

Poussin and Optics: Reflections on the Lake in “a Calm”

Janis Bell
Kenyon College, USA

Abstract Poussin’s biographers emphasised the importance of his study of optics and, particularly, of his study of Zaccolini’s treatises. Through a close examination of the reflections on the surface of the lake in *Landscape with a Calm*, we will show how Poussin’s mastery of catoptrics (the science of mirrors) guides the viewers’ experience and provides a key to the function of the lake as the central focus of the picture.

Keywords Poussin. Zaccolini. Light and shadow. Optics. Landscape. Seicento painting.

Summary 1 Introduction. – 2 Zaccolini’s Optics and Poussin’s Modernity. – 3 The Lake as Mirror. – 4 The Sky. – 5 Conclusion.

1 Introduction

The early modern study of light and color was a branch of natural philosophy known as *optika* (from the Greek) or *perspectiva* (from the Latin). This field of knowledge was particularly important to early modern artists, for whom the study of *perspectiva* led to the invention of linear perspective by Filippo Brunelleschi, its articulation by Leon Battista Alberti, and to Leonardo da Vinci’s innovations in the painting of light and color. Leonardo’s passion to perfectly imitate nature led him to question aspects of natural philosophy applicable to painting and assess them through experience. Nicolas Poussin represents an equally significant exemplar of how the systematic study of optics made possible innovations in representation. Yet

Poussin has mostly been studied as an exemplar of a literary and antiquarian approach which, from the vantage point of our modern separation of the sciences from the humanities and fine arts, seems particularly challenging to resolve.

Poussin’s study of optics was documented by André Félibien who, during his tenure in Rome from 1647-1649, became personally acquainted with the artist. Félibien characterized Poussin as striving for mastery in his art, going beyond what he could see with his eyes and could learn from the study of the great masters, by delving into science. He wrote:

l’Optique, qui dans la Peinture est comme un instrument nécessaire & favorable pour redresser

The Author would like to thank Anthony Colantuono, Judith Fields, Helen Glanville, and Pauline Maguire for reading and commenting on early drafts.



Peer review

Submitted	2020-07-03
Accepted	2020-09-24
Published	2020-12-11

Open access

© 2020 | Creative Commons Attribution 4.0 International Public License



Citation Bell, J. (2020). “Poussin and Optics: Reflections on the Lake in ‘A Calm’”. *Venezia Arti*, n.s., 29, 49-64.

DOI 10.30687/VA/2385-2720/2020/01/003

les sens, & empecher que par foiblesse ou autrement ils ne se trompent, & ne prennent quelquefois de fausses apparences pour des veritez solides.

Optics, that in painting is like an instrument which is necessary and useful to correct the senses and make sure that they are not deceived by weakness or otherwise, and do not sometimes mistake false apparitions for true solids.¹

A similar point was made by Giovanni Passeri, contrasting Poussin to Italian painters who avoided disciplined study and made "nella prospettiva errori da Elefanti" ('elephantine errors in perspective').²

Optics was a study that occupied Poussin over the course of many years, and he undoubtedly read widely as he did in other endeavors. Among his principle sources was the treatise on perspective and optics by Matteo Zaccolini (1574-1630).³ Poussin also studied the writings of Leonardo da Vinci that were known through the abridged version of the *Trattato della pittura*⁴ and the excerpts from Leonardo's autograph manuscripts that Galeazzo Arconati prepared for Cardinal Francesco Barberini, including one on light and shadow.⁵ Félibien added that he studied Albrecht Dürer, Leon Battista Alberti, and the great medieval treatises on optics by Alhacen (Latin for Ibn al-Haytham, and often spelled Alhazen) and Erazmus Ciolek Witelo.⁶ This list of authorities from the past reminds us that the threads linking modern painting with scientific interests do not necessarily pair modernity in one field with modernity in the other. Indeed, although optics made significant advances in the seventeenth century, starting with Johannes Kepler's *Ad Vitellionem paralipomena*, of 1604, and ending with Isaac Newton's *Opticks*, of

1704, the optical knowledge that inspired Poussin was not at the forefront of this transformation.

This is particularly the case with Zaccolini's four volumes on optics and perspective. Zaccolini summarized what medieval optics and Aristotelian philosophy had to offer the visual artist with a few bits of modernity culled from Kepler's important contributions to the science of vision.⁷ His complex intermixing of old and new fits the revisionist view of seventeenth-century science history where, as Pamela Smith and others have argued, the path to modernity involved the blending of authoritative knowledge with artisanal practices, alchemy, and applied mathematics.⁸ Zaccolini's treatises were never printed, limiting their influence, but they did contribute to the history of art by making extraordinarily clear how the axioms and propositions of scientific optics applied to the pictorial arts.

Poussin's study of Zaccolini was singled out by all three of his biographers – Giovan Pietro Bellori, Giovanni Passeri, and André Félibien – each of whom knew him personally, thereby testifying to the importance Poussin himself gave to optics when he relayed his thoughts on painting to them. Jean Dughet, Poussin's brother-in-law and lifelong assistant related in a letter published by Félibien that Poussin had him copy parts of the Zaccolini manuscripts before they traveled to Paris in 1640.⁹ Poussin apparently kept his copy of the Zaccolini manuscripts for the duration of his life, since Dughet offered to loan it to Roland Fréart de Chambray in 1666, and in 1678, asked the Abbé Nicaise to find a buyer for things he had inherited from Poussin, including a manuscript perspective treatise.¹⁰

After Giovanni Previtali drew attention to the frequent and extraordinary attention Bellori paid

¹ Félibien 1685, VIII, 253. The publication of the *Entretiens* in 10 parts in 5 volumes was spread out between 1666 and 1688. The volume containing the *Life of Poussin* dates from 1685. In 1685-1688, Félibien revised the text into a second edition in two volumes, which was reissued multiple times. The widely available Trévoux edition of 1725 is the text of the second edition accompanied by additional texts. See René Demoris' study of the publication history in the 1987 re-edition of the first *Entretien* (Demoris 1987).

² Passeri 1772, 351-2.

³ This four-volume treatise in the Biblioteca Medicea Laurenziana is catalogued as Ashburnham 1212, volumes 1-4, the titles of which are [1] *De' colori*, [2] *Prospettiva del colore*, [3] *Prospettiva lineale*, [4] *Della descrizione dell' ombra prodotte da corpi opachi rettilinei*.

⁴ Farago, Bell, Vecce 2018, provides a comprehensive history, a critical edition of the 1651 publication to which Poussin contributed illustrations for the chapters on human movement, and an English translation.

⁵ Robison 2009, 268-9.

⁶ On the study of Dürer in Rome, see Roccasecca 2011; for an overview of sources in Italy, Fara 2014. Alberti was available in the Italian edition by Cosimo Bartoli (*L'architettura*, Florence, 1550; *Opuscoli morali*, Florence, 1568). Alhazen and Witelo were published in Risner 1572.

⁷ This claim will be justified in my forthcoming critical edition and translation of Zaccolini's *Prospettiva del colore*, in preparation.

⁸ Smith 2009 provides extensive bibliography of an issue that has transformed the history of science in the last two decades.

⁹ Reprinted in Jouanny 1911, 483-6.

¹⁰ Wildenstein 1962.

to Poussin's light and shadow in the *Vite de' pittori, scultori, ed architetti moderni*,¹¹ Elizabeth Cropper examined the rediscovered Zaccolini treatises. Focusing upon the volume on shadow projection, *Della descrizione dell'ombra prodotta da corpi opachi rettilinei* (Florence, Biblioteca Medicea Laurenziana, Ashburnham 1212⁴), she reinterpreted Poussin's drawing of *An Artist's Studio* in the Uffizi and took on the challenge of elucidating Félibien's claim that Poussin showed what he learned from Zaccolini in his works with a splendid analysis of the *Sacrament of the Eucharist* painted for Cassiano dal Pozzo.¹² She inferred that Poussin's logical ordering of light and shadow in *Rebecca and Eliezer at the Well* (Paris, Louvre, 1648), a painting singled out by Félibien as a work indebted to Leonardo da Vinci's ideas, was a product of this same interest, since Dal Pozzo and Giovanni Baglione wrote of Zaccolini's fascination with Leonardo.¹³ Since then, numerous studies have addressed Poussin's self-portraits and the headpiece to Bellori's *Life of Poussin* which were labeled "LVMEN ET OMBRA" [fig. 1], "DE LUM. ET. OMB." and "DE LVMINE ET COLORE".¹⁴

Leonardo's writings on painting circulated in manuscript for some eight decades before their publication in Paris (1651) as the *Trattato della pittura di Lionardo da Vinci*.¹⁵ Although greatly abridged from the volume Francesco Melzi compiled from his master's notebooks, the abridged text of concise precepts inspired Poussin in its aphoristic format,¹⁶ its analysis of human movement,¹⁷ its ekphrastic descriptions of storms

and night scenes,¹⁸ and its sensitivity to effects of light and color.¹⁹ The French translation of the *Traité de la peinture* was dedicated to Poussin, but the calumny of Abraham Bosse to discredit that publication, citing Poussin's disapproval of it, was effective enough to discourage scholars from exploring its role in Poussin's maturation as an artist until recently.²⁰ Robison showed how Poussin's *The Israelites Gathering Manna in the Desert* (1637-1639, Paris, Louvre) gave ideal expression to many precepts expressed by Leonardo before the printed edition emerged.²¹ Robison further explored how Poussin's study of a "libro" on light and shadow culled from Leonardo's autograph manuscripts in Milan, and loaned to him before he left for Paris in late 1640, inspired his depiction of light and shadow in the pendant paintings for Girolamo Roscioli, *St. Matthew and the Angel* (Berlin, Gemäldegalerie) and *St. John on Patmos* (Chicago, Art Institute), both works in which landscape plays a prominent role.²²

All these studies on Poussin's optics showed how the knowledge he gained from studying optics contributed to his mastery of naturalistic effects and enhanced the rhetorical persuasiveness of his conceits. Keith Christiansen presumed that further study of the Zaccolini treatises would do more of the same, adding little to our knowledge of Poussin.²³ I will demonstrate, however, that Poussin's study of optics expanded his tools of visual expression, and made possible the realization of several innovations - innovations that would not otherwise have been possible.

11 Previtali 1976, XIV-XVI.

12 Cropper 1980, 570-1; 575.

13 Cropper 1980, 581.

14 Cropper, Dempsey 1996, 177-92; Pace, Bell 2002, 219-22; Coquery 2013, 354-60; Guerdat 2017.

15 Farago, Bell, Vecce 2018, 1-30.

16 Colantuono 2000, 286-7.

17 Bialostocki 1960; Barone 2009.

18 Bialostocki 1954; Bättschmann 1990, 97-9, 103.

19 Robison 2009.

20 For the large bibliography on this subject, see Farago, Bell, Vecce 2018, 350, and 544, fn. 206.

21 Robison 2008.

22 Robison 2009.

23 Christiansen 2008, 16: "Janis Bell has called our attention to the importance to Poussin of the writings on optics and color by the Theatine painter-theorist Matteo Zaccolini (1574-1630) for these extraordinary atmospheric effects, but this knowledge only adds to our understanding of Poussin's intention to recreate a truthful visual experience, one based on an understanding of the processes of nature and not mere appearance".

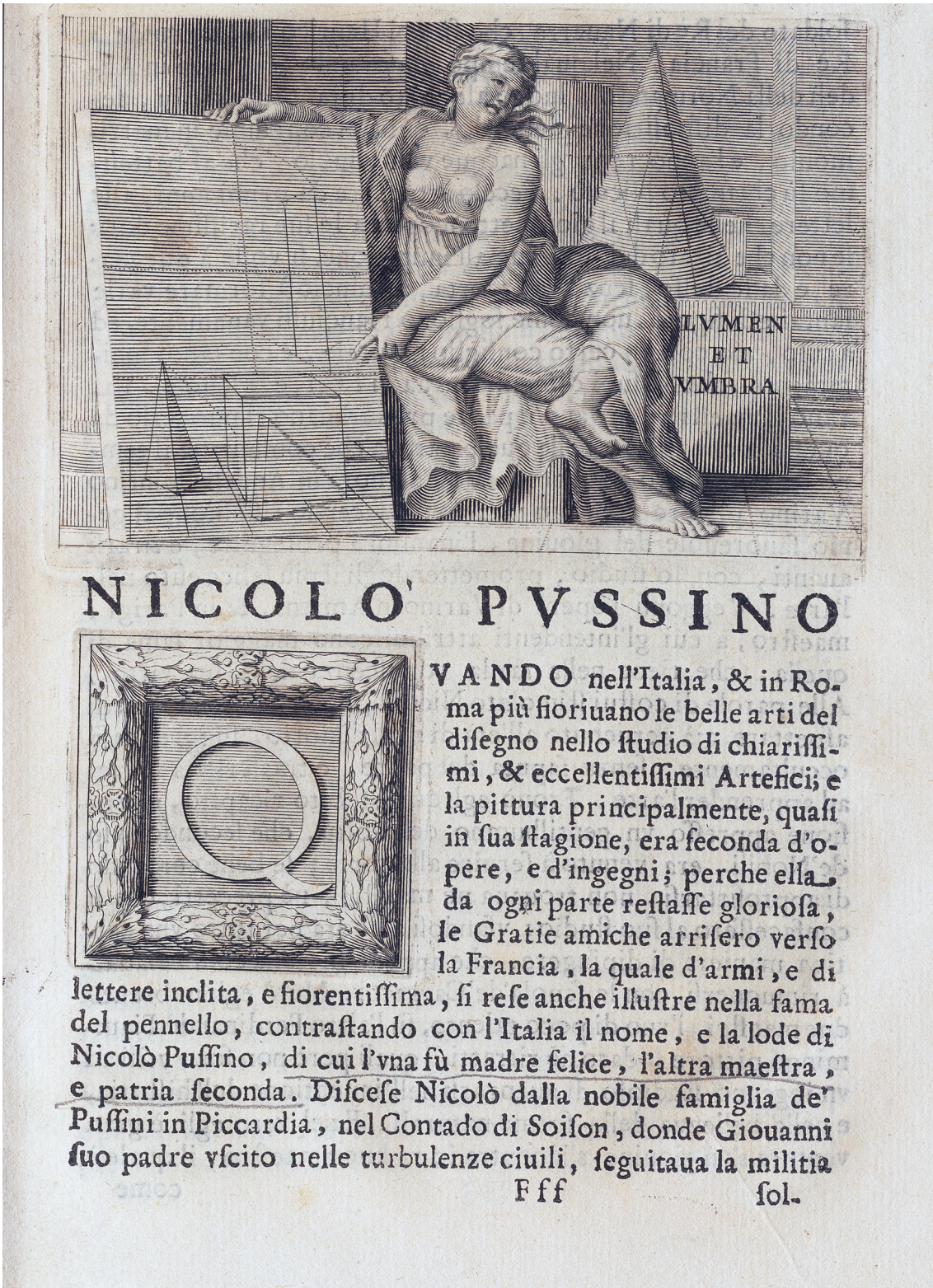


Figure 1 After Charles Errard, Allegorical headpiece to the *Life* of Nicolas Poussin, from Giovanni Pietro Bellori, *Le Vite de' pittori, scultori e architetti moderni*, Rome, Mascardi, 1672, 407. Photo: National Gallery of Art Library, David K. E. Bruce Fund, Washington DC

2 Zaccolini's Optics and Poussin's Modernity

Shortly after the J. Paul Getty Museum in Los Angeles acquired *Landscape with a Calm*, Denise Allen and David Jaffe related the reflections in the lake to Félibien's discussion in the fifth *Entretien* and argued that Poussin's representation of optical reflections here and in other works from the 1640s and 50s served the purpose of affirming his mastery of optics.²⁴ The discussion here supports Poussin's mastery of optics but goes further by suggesting that this mastery enabled Poussin to portray things that no other painter before him had done. It will also support the conclusions of Cropper and Charles Dempsey,²⁵ Cropper,²⁶ Anthony Colantuono,²⁷ and Helen Glanville²⁸ that Poussin was not a naturalistic painter in the sense that representing the picture of nature was his primary objective. Rather, naturalism was the means to an end, and that end varied in accord with the subject and/or conceit of the painting, which was always more than what first grabs the eye. Poussin was an independent thinker whose base of knowledge was broad and whose intellectual powers were considerable. Just as art historians acknowledge how the study of anatomy and life drawing furthered naturalism in the representations of the human figure, but do not presume that Poussin and other meritorious painters depicted nudes to merely demonstrate their anatomical mastery, Poussin's mastery of optics likewise furthered his pictorial objectives without being the objective itself.

Early modern optics was a broader field of study than modern optics today. In addition to the study of light, color, and the anatomy of the eye, it dealt with all the varied issues of visual perception, such as how we see distance and size, separation or contiguity, beauty or ugliness, and every other quality that can be discerned through the judgment of the sense of sight. Leonardo's abridged *Trattato* has several passages dealing with perceptual issues, the most well-known of which is the way that the juxtaposition of light and dark intensifies the perception of lightness or darkness. Zaccolini's *Prospettiva del colore* has many more examples,

particularly regarding adjustments painters can choose to make, as we will see in the next section. Thus, the optics of Zaccolini and Leonardo provided tools to help Poussin manipulate the way viewers will perceive their paintings.

In addition, the study of early modern optics elucidates certain aspects of Poussin's modernity; indeed, it helps make sense of Poussin's unusual approach to light and shade in drawings. Oscar Bätschmann observed that his wash drawings depart radically from the tradition of modelling solid forms in light and dark, the hallmark of *rilievo* in Italian art since the time of Giotto. Comparing Poussin's approach to Claude and Guercino, Bätschmann was struck by Poussin's obliteration of drawn outlines with dark wash, but did not attempt to understand why Poussin made this choice.²⁹ No less innovative was the way Poussin built form out of planes of color, a point Silvia Ginzburg emphasized as "modern" and inspirational to Cézanne.³⁰ Glanville found common ground between his use of color and his use of wash as a way of imitating the divine act of creation in the representational arts.³¹ The theory of visual perception in early modern optics informs us that both practices, separating light from dark and building form out of color, imitate the way vision presumably works.

The dominant theory of visual perception was derived from Alhacen (ca 965-ca 1040), who modified Aristotle and Ptolemy's theories to include light in addition to color as primary objects of the sense of sight. All other visual qualities were said to be intellectually constructed through the mental faculties involving recognition and inference.³² By depicting light and dark, or color *qua* color, Poussin thus provides the viewer with the raw material to perceive all visual qualities (e.g. distance, size, shape, beauty, separation, contiguity, etc.) by means of the same processes of judgment and inference involved in everyday visual experiences. It is the pictorial analogy to showing through dialogue and description, rather than telling, a solution that gives the reader of literature the requisite cues to

²⁴ Allen, Jaffe 1998, 30.

²⁵ Cropper, Dempsey 1996.

²⁶ Cropper 1999, 78.

²⁷ Colantuono 1986, 2000.

²⁸ Glanville 2015.

²⁹ Bätschmann 1990, 3-15.

³⁰ Ginzburg 2006, 286; Ginzburg repeats this argument in 2008 and 2010.

³¹ Glanville 2015, 4-8.

³² Sabra 1978; Alhacen 2001, I, LX-LXXIII.

discern the motives and character traits of the actors in a story. Poussin gives the viewer the tools to recognize and infer from visual cues of light, dark, and color; in this way, he encourages the viewer's engagement of the mind to understand and gain knowledge, an idea Poussin essentially stated in his letter to Chantelou of 20 March 1642.³³

Ginzburg discarded the likelihood that Zaccolini could have been the inspiration for Poussin's new approach to landscape in ca 1640, instead, building an argument for his presumed influence from Girard Desargues and Abraham Bosse.³⁴ It may be true that Poussin admired Desargues and learned something from Bosse during his two years in France (1640-1642), but it is premature to discard his study of Zaccolini as a potential inspiration. In *Brouillon project* (1640), Desargues' printed criticism of a drawing Poussin sent him from Rome does not point to a friendship of mutual admiration, whether that lost drawing concerned a method of shadow projection based on Zaccolini or on Leonardo.³⁵ Moreover, no preparatory drawings or underdrawings show evidence that Poussin projected his cast shadows using Desargues' method. On the contrary, first-hand reports of his "grande machine" describe him working by sight to observe the projection of shadows and the fall of light on wax figurines set inside a viewing box.³⁶ Although Zaccolini wrote a perspective treatise with an entire volume dedicated to shadow projection, he had enough practical experience to acknowledge that geometric methods were tedious and most painters had no time to work out such details. He therefore proposed that painters should educate themselves in the rules first, but then work intelligently by using his illustrations as a quick guide, without having to draw out all the lines.

Zaccolini's guidance on the way vast spaces are perceived, and how painters can distinguish near from far, inspired Poussin to invent a new way of organizing a landscape. Not only did Zaccolini elaborate on the importance of color perspective in *Prospettiva del colore* (Florence, Biblioteca Medicea Laurenziana, Ashburnham 1212²), but he also devoted chapters to the diminution of shadow intensity following the example of Leonardo da Vinci.³⁷

Addressing the issue of how a painter can produce the impression of vast space, he explained that a variety of colors and objects is not only satisfying to the eye but gives the impression of greater space. A traveler seeing a town on the far side of a uniform plain who judges it to be near, will discover after a full day's journey that more distance must be traversed and, conversely, a traveler seeing a town beyond groves of trees, buildings, and other objects will judge it to be quite far yet arrive earlier than expected. He advised painters to apply this principle to their pictures to make the pictorial space look deeper:³⁸

si debbono interrompere con ornati edifitij di buona maniera d'architettura, di Giardini, di Alberi con correnti d'Acqua, di peschieri, di fiumi, di laghi, di boschi, di spatij piani, e montuosi, di colline, di Montagne, e d'ogn'altra cosa simile, come Castelli, Città, Torre, e fortezze, et altri cose simili fin' al pari dell'orizzonte

[they] should intersperse ornaments such as edifices in a good style of architecture, gardens, trees, cascades, fisheries, rivers, lakes, woods, open plains and hillocks, hills, mountains, and all similar kinds of things such as castles, cities, towers, fortresses and similar things as far the horizon.

Thus, eschewing the time-worn recessional devices of the dark *repoussoir*, the alley of diminishing trees, and the winding river, Poussin learned that he could give the impression of vast space by incorporating many compartments with many things. He invented a novel way to do so in the pendant landscapes from 1648: *Landscape with the Body of Phocion Carried Out of Athens* (Cardiff, National Museum) [fig. 2], and *Landscape with the Ashes of Phocion Collected by his Widow* (Liverpool, Walker Art Gallery). In both cases, a vast space was appropriate to the story told by Plutarch in which a false accusation of treason necessitated Phocion's burial far outside the city walls. Anthony Blunt considered these Poussin's first attempts to develop a new style of landscape, one which "went beyond the

33 Glanville 2015, 12, pointed this out. For the text of the letter, see Jouanny 1911, 121-2.

34 Ginzburg 2006, 288, and in subsequent publications on this same argument (2008, 2010, 2011).

35 Le Goff 1999, 67-9, and Bell 2003, 84, argue independently for Zaccolini's method in the lost drawing, while Fiorani 1994, 267-9, argued for Leonardo's authorship.

36 De Grazia, Steele 1999.

37 Bell 2013, gives an overview of Leonardo's theory.

38 Zaccolini, *Prospettiva del colore*, trattato XVI, cap. 16, fol. 140v: "Il piano si dimostrerà maggiore essendo copioso da varij spartimenti" ('the plane will appear larger when full of varying compartments'). All citations give the treatise number in Roman, chapter number in Arabic and folio number in the manuscript.



Figure 2 Nicolas Poussin, *Landscape with the Funeral of Phocion*. Cardiff: National Museum of Wales, on loan from the Earl of Plymouth, Oakley Park, Schropshire. Photo: Web Gallery of Art

structural devices of his beloved models, Domenichino and Annibale”.³⁹ Poussin made many small subdivisions with colors, stones, figures, animals, and verdure. Zigzagging paths and colored wedges of light and dark shapes lead our eye on a slow

journey from foreground to background where we not only delight in the myriad of things displayed but, because it takes us a long time to explore this richness, we experience the vastness of the space as we “read” the picture, one element at a time.⁴⁰

3 The Lake as Mirror

The mirror lake with its manifold reflections is a common motif in Poussin’s landscapes and sacred histories. By a close examination of reflections in the lake of *Landscape with a Calm* [fig. 3], we will see how Poussin made use of optics to imitate nature as well as to direct the viewer’s experience and create meaning.⁴¹

Recent monographs and exhibitions have highlighted the reappearance of the paintings Félibien called “Un temps calmes & serain” and its pendant “L’Orage,” painted for Jean Pointel in 1650-1651, after Thuillier recognized them among paintings attributed to Poussin’s brother-in-law Gaspard Dughet.⁴² Although many problems still remain in

³⁹ Blunt 1944, 157; on 163 he also pointed out that landscape elements are “built up three dimensionally like figure compositions [...] rather than through *repoussoirs* or panoramas, leading the eye back through a series of carefully disposed masses”.

⁴⁰ On reading pictures, see Goldstein 1966.

⁴¹ The section builds upon a conference paper presented at the Getty symposium on the painting held in 1998, organized by David Jaffe. I thank all the conference participants, and readers of this final version, for their helpful feedback.

⁴² Félibien 1685, VIII, 303. For a full bibliography, see the Getty website at www.getty.edu/art/collection/objects/106381; Thuillier 1976.



Figure 3 Nicolas Poussin, *Landscape with a Calm*. Oil on canvas. Los Angeles, The J. Paul Getty Museum. Photo: The Getty Open Content Program

distinguishing works from the late 1620s and early 1630s, these pendant landscapes are highly regarded as masterpieces of Poussin's maturity.⁴³ In speaking of *A Calm*, Richard Verdi emphasized the "sharply focused forms and pellucid light" and the "poise and clarity of its design".⁴⁴ In a later exhibition devoted to landscape, Pierre Rosenberg particularly emphasized the contrast of *A Calm* as a pendant to *The Storm* down to the details of their execution: smooth unified brush strokes in one, quick and nervous in the other.⁴⁵

In *A Calm*, the lake occupies one-third of the land mass and extends across nearly the entire pictorial width. By sheer virtue of its size, the lake is the single most dominant element in the picture. People and animals are distributed throughout the space, as are natural features such as trees and

hills, and manmade structures of walls and buildings. In the remote distance, the low hills give way to gigantic mountains whose rocky peaks rise into the clouds. The reflections in the lake mirror the forms of nature surrounding that body of water – a stable, a herd of cattle and a flock of sheep, distant walls and edifices – functioning as a natural mirror. This mirror transforms what it reflects by making the images slightly darker and less clear than the objects being reflected.

It was commonplace in optical literature to describe reflections as darker and weaker than the original objects being reflected, as their color was said to mingle with the dark color of the (metal) mirror and because "light weakens as it extends from its source".⁴⁶ Zaccolini explained the theory in *Prospettiva del colore* in terms that emphasized

⁴³ Whitfield 1996, and Ginzburg 2011, explore the complexity of attributions in the years when Poussin painted figures in Dughet landscapes or sold Dughet's works as his own.

⁴⁴ Verdi 1995, 286, no. 73.

⁴⁵ Rosenberg 2008, 260-1, no. 58.

⁴⁶ Alhacen 2006, book IV, ch. 2, paragraphs 11-13 [pp. 287-8]), and ch. 3, paragraphs 93-96 [p. 319]).



Figure 4 Nicolas Poussin, *Landscape with a Calm*. Detail. Oil on canvas. Los Angeles: The J. Paul Getty Museum. Photo: The Getty Open Content Program

the variations in color and light which, in the reflected images, are “un concerto visibile, e così raro di eccellente proportione” (‘a visible concert, and of such rare and exquisite proportions’) that nearby things appear to be nearby and distance things appear to be distant.⁴⁷ Poussin took this analogy to heart in creating a veritable symphony of reflected colors, tonally varied in their relationship to their objects as they reduce in contrast and intensity depending upon their distance from the water.

While scientific optical texts followed a standard presentation starting with the optics of plane mirrors and proceeding through convex or spherical mirrors to concave or burning mirrors, presenting the equal angles law (that the incident ray percusses and rebounds at equal angles like a ball thrown at a wall), Zaccolini focused instead on the principles necessary to accurately paint reflections on surfaces that painters might wish to depict. He showed how these laws must guide the painter in order to avoid errors and the embarrassment arising when errors are noticed. The painter needs to know that reflections do not appear at night, will look broken and serpentine in moving water, and that when they appear in still water, the left and right sides will be reversed as will the top and the bottom. Poussin never makes such errors despite the absence of drawn lines in underdrawings and preparatory studies, having fully integrated the rules. This we can observe in the clear, precise reflections from the stationary sheep at the river bank, some of which are bending to drink, but have not yet disturbed the smooth surface of the water. Where a cow up ahead moves forward, white ripples appear in the water and there is no reflection

visible [fig. 4]. The viewer who looks as carefully as Poussin wished will not fail to notice how Poussin has developed the idea of *varietà* in the representation of animals usually depicted in undifferentiated herds.

Poussin’s mastery of optics led him to realize that the depiction of reflections in water can reveal where the imaginary or ideal viewer stands as effectively as a vanishing point in a linear perspective design. Generally, reflections match the colors, shapes, and proportions of objects, but as Zaccolini emphasized, water only represents images of what it “sees”. To reflect something on the water surface visible to the imagined viewer, one must be able to draw a straight line from each part of that object to the water surface and another line from the water surface to the imaginary viewer. Each line represents the path of a ray of light and color. Since the equal angles law of reflection states that the angle of incidence equals the angle of reflection, the rays from the object must strike the water surface at the same angle that the reflected rays bounce off the surface towards the viewer. Félibien understood the importance of this principle. His fifth *Entretien*, published in 1679, presented a geometric diagram showing these extended lines supplemented by a representational illustration that can be seen at a glance [fig. 5]. This illustration makes apparent that the tall column topped by a vase will not appear in its entirety in the reflection seen by an observer standing on the opposite shore; the observer will see only the upper part, where the pyramid of rays from the point of reflection to the eye intersects the rays arriving from points on the object at the water surface. It is much more ele-

⁴⁷ Zaccolini, *Prospettiva del colore*, trattato XII, cap. 3, fol. 86v.

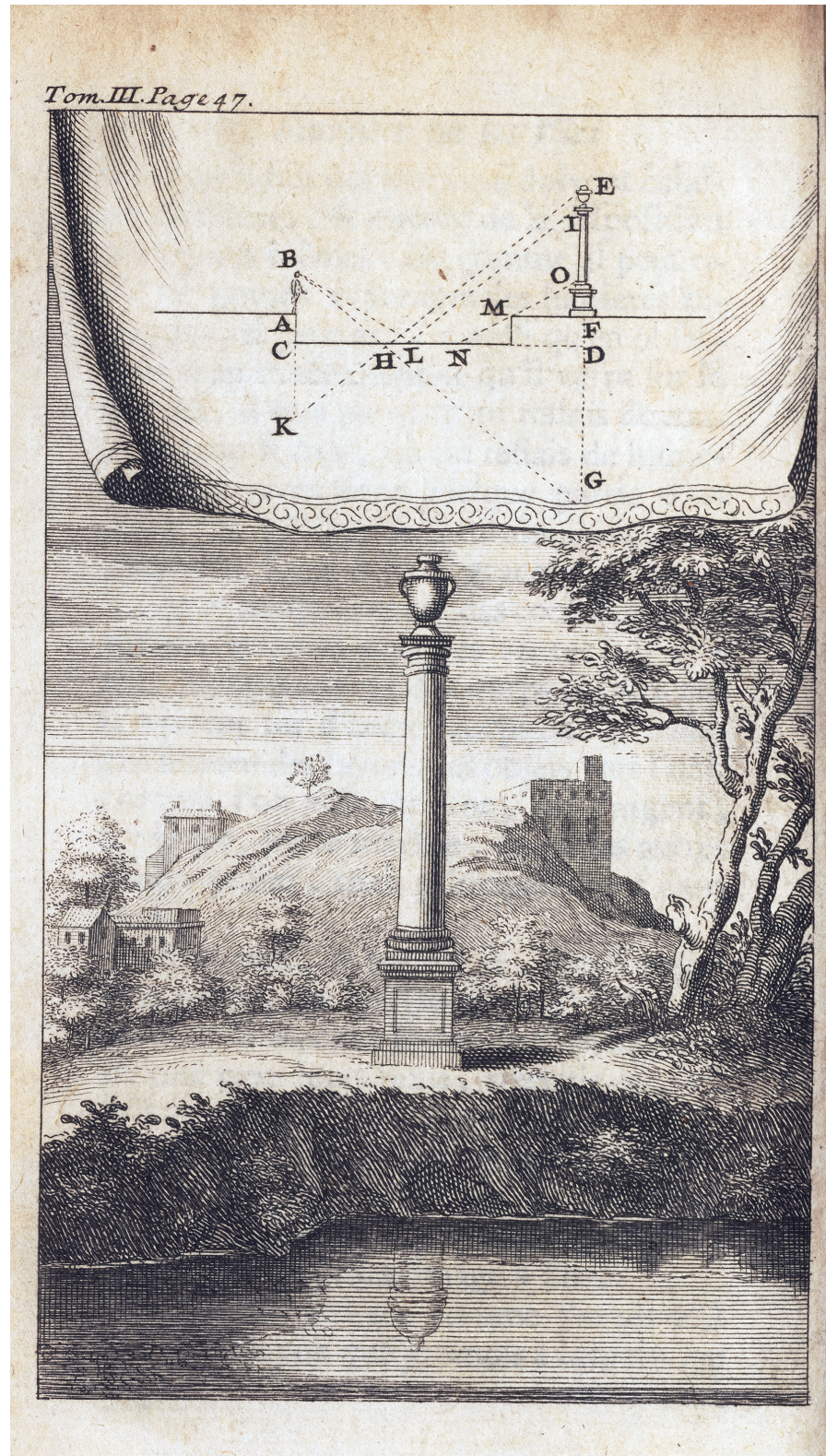


Figure 5 Diagram of a column and its reflection in water. From André Félibien, *Entretiens sur la vie et les ouvrages des plus excellents peintres anciens et modernes*, V, 2nd ed., vol. 3. Trévoux, 1725, 48. Photo: National Gallery of Art Library, David K. E. Bruce Fund, Washington DC

gant than Zaccolini's chapter in *Prospettiva lineale* (fol. 67r), in which the same principle is elucidated with a plane mirror set parallel to the tower,⁴⁸ and in *Prospettiva del colore*, where a crenellated tower seen slightly to the left of center is shown reflected in a body of water.⁴⁹ Knowing that the temptation would be to depict all or most of the column in the reflection, Félibien advocated studying optics to understand the causes of things and cited Poussin as a model.⁵⁰ Zaccolini had made a similar recommendation.⁵¹

Poussin's mastery of these principles made it possible for him to realize their potential as enriching elements rather than decorative ornaments. In *A Calm*, the images of distant buildings are truncated, so that the tops of the highest buildings seem to rise directly above the reflections of the cattle and sheep. The huge rocky mountain is not reflected in the lake despite its massive size. These details convey information about the viewer's slightly elevated position and distance, corroborated by

the downward slope of the land at the front edge and the view of the tree tops in the enclosed garden behind the first wall. These reflections convey information that help viewers make sense of three-dimensional relationships represented on the two-dimensional picture surface. We understand that the mountain which gathers clouds is far enough to take on the apparent blue of the sky, but the palace behind the wall is not that far. Both Leonardo and Zaccolini warned that large objects reduced in size in the distance could be confused with nearer, small objects, a limitation of linear perspective which necessitated the use of color perspective to clarify relative position in space.⁵² It should be pointed out that Poussin eschewed the popular aerial perspective device of feigning dense, murky air to indicate distance; instead, he portrayed transparency and high surface reflectance in the distance as a result of his innovative explorations of painting technique, working with superimposed strata of transparent pigments.⁵³

4 The Sky

Given that Poussin's reflections function as conveyors of information helping the viewer navigate through the pictorial space, we can agree that they are more than pretty lures for the eyes and demonstrations of skill and knowledge. This becomes especially evident in the very center of the lake. All a viewer sees looking at the sky near the horizon is a sunny haze with some formed clouds. The sky is almost as white as the clouds, and its candor transforms everything in the distance from the lightened shadows of the buildings to the rocky cliffs of the mountains, making barely discernible where the rocky cliffs end and the sky begins. Overhead, however, the sky is a clear blue, free of clouds. We know this because no clouds are reflected in the mirror lake. The lake thus reveals what the humans engaged in quotidian activities do not see directly: the undisturbed purity of the heavens above, infinite, free, and calm.

No one on earth seems to notice this heavenly peace. The goatherd seems to be contemplating the antics of his goats. A horseman gallops away to some invisible but distant place, reaching out

his arm as if to grasp it sooner; another quietly observes his horse satisfying its thirst; while a third indoors is engaged in washing. On the far side of the lake, a shepherd follows his flock with his gaze, while the cattleman drives his oxen into the water with a large stick. Outside the city walls, a few remote figures, mere dots on the picture surface, seem focused on the city beyond. But the privileged viewer, Pointel, settles his gaze on the center of the lake where the field of blue is not interrupted by patches of varying colors. The privileged viewer thus sees the reflection of the overhead sky which the figures inhabiting the landscape do not see. Like the omniscient narrator in a story, the privileged viewer sees everything that the human actors see but also sees what the water "sees". And that is a clear expanse of blue at the zenith of the sky.

This second-hand view of the unseen heavens, normally visible only to those who turn their eyes heavenward, may be related to recommendations Zaccolini provided. He suggested painters take advantage of reflected images to show what the main protagonists in the story cannot see or what the

⁴⁸ This volume can be consulted online at www.museogalileo.it by searching the library catalogue under Zaccolini.

⁴⁹ Florence, Biblioteca Medicea Laurenziana, MS Ashburnham 12122 (trattato XII, capitolo 16), fol. 102v.

⁵⁰ Discussed in Robison 2009, 271.

⁵¹ Zaccolini, *Prospettiva del colore*, trattato XII, cap. 16, fol. 102v.

⁵² Farago, Bell, Vecce 2018, ch. 307; Bell 1993.

⁵³ I rely on a forthcoming chapter by Simona Rinaldi that emphasizes Poussin's innovations in technique in relation to Zaccolini's theory.

viewer cannot see directly. For example, a soldier seeing the enemy reflected in the water can prepare for the skirmish, and a person passing over a bridge can enjoy the reflections of the underside of the arches in the water, while

il Pittore non havendo sito da ispiegare I storie, ò qualsivoglia attione, sopra del detto Ponte, le potrà dimostrare mediante l'imagini, che dall'acqua si veggono nella parte di sotto à gli archi del detto ponte [...] hora il Pittore dimostrando in questo con l'intelligenza di maggior artificio la sua pittura vaga potrà acquistare maggior honore e fama immortale.

the painter, not having a place to display some action in the story above the bridge, would be able to show it by means of the images that the water sees from the underside of the arches of this bridge] [...] and due to the cleverness of such artifice, would accrue great honor and immortal fame.⁵⁴

In the previous chapter Zaccolini suggested that a knowledge of optics could bring military benefits because "a valiant soldier could be informed of enemy forces by means of these [reflected] images".⁵⁵ Such practical suggestions inspired Poussin who, by 1650, had reached the point of mastery where he could invent a body of reflective water that became the central focus of the painting.

If the lake is indeed the central focus of *A Calm*, then how might we interpret it? We have already seen that Poussin used wash and blotches of color so that the viewing of his painting would engage human vision in a way analogous to determinate vision, the kind of vision that brings knowledge and understanding through the engagement of the intellect. In the case of the lake, the analogy to human vision is furthered by anatomical optics, which explained that the eye sees by means of reflection and refraction through aqueous humors. Whether Poussin accepted the old *perspectiva* model of a spherical eye or the new model of light focused onto the retina, the image-forming properties of the eye and its aqueous substance were indisputable. Thus, we have an interesting set of parallels:

the viewer and the sentient beings in the painting see the lake. The lake "sees", but only a part of what the viewer sees, and what the sentient beings depicted do not see at all: the clear sky overhead. Thus, the viewer is granted the privileged position of seeing simultaneously the world inhabited by mankind and the celestial realm.

In *De caelo*, Aristotle linked the perfection of the celestial region directly to its distance from the earth.⁵⁶ This idea was repeated by Zaccolini, who explained that the greatest height coincides with the purest air, and that this should be depicted with the most perfect, deep azure.⁵⁷ In the meteorological language of the time, the zenith of the sky is the most rarified. This third and highest realm of the air lacks meteors, the term for disturbances in the air such as weather, comets, rainbows, lightening, winds, and rising dew from imperfect mixtures of the four elements.⁵⁸ Consequently, it is calm and unchanging. The cosmos was widely believed to be constructed of concentric spheres with a central terraqueous sphere surrounded by a sphere of air, which was surrounded by a sphere of more rarified fire. The medieval schema had included a central sphere of earth surrounded by a sphere of water, but when geographical explorers from Portugal proved that land masses exist beyond the oceans, the schema was revised.⁵⁹ Poussin's inclusion of large bodies of water in his landscapes may testify to his modernity in accepting the new model, although it is possible that he accepted Neostoic views of a single, unifying element,⁶⁰ or even the heliocentric astronomical challenge to cosmology, at the time banned by the Catholic church.

The glimpse Poussin provides into the realm at the zenith of the sky, depicted in a clear light blue, contrasts with the sully of that blue by the admixture of gray and white at the horizon, a sign of vapor condensing in the cold to form clouds. Closer to land, curls of smoke rise from human activity and drift behind a low hill in the middle ground, a quotidian example of a hot exhalation with upward movement that creates weather and other disturbances in the inhabited, terraqueous realm. Poussin certainly wanted the viewer to notice this contrast and think about its implications. The English

⁵⁴ Zaccolini, *Prospettiva del colore*, trattato XII, cap. 17, foll. 103r-v.

⁵⁵ Zaccolini, *Prospettiva del colore*, trattato XII, cap. 16, fol. 103r. An anonymous reviewer pointed out that Félibien also has Pyramde remark that reflections reveal things the eye does not directly see (Félibien 1679, V, 53).

⁵⁶ Arist., *De caelo*, 269^b, 13-18.

⁵⁷ Zaccolini, *Prospettiva del colore*, trattato XV.

⁵⁸ Heninger 1968, 4.

⁵⁹ Grant 1994, 48.

⁶⁰ McTighe 1996, esp. 21 and 34, explores the relationship to similar ideas in Neostoicism.

poet John Donne (1572-1631) reminds us that such contrasts were frequently evoked in metaphors as he consoles his feverish mistress by comparing her true nature to this uppermost realm:

These burning fits but meteors bee
Whose matter in thee is soone spent.
Thy beauty, and all parts, which are thee
Are unchangeable firmament.⁶¹

The clear sky above contrasts the density of air near the horizon. This was a well-accepted concept in ancient and medieval optics and meteorology. Zaccolini's synopsis of the features relevant to painting are presented in *Treatise XIV of Prospettiva del colore*, where he explains that the whiteness we see arises from apparent coloristic and perspective effects because this air is full of humidity. This whiteness is invisible when we are close to it because the droplets are so small; but at a great distance, the space between all these minute particles of moisture is condensed (as the perspective of diminution dictates), making them appear to be a nearly opaque white. This is what happens with clouds,

il che non può accadere nella suprema parte del Cielo, il quale si dimostra ordinariamente di color turchino, [...] per la quale benche da vapori sia mischiata, nulla dimeno per la poca quantità non facendosi densità sensibile, non si potrà anche dimostrare bianca, e perciò così diafano et interminato perspicuo si dimostra turchino, vedendosi le stele

[but this whiteness] cannot occur at the highest part of the sky which normally looks a clear blue color [...] and even though these vapors are mixed, the quantity is so small that its density is not perceptible and thus cannot appear white, and because it is so transparent, we see the stars above.⁶²

By gracing Pointel with a vision of the celestial realm as he delights in the beauty of earth, Poussin reminds his patron of the divine presence of the creator in the beauty of earth. The painter makes visible what God makes manifest, but which few can see: God's omnipresent majesty.

5 Conclusion

This particular interpretation is one that we have been prepared to accept in seventeenth-century Italy due to the pioneering work of Pamela Jones. In her analysis of the art criticism of Francesco Borromeo, landscapes were particularly valued as manifestations of God's goodness.⁶³ Jones argues that Ignatius's writings and Filippo Neri's spiritual guidance were inspirational to Borromeo for their conviction that God dwells in creatures and plants – a trend in the seventeenth century known as Christian opti-

mism. Zaccolini, also subscribed to these views, expressing them less eloquently but no less fervently.⁶⁴

Since this is not the appropriate place to discuss the meaning of Poussin's landscapes in general, we will conclude with the bold assertion that Poussin's study of optics, particularly the writings of Zaccolini, enabled him to compose a novel kind of idyllic landscape, transforming the tradition of the Arcadian pastoral into a modern vision of human experience in concert with nature.

⁶¹ Donne 1633, 209-10 (*A Feaver*, lines 21-24).

⁶² Zaccolini, *Prospettiva del colore*, trattato XIV, cap. 4, fol. 112r.

⁶³ Jones 1988, 263-8.

⁶⁴ Bell 2020, 70-2.

References

Primary Sources

- Alhacen (2001). *Alhacen's Theory of Visual Perception: A Critical Edition, with English Translation and Commentary, of the First Three Books of Alhacen's 'De aspectibus', the Medieval Latin Version of Ibn al-Haytham's 'Kitāb al-Manāẓir'*. Ed. and trans. by A.M. Smith. Philadelphia. Transactions of the American Philosophical Society 91/4.
- Alhacen (2006). *Alhacen on the Principles of Reflection: A critical edition, with English translation and commentary of Books 4 and 5 of Alhacen's 'De aspectibus', the Medieval Latin Version of Ibn al-Haytham's 'Kitāb al-Manāẓir'*. Ed. and trans. by A.M. Smith. Philadelphia. Transactions of the American Philosophical Society 96/2.
- Bellori, G.P. (1672). *Le vite de' pittori, scultori e architetti moderni*. Roma.
- Desargues, G. (1640). *Brouillon proiect d'exemple d'une maniere universelle du S.G. D.L. touchant la pratique du trait à preuves pour la coupe des pierres en l'Architecture: Et de l'esclaircissement d'une maniere de reduire au petit pied en Perspective comme en Geometral, & de tracer tous Quadrans plats d'heures egales au Soleil*. Paris: w.e. Reprinted in Poudra, N.G. (éd.), *Oeuvres de Desargues, réunies et analysées*. Paris, 1863.
- Donne, J. (1633). *Poems*. London.
- Félibien, A. (1679). *Entretiens sur la vie et les ouvrages des plus excellents peintres anciens et modernes*. Tomes V & VII. Paris.
- Félibien, A. (1685). *Entretiens sur la vie et les ouvrages des plus excellents peintres anciens et modernes*. Tomes VII & VIII. Paris.
- Leonardo da Vinci (1651). *Il trattato della pittura*. Ed. R. DuFresne. Paris.
- Passeri, G.B. (1772). *Vite de' Pittori, Scultori ed Architetti che hanno lavorato in Roma morti 1641 sino all'anno 1673*. A cura di G.G. Bottari e G.L. Bianconi. Roma.
- Risner, F (ed.) (1572). *Opticae thesaurus*. Basel.

Secondary Sources

- Allen, D.; Jaffe, D. (1998). "Poussin's *A Calm* and *A Storm*". *Apollo*, 147, 436, 28-34.
- Barone, J. (2009). "Poussin as Engineer of the Human Figure: The Illustrations for Leonardo's *Trattato*". Farago, C. (ed.), *Re-reading Leonardo: The Treatise on Painting across Europe, 1550-1900*. Farnham, 197-235.
- Bätschmann, O. (1990). *Nicolas Poussin: Dialectics of Painting*. London.
- Bell, J. (1993). "Zaccolini's Theory of Color Perspective". *Art Bulletin*, 75, 91-112.
- Bell, J. (2003). "Zaccolini's Unpublished Perspective Treatise: Why Should We Care?". Massey, L. (ed.), *The Treatise on Perspective: Published and Unpublished*. New Haven, 79-103.
- Bell, J. (2013). "Leonardo's 'Prospettiva dell'ombra': Another Branch of Non-linear Perspective". Fiorani, F.; Nova, A. (eds), *Leonardo da Vinci and Optics*. Venice, 53-85.
- Bell, J. (2020). "Zaccolini e Milano. Nuove indagini, nuove attribuzioni". Mengozzi, M. (a cura di), *L'eredità culturale e artistica di Matteo Zaccolini*. Cesena, 43-72. Quaderni 3.
- Białostocki, J. (1954). "Une idée de Leonardo réalisée par Poussin". *La Revue des arts*, 4, 131-6.
- Białostocki, J. (1960). "Poussin et le *Traité de la peinture de Léonard*". *Études*, 1, 133-40.
- Blunt, A. (1944). "The Heroic and the Ideal Landscape in the Work of Nicolas Poussin". *Journal of the Warburg and Courtauld Institutes*, 7, 154-68.
- Christiansen, K. (2008). "The Critical Fortunes of Poussin's Landscapes". Rosenberg, P.; Christiansen, K. (eds), *Poussin and Nature. Arcadian Visions = exhibition catalogue* (New York, 12 February-May 11 May 2008). New York, 9-38.
- Colantuono, A. (1986). *The Tender Infant: "invenzione" and "figura" in the Art of Poussin* [Ph.D. dissertation]. Baltimore.
- Colantuono, A. (2000). "Poussin's 'Osservazione sopra la pittura': Notes or Aphorisms". *Studi seicenteschi*, 41, 285-311.
- Coquery, E. (2013). *Charles Errard (1601-1689): La noblesse du décor*. Paris.
- Cropper, E. (1980). "Poussin and Leonardo: Evidence from the Zaccolini MSS". *Art Bulletin*, 62, 570-83.
- Cropper, E. (1999) "Conception and Deception: Poussin's Mirrors". *Cleveland Studies in the History of Art*, 4, 76-95.
- Cropper, E.; Dempsey, C. (1996). *Nicolas Poussin: Friendship and the Love of Painting*. Princeton.
- De Grazia, D.; Steele, M. (1999). "The 'Grande Machine'". *Cleveland Studies in the History of Art*, 4, 64-75.
- Demoris, R. (2014). "Note Bibliographique". Félibien, A. *Entretiens...* Paris, 367-74.
- Fara, G.M. (2014). *Albrecht Dürer nelle fonti italiane antiche 1508-1686*. Firenze.
- Farago, C.; Bell, J.; Vecce, C. (2018). *The Fabrication of Leonardo da Vinci's "Trattato della pittura" with a scholarly edition of the editio princeps (1651) and an annotated English translation*. Leiden.
- Fiorani, F. (1994). "The Theory of Shadow Projection and Aerial Perspective. Leonardo, Desargues and Bosse". Dhombres, J.; Sakarovitch, J. (eds), *Desargues en son temps*. Paris, 267-82.
- Ginzburg, S. (2006). "La nascita del paesaggio 'classicista' di Nicolas Poussin". Cappelletti, F. (a cura di), *Archivi dello sguardo. Origini e momenti della pittura di paesaggio in Italia = Atti del Convegno* (Ferrara, 22-23 October 2004). Bagno a Ripoli (FI), 285-322.
- Ginzburg, S. (2008). "Poussin refusé (1)". *Revue de l'art*, 161, 21-8.
- Ginzburg, S. (2010). "Poussin et la perspective dans la France de Richelieu". Frommel, S.; Bardati, F. (éds), *La réception de modèles "cinquiescenschi" dans la théorie et les arts français du XVIIe siècle*. Geneva, 51-67.

- Ginzburg, S. (2011). "Les paysages de Nicolas Poussin et de Gaspard Dughet dans la première moitié du XVII^e siècle". Cappelletti, F.; Loire, S. (éds), *Nature et idéal. Le paysage à Rome 1600-1650 = catalogue d'exposition* (Paris et Madrid, 9 March-25 September 2011). Paris, 55-67.
- Glanville, H. (2015). "Nicolas Poussin: Creation and Perception", in "Nicolas Poussin. Technique, Practice, Conservation", special issue, *Kermes*, 94(5), 1-15.
- Goldstein, C. (1966). "The Meaning of Poussin's Letter to De Noyers". *Burlington Magazine*, 108, 233-7.
- Grant, E. (1994). *Planets, Stars, & Orbs. The Medieval Cosmos, 1200-1687*. Cambridge.
- Guerdat, P. (2017). "Through the appraisal process: René Gimpel (1881-1945) and Nicolas Poussin's 'Self-Portrait', from rediscovery to de-attribution". *Journal of Art Historiography*, 16, 1-45.
- Heninger, S.K. (1968). *A Handbook of Renaissance Meteorology*. New York.
- Jones, P. (1988). "Federico Borromeo as a Patron of Landscapes and Still Lives: Christian Optimism in Italy ca 1600". *The Art Bulletin*, 70(2), 261-72.
- Jouanny, C. (1911). *Correspondance de Nicolas Poussin*. Paris. Archives de l'art français 5.
- Le Goff, P., (1999). "Abraham Bosse, lecteur de Vinci: ou querelle à l'Académie Royale autour du Traité de la Peinture de Léonard de Vinci: l'argumentaire d'Abraham Bosse". Fabrizio-Costa, S.; Le Goff, J.-P. (éds), *Léonard de Vinci entre France et Italie: 'miroir profond et sombre' = actes du colloque international de l'Université de Caen*. Caen, 55-80.
- McTighe, S. (1996). *Nicolas Poussin's Landscape Allegories*. Cambridge.
- Pace, C.; Bell, J. (2002). "The Allegorical Engravings in Bellori's Lives". Bell, J.; Willette, T. (eds), *Art History in the Age of Bellori*. New York; Cambridge, 191-223 and 346-52.
- Previtali, G. (1976). "Introduzione". Bellori, G.P., *Le vite de' pittori, scultori e architetti moderni*. A cura di E. Borea. Torino, IX-LX.
- Rinaldi, S. (forthcoming). "Seventeenth-century Pictorial Technique and Zaccolini's Guidelines". Bell, J. (ed.), *On Color Perspective: A Translation and Critical Edition*.
- Robison, P. (2008). "Leonardo's *Trattato della pittura*, Nicolas Poussin, and the Pursuit of Eloquence in Seventeenth-century France". Farago, C. (ed.), *The Ethics of Style*. Manchester, 189-236.
- Robison, P. (2009). "Leonardo's Theory of Aerial Perspective in the Writings of André Félibien and the Paintings of Poussin". Farago, C. (ed.), *Re-reading Leonardo: The Treatise on Painting across Europe, 1550-1900*. Burlington, 267-97.
- Roccasecca, P. (2011). "Il ruolo della teoria düreriana nella formazione degli artisti nell'Accademia del Disegno di Roma". Ebert-Schifferer, S.; Hermann-Fiore, K. (a cura di), *Dürer, l'Italia e l'Europa*. Cinisello Balsamo, 88-97.
- Rosenberg, P. (2008). Rosenberg, P.; Christiansen, K. (eds), *Poussin and Nature. Arcadian Visions = exhibition catalogue* (New York, 12 February-May 11 May 2008). New York.
- Sabra, A.I. (1978). "Sensation and Inference in Alhazen's Theory of Visual Perception". Machamer, P.; Turnbull, R. (eds), *Studies in Perception: Interrelations in the History of Philosophy and Science*. Columbus, 160-85.
- Smith, P.H. (2009). "Science on the Move: Recent Trends in History of Early Modern Science". *Renaissance Quarterly*, 62, 345-75.
- Thuillier, J. (1976). "Poussin et le paysage tragique: 'l'Orage Pointel' au musée des Beaux-Arts de Rouen". *La Revue du Louvre*, 26, 345-55.
- Verdi, R. (1995). *Nicolas Poussin 1594-1665 = exhibition catalogue* (London, 19 January-9 April 1995). London.
- Whitfield, C. (1996). "A propos des paysages de Poussin". *Nicolas Poussin (1594-1665) = Actes du colloque* (Paris, Musée du Louvre, 19-21 octobre 1994). 1ère éd. Paris, 246-67.
- Wildenstein, G. (1962). "Note sur l'Abbé Nicaise et quelques-un de ses amis romains". *Gazette des Beaux-Arts*, 60, 565-8.

