

XIII

CHRISTOPHE BOUCHERIE

Ethics and natural philosophy in the public representation of the scientific experiment: A reading of Wright of Derby's *An Experiment on a Bird in the Air Pump* (1768) in the light of Mary Shelley's *Frankenstein* (1818)

Joseph Wright of Derby's painting of the Air Pump has often been described as a representation of the scientific enquiry and natural philosophy of the Enlightenment, whereby an itinerant scientist-philosopher lectures a family about the functioning of a well-known scientific instrument, the air pump, and enlightens them about its associated phenomena. This article proposes an alternative philosophical and moral reading of this powerful visual artefact by comparing it to the famous horror experiment of Mary Shelley's gothic novel *Frankenstein*. When realism crosses fiction: the representation of the ethical boundaries of science in the life and death experiment.

A very great and uncommon genius in a peculiar way.¹ These words from an anonymous art reviewer in 1768 summarise well how Joseph Wright of Derby was perceived in the second half of the eighteenth century. Indeed, he has been often described as a 'provincial' painter (Wright 'of Derby') by contrast to his established London rivals Joshua Reynolds and Thomas Gainsborough. His famous candlelight scenes have also been categorised as 'cultural oddities'.² *An Experiment on a Bird in the Air Pump* (Figure 1) is probably one of the best known of these scenes. This fascinating painting is today on display at the National Gallery next to iconic paintings of some of the most acclaimed British painters of all time: Constable, Gainsborough, Turner, Stubbs, Lawrence and Reynolds. However, with its rather peculiar subject matter, this large painting (183 x 244 cm) attracts far more viewers than more famous paintings in the room.³ This unusual scene represents an itinerant scientist who demonstrates to his audience the functioning of an air pump, at the expense of a white cockatoo. As the air is being withdrawn from a glass bowl, a vacuum is created and the bird falls and suffocates. In the *Air Pump*, Wright of Derby captures the various reactions of the members of the audience. From the indifferent young lovers, the dubitative young boy on the left, the frightened girls at the centre,

¹ 'A lover of the arts', *The Gazetteer and New Daily Advertiser*, 23rd May 1768, p.4.

² David Solkin, *Painting for Money: The Visual Arts and the Public Sphere in 18th-Century England*, (Yale, 1993), p.227.

³ Marguerite Helmers, 'Painting as a Rhetorical Performance: Joseph Wright's *An experiment on a Bird in the Air Pump*', *JAC* Vol. 21.1 (2001), available from <http://www.jaconlinejournal.com>, p.76.

to the meditative old man sitting at the table: the painting displays a whole range of emotions that contributes to the dramatic effect of the scene. A decomposing human skull in a jar completes the scene in the foreground. The scientist stares at the viewer and seems to invite us to participate in the experience and decide whether we think the bird must live or die.



Figure 1: Joseph Wright of Derby, *An Experiment on a Bird in the Air Pump*, 1768, oil on canvas, 183 by 244 cm. ©The National Gallery.

On 30th August 1797, a day after the death of Wright of Derby, Mary Wollstonecraft Godwin, later known as Mary Shelley, was born. Mary Shelley is best known for her gothic novel *Frankenstein; or, The Modern Prometheus*, first published in 1818. The protagonist, Victor Frankenstein, is a young natural philosopher who manages to impart life to a creature made of relics from the dead, with terrible consequences. In the summer of 1816, Mary Shelley and her then lover and husband-to-be Percy Bysshe Shelley spent time in Switzerland with Lord Byron.⁴ During several rainy days, confined in Lord Byron's house, he and his guests read German ghost stories translated into French to distract themselves. Lord Byron then challenged Mary, Percy and his own personal physician John Polidori to a writing contest to demonstrate their skills. "We will each write a ghost story", said Lord Byron.⁵ The subject of the story was "The nature of the principle of life and whether there was any probability of

⁴ Mary Shelley, *Frankenstein, or The Modern Prometheus*, (first published 1818, reprinted Oxford World Classics, 2008), preface from the 1831 edition, p.194.

⁵ *Ibid.* p.194.

its ever being discovered and communicated.⁶ Mary came up with a story that would two years later become *Frankenstein*.

The *Air Pump* and *Frankenstein* were created exactly fifty years apart. Despite this period, the painting and the novel show some fascinating points of comparison. The November 1992 edition of *Frankenstein* and a later audiobook of October 1996 of *Three Classic Horror Stories (Frankenstein, Dracula and Dr. Jekyll and Mr. Hyde)* by publisher Penguin Classics actually used the *Air Pump* as their cover page. The *Air Pump* has usually been studied in the light of Wright of Derby's keen interest in the depiction of scientific experiments⁷ and his close connections to the Midlands circles of industrialists, natural philosophers and intellectuals of the Enlightenment and, in particular, some prominent members of the Lunar Society of Birmingham such as Erasmus Darwin and Joseph Priestley. Together with *Frankenstein*, the painting depicts a scientific experiment based on genuine research of the time and evidences the popularisation of science and dissemination of scientific knowledge. In this depiction of the scientific experiment, the painting shares the gothic atmosphere of *Frankenstein* and some of the philosophical thoughts of the Enlightenment. Another reading of both works in the light of religious symbolism opens the question of ethics and morality.

The experiment of the *Air Pump* is easy to understand: the air is pumped out of the glass bowl by two pistons and, a vacuum being created, any animal placed in the bowl is asphyxiated and may possibly die if the air is not readmitted in time. Despite the dramatic scenery of the *Air Pump*, such demonstration was not revolutionary in 1768. Invented in 1649 by Otto von Guericke, the air pump was already a well-known scientific instrument at the time. The first effective air pump built in England in 1658 for scientific purposes was used by Robert Boyle (Figure 2) in a series of tests he conducted to demonstrate the role and function of air in the respiration of animals.⁸ The *Air Pump* neither shows a breaking experiment nor makes history. As highlighted by Benedict Nicolson, the air pump was already a popular instrument in the eighteenth century and widely used by the scientific community.⁹ The audience in the *Air Pump* is clearly not comprised of scientists or experts: Wright of Derby depicts here different generations of people that might be the members of a same family. The focus seems to be the popularisation of science rather than trying to show any new ground-breaking scientific development. Indeed, Wright of Derby illustrates a demonstration of popular science in the form of public spectacle, rather than pure scientific research. The scientist Joseph Priestley used to teach his students to use instruments such as the air pump to entertain their families.¹⁰

⁶ Ibid.p.195.

⁷ See William Bemrose, *The Life and Works of Joseph Wright, A.R.A., Commonly Called "Wright of Derby"*, (Bemrose and Sons, London, 1885) or Benedict Nicolson, *Joseph Wright of Derby, Painter of Light*, Volume I, (Paul Mellon Foundation for British Art, London 1968).

⁸ Robert Boyle, *New Experiments Physico-Mechanical, Touching the Spring of the Air and Its Effects*, (Oxford, 1660).

⁹ Nicolson, *Joseph Wright of Derby*, p.112

¹⁰ Joseph Priestley, *Memoirs of Dr. Joseph Priestley, to the Year 1795, Written by Himself*, (London, ed. 1809), pp.36-37.

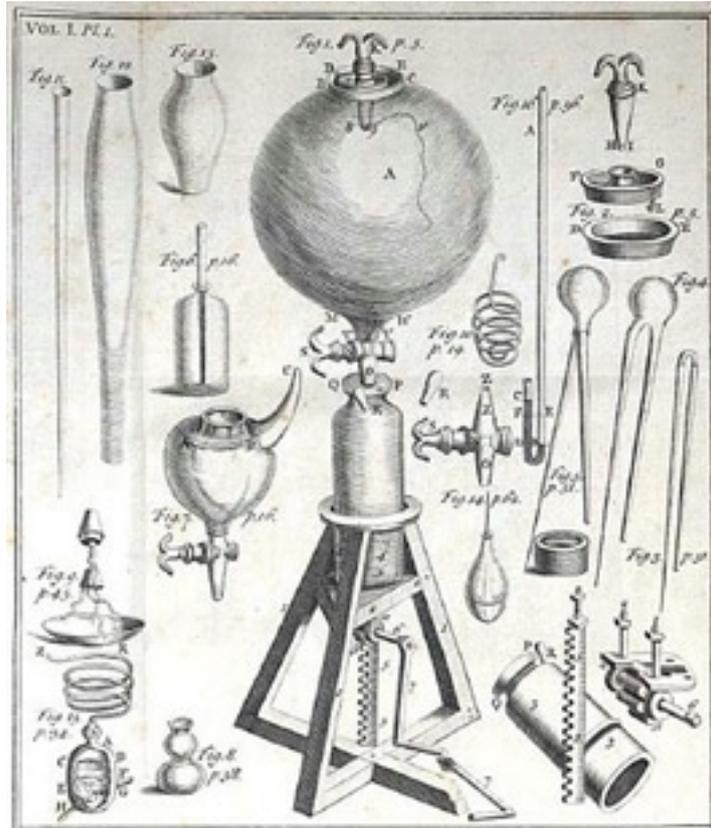


Figure 2: A Pneumatical Engine [or air pump] and its parts, from Boyle's *Spring and Weight of the Air* published in 1661 (engraving) (b/w photo), English School, (17th century) / Private Collection / Bridgeman Images.

Indeed, itinerant lecturers and natural philosophers used to hold scientific demonstrations in public to teach and disseminate scientific knowledge in accordance with Enlightenment values. In this form of entertainment, they would enthrall their audience with spectacular experiments, using instruments such as the air pump.¹¹ Wright of Derby certainly attended some of these scientific demonstrations. The model of air pump he depicts may well have been copied directly from the one used by the scientist James Ferguson who gave several lectures in Derby.¹² In the novel, Victor Frankenstein, following the path of any enlightened young scientist, explains that he avidly attended these lectures during his formative years '[...] my utmost wonder was engaged by some experiments on a airpump, which I saw employed by a gentleman whom we were in the habit of visiting.'¹³ In contrast to the painting, the experiment in *Frankenstein* is a radical and secretive one. From the public lecture of the *Air Pump*, we are now into the private and hidden laboratory of the apprentice-sorcerer. Despite being transgressive by nature, the experiment of Victor

¹¹ On the public spectacle of science, see Geoffrey Sutton, *Science for a Polite Society: Gender, Culture, and the Demonstration of Enlightenment*, (Colorado: Westview Press, 1995) or Simon Schaffer, 'Natural Philosophy and Public Spectacle in the Eighteenth Century', *History of Science*, xxi, (1983).

¹² Stephen Daniels, *Joseph Wright*, (Tate Gallery Publishing, 1999), p.40.

¹³ Shelley, *Frankenstein*, p.24.

Frankenstein is ground-breaking and is seen by him as a progress of science. When Mary Shelley refers to the ‘spark of being’ which animates the ‘lifeless thing’,¹⁴ this is possibly an allusion to Galvani’s contemporary experiments to animate dead animals with electric stimulation. She indeed mentions ‘galvanism’ as a source of inspiration in her introduction of the 1831 edition. Galvani’s nephew Aldini also attempted the reanimation of hanged criminals and managed to stimulate artificially some of the limbs of a dead criminal.¹⁵ Shelley also claimed that she took inspiration from the works of Erasmus Darwin to write her novel.¹⁶ Indeed, Darwin alluded to the creation of a monster from nature in his study *Zoonomia*:

For we can create nothing new, we can only combine or separate ideas, which we already received by our perceptions: thus if I wish to represent a monster, I call to mind the ideas of every thing disagreeable and horrible, and combine the nastiness and gluttony of a hog, the stupidity and obstinacy of an ass, with the fur and awkwardness of a bear, and call the new combination Caliban. Yet such a monster may exist in nature, as all his attributes are parts of nature.¹⁷

Erasmus Darwin was coincidentally a founding member of the Lunar Society and a close acquaintance of Joseph Wright of Derby. Darwin, who moved to Derby after 1780, was also the physician who treated Joseph Wright of Derby for his asthma. Darwin’s strong influence on the writer and the artist either as a source of inspiration or as a reference cannot be completely ignored and evidences the influence of the Enlightenment on Shelley and Wright of Derby.

In the depiction of popular and accessible science, both works encapsulate a gothic atmosphere. This atmosphere clearly contributed to the success and popularity of these works, by creating a feeling of mystery and horror. Shelley’s novel is usually described as a subgenre of gothic, the gothic horror. The combination of light and dark and multiple allusions to the moon are dominant gothic tropes. Indeed, Victor Frankenstein, in his narrative, constantly refers to night and day, light and dark or the moonlit atmosphere: ‘Until from the midst of this darkness a sudden light broke in upon me – a light so brilliant and wondrous [...]’¹⁸ In another passage: ‘[...] the moon gazed on my midnight labours, while, with unrelaxed and breathless eagerness, I pursued nature to her hiding places.’¹⁹ The creature also experiences light and dark: ‘Darkness then came over me, and troubled me; but hardly had I felt this, when, by opening my eyes, as I now suppose, the light poured in upon me again.’²⁰

¹⁴ Ibid.p.38.

¹⁵ Sharon Ruston, *The science of life and death in Mary Shelley’s Frankenstein*, Article published on the British Library website (<https://www.bl.uk/romantics-and-victorians/articles/the-science-of-life-and-death-in-mary-shelleys-frankenstein>) [accessed: 11 March 2017].

¹⁶ Shelley, *Frankenstein*, pp. 3 and 195.

¹⁷ Erasmus Darwin, *Zoonomia; or the Laws of Organic Life*, (London, 1794), p.132.

¹⁸ Shelley, *Frankenstein*, p.34.

¹⁹ Ibid. p.36.

²⁰ Ibid. p.80.

Similarly, the *Air Pump*, through Wright of Derby's clever use of *chiaroscuro*, confronts the viewer with a stark contrast of light and dark. The atmosphere of the painting is also haunting and feels, surprisingly, very gothic. The viewer is drawn into the painting by the light. The main light source is a single candle hidden behind the jar containing the skull. A second light source appears on the right through the window in the form of a full moon, maybe a hidden reference to the Lunar Society? We also distinguish through the window, a dead tree, and what resembles the ruins of a castle or a church, both intriguing artistic representations which can be found later in the gothic genre. The painting was however created only four years after Horace Walpole's novel *The Castle of Otranto* (1764), which established gothic fiction as a new literary genre. There is no suggestion here that Wright of Derby read the novel or was influenced in any way by this new genre when he painted this particular scene. However, this gothic atmosphere is quite peculiar in this artwork and clearly stood out when it was exhibited the first time. Another aspect of the gothic narrative is the expression of fear and horror. In the following passage of the novel, Frankenstein describes for example his horrific and dark practices:

Darkness had no effect upon my fancy; and a church-yard was to me merely the receptacle of bodies deprived of life, which, from being the seat of beauty and strength had become food for the worm. Now I was [...] forced to spend days and nights in vaults and charnel houses.²¹

In the painting, the reflection of the light on the figure of the scientist accentuates the wild appearance of the man, like a magician or sorcerer emerging from the shadows. A feeling of terror, expressed by the petrified attitude of the two children, captivates the imagination of the viewer. Influenced by *Frankenstein's* modern adaptations or portrayals, the modern viewer may see the natural philosopher of Wright of Derby's *Air Pump* with his wild hair and staring eyes as the archetype of the sorcerer or 'mad scientist'.

Beyond the pure scientific representation and the dissemination of knowledge, both works seem to reflect or borrow from the Enlightenment philosophers and, in particular, John Locke and David Hume. The painting as well as the novel appears to embody certain principles and methods of the empiricist theory. In his *Enquiry concerning Human Understanding*, David Hume makes the proposition that 'causes and effects are discoverable, not by reason, but by experience [...]'.²² Hume suggests that we usually infer causation on the basis of our sensory experience of the conjunction of two things. He applies an inductive reasoning process by which a series of observations or experiences lead us to formulate causation. The experiment of the *Air Pump* reproduces indeed an experiment conducted by Robert Boyle in 1660 to infer the

²¹ Ibid. p.34.

²² David Hume, *An Enquiry concerning Human Understanding*, (first published in 1748, reprinted Oxford World Classics, 2007), paragraph 28, p.20.

role of air in the respiration of animals: the bird suffocates and suffers when the air is removed from the receiver and revives when the air is readmitted. Boyle applies here an inductive reasoning to various experiments he made. Similarly, Monique R. Morgan argues that the acquisition of knowledge by creature in *Frankenstein* resembles David Hume's proposition on causation through our sensory experience. As she highlights:

Hume's hypothetical situation aptly describes how Frankenstein's creature is 'brought on a sudden into this world,' endowed from the start 'with the strongest faculties of reason and reflection,' and yet devoid of experience. As Hume predicts the creature is eventually able to infer cause and effect once 'he has acquired more experience'.²³

Another influence of empiricist theory is also visible in the *Air Pump*, whereby the use of *chiaroscuro* recalls the metaphor of the mind as a darkened room made by John Locke in his *Essay concerning Human Understanding*. Indeed, Locke explains: 'That external and internal Sensation, are the only passages that I can find, of Knowledge, to the Understanding. These alone, as far as I can discover, are the Windows by which light is let into this dark Room.'²⁴ In the painting, the darkness of the room symbolises our ignorance and the source of light symbolises our understanding of nature: we are 'enlightened'. Through external (visual) and internal (feeling for the bird) experience we gain knowledge and understanding. The classical doorway accentuates this idea that we are experiencing revelation in the 'temple' of Enlightenment.

During the eighteenth century, some thinkers of the Enlightenment embraced the scientific revolution and attempted at the same time to reconcile it with religion. The famous epitaph written by the poet Alexander Pope for Isaac Newton illustrates this well:

Nature and Nature's laws lay hid in night:
God said, Let Newton be! and all was light.²⁵

Pursuant to this new natural theology, religion would be no longer grounded on faith and divine revelation, but could now be backed by reason and science.²⁶ The *Air Pump* contains a visual religious narrative inspired from this natural theology. Indeed, Wright of Derby depicts the scene in the manner of Caravaggio, using a theatrical *chiaroscuro* to accentuate the mystique aspect of the scene and bring a religious atmosphere. The range of emotions of the audience is also significant in

²³ Monique R. Morgan, 'Frankenstein's Singular Events; Inductive Reasoning, Narrative Technique, and Generic Classification'. *Romanticism on the Net*. No.44 Nov. 2006.

²⁴ John Locke, *An Essay concerning Human Understanding*, (first published in 1689, reprinted Oxford World Classics, 2008), paragraph 17, p.96.

²⁵ Alexander Pope, quoted by Peter Millican in Hume, *An Enquiry*, introduction p.xxiv.

²⁶ Peter Millican in Hume, *An Enquiry*, p.xxiv.

its religious symbolism, because the representation of emotion in art was reserved for religious imagery during the Renaissance. Joseph Priestley wrote in 1761: '[...] real history resembles the experiments with the air pump, condensing engine and electrical machine, which exhibit the operations of nature, and the nature of God himself.'²⁷ In the *Air Pump*, Wright of Derby depicts such an operation of nature, and viewers of the time would have seen this experiment as the 'overpowering sensation of awe in the face of God's work.'²⁸ Wright of Derby is illustrating here the 'invisible hand of God' and his almighty power over life and death. The natural philosopher, the white cockatoo and the old man could represent a Holy Trinity: the scientist with a Christ-like figure at the centre among his disciples, the white dove of the Holy Spirit and the old man meditating in front of a skull, as the Father figure. Similarly, in *Frankenstein*, Victor Frankenstein compares himself to the Creator (God) when he claims that:

A new species would bless me as its creator and source; many happy and excellent natures would owe their being to me. No father could claim the gratitude of his child so completely as I should deserve theirs.²⁹

This religious symbolism in *Frankenstein* raised some criticism when the novel was first published. In particular, Sir Walter Scott wrote a review of the novel. He generally praised the writing qualities of Shelley but criticised vigorously the almost blasphemous idea that a man could take on the role of the Creator.³⁰

The novel and the painting share the theme of the mutability of life. In the novel, Mary Shelley also reproduces some verses of the poem 'Mutability' by Percy Shelley. This passage from one stage of nature to another through transformation is very present in the novel. The creature of *Frankenstein* is created from the dead and brought to life. In the *Air Pump*, the bird is suffocating and about to die, but can revive at any moment by decision of the scientist. We can visualise here a sort of cycle of life and death. Frankenstein claims that 'Life and Death appeared to me ideal bounds, which I should first break through, and pour a torrent of light into our dark world.'³¹ Equally, the skull in the painting reminds us of death. It can be interpreted in this scene as a visual symbol of spiritual significance such as a *vanitas* or *memento mori*, to illustrate the transience of life or the certainty of death.

In his *Treatise on Ancient Painting*, Georges Turnbull expresses the idea that painting should contribute to natural philosophy and morality. He explains that 'Pictures are of two sorts, natural and moral', the former represent 'Samples of Nature's visible Beauties, and for that Reason Samples and Experiments in natural Philosophy'

²⁷ Joseph Priestley, *Lectures on History and General Policy*, ed. J.T.Rutt (London, Cheapside, reprinted 1826), p.30.

²⁸ Helmers, 'Painting as a Rhetorical Performance', p. 76.

²⁹ Shelley, *Frankenstein*, p.36.

³⁰ Review by Sir Walter Scott, *The Edinburgh Magazine*, March 1818, p. 249-253.

³¹ Shelley, *Frankenstein*, p.36.

and also argues that ‘moral Pictures’ are ‘Samples of moral Nature, or of the Laws and Connexions of the moral World, and therefore Samples in moral Philosophy.’³² According to David Solkin, Turnbull reformulates the aesthetic philosophy of the Earl of Shaftesbury. Turnbull does not strictly separate these ‘two sorts’ and considers painting as a form of cultural expression which combines moral and natural philosophy for the improvement of human understanding.³³ In this sense, the *Air Pump* is not only a painting showing an experiment in natural philosophy, but it also clearly provokes a moral debate. The suffering of the bird seems unnecessarily cruel, particularly if the experiment is seen as a form of entertainment. The dismay of the young girl is an illustration of it. Viewers at the time would also have seen it similarly. Indeed, as highlighted by James Ferguson in his *Lectures on Select Subjects* in 1764:

If a fowl, a cat, rat, mouse or bird, be put under the receiver, and the air be exhausted, the animal is at first oppressed as with a great weight, then grows convulsed, and at last expires in all the agonies of a most bitter and cruel death. But as this Experiment is too shocking to every spectator who has the least degree of humanity, we substitute a machine called the lungs-glass in place of the animal [...].³⁴

Wright of Derby’s choices of subject and composition show that the painting was intended to be seen by a larger audience. He knew that his painting would be widely seen because it was exhibited in London at the Society of Artists in 1768 and reproduced in prints in 1769. Why then does Wright of Derby represent a white cockatoo, a rare and expensive bird ‘and one whose life would never in reality have been risked in an experiment such as this’?³⁵ The answer is maybe that Wright of Derby wanted to use this dramatic visual device, in order to highlight the risks of science and its consumption for popular entertainment.

More generally, the painting raises the question of the benevolence of science: is science always a source of real positive progress? Is it God that is defeated by science in this painting, whereby the viewer becomes himself God because he can decide upon the life or death of the bird? These questions of morality and benevolence of science are very pertinent in the context of *Frankenstein* because Victor is initially pursuing a noble cause: ‘if I could banish disease from the human frame, and render man invulnerable to any but a violent death!’, but ends up making himself God Creator by vanity. Is his experiment a success (he revived the dead) or a failure (what he created is a monster)? In François Rabelais’s *Gargantua*, Gargantua teaches his son Pantagruel that ‘*science sans conscience n’est que ruine de l’âme*’ (Science/knowledge without conscience

³² Georges Turnbull, *Treatise on Ancient Painting*, (London, 1740), p.145.

³³ David Solkin, ‘ReWriting Shaftesbury. The *Air Pump* and the limits of commercial humanism’, in *Early Modern Conceptions of Property (Consumption & Culture in the 17th & 18th century)* (John Brewer, 1995), p.236.

³⁴ David Brewster, *Ferguson’s lectures on select subjects*, (Edinburgh, second edition, 1806), vol. I, p.228. This is a re-edition of lectures published by Ferguson in 1764.

³⁵ Judy Egerton, *National Gallery Catalogues (new series): The British School (1998) Catalogue entry*, p. 340.

is nothing but the ruin of the soul).³⁶ Both the *Air Pump* and *Frankenstein* allude to this moral dilemma of science and, whereas they both celebrate some values of the Enlightenment in the public diffusion of knowledge, they also demonstrate its limits. These two works are opening up the ethical question of conscience in the scientific experiment. Could they be seen as precursors of the modern bioethics?

BIBLIOGRAPHY

Primary sources:

“A lover of the arts”, *The Gazetteer and New Daily Advertiser*, 23rd May 1768, p.4.

Robert Boyle, *New Experiments Physico-Mechanical, Touching the Spring of the Air and Its Effects*, (Oxford, 1660).

David Brewster, *Ferguson’s lectures on select subjects*, (Edinburgh, second edition, 1806).

Erasmus Darwin, *Zoonomia; or the Laws of Organic Life*, (London, 1794).

David Hume, *An Enquiry concerning Human Understanding*, (first published in 1748, reprinted Oxford World Classics, 2007).

John Locke, *An Essay concerning Human Understanding*, (first published in 1689, reprinted Oxford World Classics, 2008).

Joseph Priestley, *Lectures on History and General Policy*, ed. J. T. Rutt (London, Cheapside, reprinted 1826)

_____, *Memoirs of Dr. Joseph Priestley, to the Year 1795, Written by Himself*, (London, ed. 1809).

François Rabelais, *The Very Horrific Life of Great Gargantua, Father of Pantagruel* (also referred to as *Gargantua*), 1534.

Sir Walter Scott, *The Edinburgh Magazine*, March 1818, pp. 249-253.

Mary Shelley, *Frankenstein, or The Modern Prometheus*, (first published 1818, reprinted Oxford World Classics, 2008), preface from the 1831 edition.

Georges Turnbull, *Treatise on Ancient Painting*, (London, 1740).

³⁶ François Rabelais, *The Very Horrific Life of Great Gargantua, Father of Pantagruel* (also referred to as *Gargantua*), 1534.

Secondary sources:

William Bemrose, *The Life and Works of Joseph Wright, A.R.A., Commonly Called "Wright of Derby"*, (Bemrose and Sons, London, 1885).

Stephen Daniels, *Joseph Wright*, (Tate Gallery Publishing, 1999).

Judy Egerton, National Gallery Catalogues (new series): *The British School* (1998)
Catalogue entry.

Marguerite Helmers, 'Painting as a Rhetorical Performance: Joseph Wright's *An experiment on a Bird in the Air Pump*', *JAC* Vol. 21.1 (2001), available from <http://www.jaconlinejournal.com>.

Monique R. Morgan, 'Frankenstein's Singular Events; Inductive Reasoning, Narrative Technique, and Generic Classification'. *Romanticism on the Net*. No.44 Nov. 2006.

Benedict Nicolson, *Joseph Wright of Derby, Painter of Light*, Volume I, (Paul Mellon Foundation for British Art, London 1968).

Sharon Ruston, 'The science of life and death in Mary Shelley's *Frankenstein*', Article published on the British Library website (<https://www.bl.uk/romantics-and-victorians/articles/the-science-of-life-and-death-in-mary-shelleys-frankenstein>) [accessed: 11 March 2017].

David Solkin, *Painting for Money: The Visual Arts and the Public Sphere in 18th-Century England*, (Yale, 1993).

David Solkin, 'ReWriting Shaftesbury. The Air Pump and the limits of commercial humanism', in *Early Modern Conceptions of Property (Consumption & Culture in the 17th & 18th century)* (John Brewer, 1995).

Simon Schaffer, 'Natural Philosophy and Public Spectacle in the Eighteenth Century', *History of Science*, xxi, (1983).

Geoffrey Sutton, *Science for a Polite Society: Gender, Culture, and the Demonstration of Enlightenment*, (Colorado: Westview Press, 1995).