ Benjamin West's *Death of General Wolfe* combines the use of light as a symbol, in this case for the heroic sacrifice of Wolfe for the good of the British Empire in the Seven Years' War, and an interest in naturalism, perhaps taken to abstraction in his placement of the figures in a manner that reflects images of the Deposition and the insistence of putting Native Americans or figures in Native American-style clothing in the foreground. Even West's insistence on using period clothing rather than the traditional togas, reflects his interest in locating the event in a particular period of history.³⁵

Conclusion

The Renaissance, and the rediscovery of ancient texts, as well as the influence of ones from Islamic scholars from the Middle Ages, contributed to the changes in the meanings of light. This period can also be seen as the onset of the decline of the centrality of religion in people's lives, as well as the beginnings of the importance of science as a major contributor to the understanding of the natural world and the place of people within that world. As the explanations for the phenomena of the world became more rational and less religious, so too did the symbolic use of light shift to highlight that rationality as opposed to religious devotion. Along with that shift came the move towards new political systems, ideas of civil rights, and rationality within political systems, which meant that symbolic uses of light in art could also be co-opted for political means.

Light, in the Western art of the late Medieval and Renaissance periods, was linked closely with divinity, specifically the Christian God. The onset of the plague in 1347 began a period of rapid shifts in society and culture, marked by increasing social mobility and an increasing willingness to question accepted political and religious institutions.

As the Church lost power to the nation-state, science and knowledge became the focus of both thought and art, leading to a shift in the conception of light in art as a symbol of inspiration, thought, and knowledge. This change then also made it easy for light to be associated with political changes, especially in the eighteenth century, given the political and social revolutions of that period.

Endnotes

1. See Johannes Fried's overview of the Medieval world for an excellent summary of the shifts in Europe over the course of the Middle Ages, including the rate of change in culture and society in the Late Middle Ages.
2. Borrowman, pg. 342
3. *Ibid.*, pg. 355.
4. Daniel J. Boorstin, "An Architecture of Light," Excerpted from *The Creators*. New York, 1992, pp. 246 – 254: p. 1.
5. This attribution is very much in dispute, and is tied up in current political events and issues as well. But, if we take it as a Renaissance painting, possibly by da Vinci, than the idea of the ties of light, science, and religion being discussed in this paper still hold up. See Zev Shalev's excellent summary of the attribution issues on [narativ.org](https://narativ.org/2019/01/02/salvator-mundi-art-of-the-deal-the-lost-davinci/?fbclid=IwAR0mpQUSk8pz7qA_rXF-DWY3eLXnL2d5CGCdMDirPIxXF9tBuyIIufS_eKM) for more:
https://narativ.org/2019/01/02/salvator-mundi-art-of-the-deal-the-lost-davinci/?fbclid=IwAR0mpQUSk8pz7qA_rXF-DWY3eLXnL2d5CGCdMDirPIxXF9tBuyIIufS_eKM.
6. Isaacson, p. 96
7. Benedictow, p. 380. There is some discussion about the validity of numbers given the inconsistent data and the differing impacts of the disease throughout the continent.
8. Strathern, p. 14
9. pg. 5. It is clear that Cennini wanted to be seen as an innovator in the same vein as Giotto from reading *Il Libro*.
10. pg. 23
11. Massing, pg. 34
12. Bergstein and Donatello, pg. 835
13. Strathern, pg. 101
14. pp. 54-58
15. Smith, pp. 84-85.
16. Greenstein, p. 681
17. pg. 83
18. As quoted in Isaacson, pg. 275
19. Isaacson, pg. 266
20. da Vinci as quoted in Isaacson, pg. 267
21. Isaacson, pgs. 270-271
22. Partridge, pg. 165
23. Eire, pg. 683
24. Davies, David. "El Greco and the Spiritual Reform Movements in Spain." *Studies in the History of Art* 13 (1984): 57–75. <http://www.jstor.org/stable/42617963>., p. 60-63.
25. Miller, p. 22
26. Brown, p. 1119
27. Predestination refers to the Protestant idea that some people are chosen to be saved by the Christian God at birth, and so salvation is not through good works and a good life, but through election. The saved do not know who they are, so all should still practice good works and live a good life. Calvin was especially firm in his belief in this theory. See Eire, pp. 295-296.
28. Schrader, Turner, and Yocco, pg. 161.
- 29.. blumenthal, pg. 45
30. Didier Maleuvre's "David Painting Death" for an interesting discussion of David's many paintings of heroic deaths that can be read as being in service to the revolution.
31. A compelling argument for this is given in Laura Baudot's "An Air of History: Joseph Wright's and Robert Boyle's Air Pump Narratives."
32. This is argued for in David H. Solkin's article "Joseph Wright of Derby and the Sublime Art of Labor," which makes a compelling case for Wright's glorification of the new, industrial working class.
33. Solkin, p. 170 and 180-181
34. Copley was also a Loyalist, so this was painted for Watson, who was a spy for the British. For a detailed and interesting reading of this work, see Albert Boime's "Blacks in Shark Infested Waters" in Pinder's *Race-ing Art History*.
35. West's painting was allegedly almost rejected by King George III because of the lack of togas, but he did go on to become the second president of the Royal Academy in London after Sir Joshua Reynolds. See Montagna's "Benjamin

West's *Death of General Wolfe*," p. 73. See also Vivien Green Fryd's "Rereading the Indian in Benjamin West's *Death of General Wolfe*," p. 73.

Works Cited

- Alberti, Leon Battista. *On Painting*. Translated by Cecil Grayson. Introduction by Martin Kemp, Reprint, London, 2004.
- Baudot, Laura. "An Air of History: Joseph Wright's and Robert Boyle's Air Pump Narratives." *Eighteenth-Century Studies*. Vol. 46, No. 1 (Fall 2012), pp. 1-28.
- Benedictow, Ole J. *The Black Death 1346-1353: The Complete History*. Woodbridge, Suffolk, 2006.
- Bergstein, Mary and Donatello. "Donatello's 'Gattamelata' and Its Humanist Audience." *Renaissance Quarterly*, Vol. 55, No. 3 (Autumn, 2002), pp. 833-868.
- Boorstin, David J. "An Architecture of Light." Excerpted from *The Creators*. New York: 1992, pp. 246 – 254.
- blumenthal, hannah. "A Taste for Exotica: Maria Sibylla Merian's *Metamorphosis insectorum Surinamenisum*." *Gastronomica*, Vol 6, No 4 (Fall 2006), pp. 44-52.
- Boime, Albert. "Blacks in Shark Infested Waters: Visual Encodings of Racism in Copley and Homer." Kymberly N. Pinder, editor. *Race-ing Art History: Critical Readings in Race and Art History*. New York, 2002, pp. 169-189.
- Borrowman, Shane. "The Islamization of Rhetoric: Ibn Rushd and the Reintroduction of Aristotle into Medieval Europe." *Rhetoric Review*, Vol. 27, No. 4 (2008), pp. 341-360.
- Brown, Christopher Boyd. "Art and the Artist in the Lutheran Reformation: Johannes Mathesius and Joachimsthal." *Church History* 86:4 (December 2017), 1081-1120.
- Cennini, Cennino. *The Book of Art*. Translated by Christiana J. Herringham, London, 1930.
- Davies, David. "El Greco and the Spiritual Reform Movements in Spain." *Studies in the History of Art* 13 (1984): 57–75. <http://www.jstor.org/stable/42617963>.
- Eire, Carlos M. N. *Reformations: The Early Modern World, 1450-1650*. New Haven, 2016.
- Fried, Johannes. *The Middle Ages*. Translated by Peter Lewis. Cambridge, Massachusetts, 2015.
- Fryd, Vivien Green. "Rereading the Indian in Benjamin West's *Death of General Wolfe*." *American Art*. Vol 9, No. 1 (Spring 1995), pp. 72-85. *JSTOR*,
- Greenstein, Jack M. "On Alberti's 'Sign': Vision and Composition in Quattrocento Painting." *The Art Bulletin*, Vol. 79, No. 4 (Dec., 1997), pp. 669-698. *JSTOR*,
- Isaacson, Walter. *Leonardo da Vinci*. New York, 2017.
- Maleuvre, Didier. "David Painting Death." *Diacritics*. Vol 30, No 3, Post-Mortem: The State of Death as a Modern Construct (Autumn, 2000), pp. 13-22, 24-27. *JSTOR*,
- Massing, Michael. *Fatal Discord: Erasmus, Luther, and the Fight for the Western Mind*. New York, 2018.
- Miller, Jerome A. "Vermeer's Window: An Artist's Meditation on Living in the Present." *America*. 10/19/15, Vol 213, Issue 11, pp. 20-22.
- Montagna, Dennis. "Benjamin West's *The Death of General Wolfe: A Nationalist Narrative*." *The American Art Journal*. Vol. 13, No. 2 (Spring 1981), pp. 72-88.
- Partridge, Loren. *Art of Renaissance Venice, 1400-1600*. Oakland, California, 2015.
- Schrader, Stephanie, Nancy Turner, and Nancy Yocco. "Naturalism Under the Microscope: A Technical Study of Maria Sibylla Merian's 'Metamorphosis of the Insects of Surinam.'" *Getty Research Journal*, No. 4 (2012), pp. 161-172.
- Smith, Pamela H. "Art, Science, and Visual Culture in Early Modern Europe." *Isis*, Vol. 97, No. 1 (March 2006), pp. 83-100.
- Solkin, David H. "Joseph Wright of Derby and the Sublime Art of Labor." *Representations*. Vol.83, No. 1 (Summer 2003), pp. 167-191.
- Strathern, Paul. *The Medici: Power, Money, and Ambition in the Italian Renaissance*. New York, 2016.