Technologies of Illusion:
De Loutherbourg's Eidophusikon in Eighteenth-Century London
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Detail from Edward Francis Burney, *The Eidophusikon showing Satan arraying his Troops on the Banks of a Fiery Lake with the Rising of the Palace of Pandemonium from Milton, c.* 1782 (*plate 1*).

On 26 February 1781 a novel attraction opened in Lisle Street, Leicester Square. Described in a press announcement as 'Moving Pictures representing Phenomena of Nature', the new spectacle was the 'Eidophusikon'. It was the first of several visual attractions with Greek-inspired names – 'Panorama', 'Cosmorama', 'Eidometropolis', and 'Diorama' – that were to appear in the next few years and provide London audiences with immersive experiences of landscape.[1] 'Eidophusikon' derives from *eidoion* ('phantom', 'image' or 'apparition') combined with *phusis* ('nature' or 'natural appearance') and *eikon* ('image' or 'likeness'). The blending of the natural with the supernatural, implied in its name, suited the Eidophusikon's magical simulations of natural scenes. Like so many of the visual attractions of the time, the Eidophusikon hovered between the worlds of art and technology, entertainment and science; moreover, in its illusions, it evoked the magical and uncanny.

The Eidophusikon's mixture of technical wizardry and visual magic touched on a number of issues that would in successive years come to define the boundaries between art and technology, art and entertainment, science and spectacle. As one of the earliest examples of technology-driven visual entertainment, the Eidophusikon clearly prefigures modern cinema. But understanding the attraction's cultural and historical significance as an eighteenth-century object requires consideration of such apparently disparate subjects as theatrical scenography, clockwork automata, theories of the natural world, occult metaphysics, *plein air* oil sketching, landscape painting, and the production of immersive visual entertainments.

The one surviving image of the Eidophusikon is Edward Francis Burney's watercolour drawing from 1782 (*plate 1*). This drawing depicts a theatre interior with some figures entering and others already seated on benches. To the right, separated from the audience by a low enclosure, is a harpsichord. The audience faces a miniature stage framed by a proscenium arch. Two metres wide, one and a quarter metres high, and two and a half metres deep, this stage was used to present a series of scenic illusions designed to mimic natural phenomena. These illusions employed changing light effects to simulate different times of day and various atmospheric conditions. The scenes were accompanied by sound effects and by music by Johann Christian Bach, Michael Arne and Charles Burney, performed on the harpsichord, and occasionally accompanied by singing.

The Eidophusikon's inventor was the Strasbourg-born artist Philippe Jacques de Loutherbourg (1740–1812).[2] A mechanical genius as well as a talented landscape painter and a revolutionary stage designer, de Loutherbourg was a member of
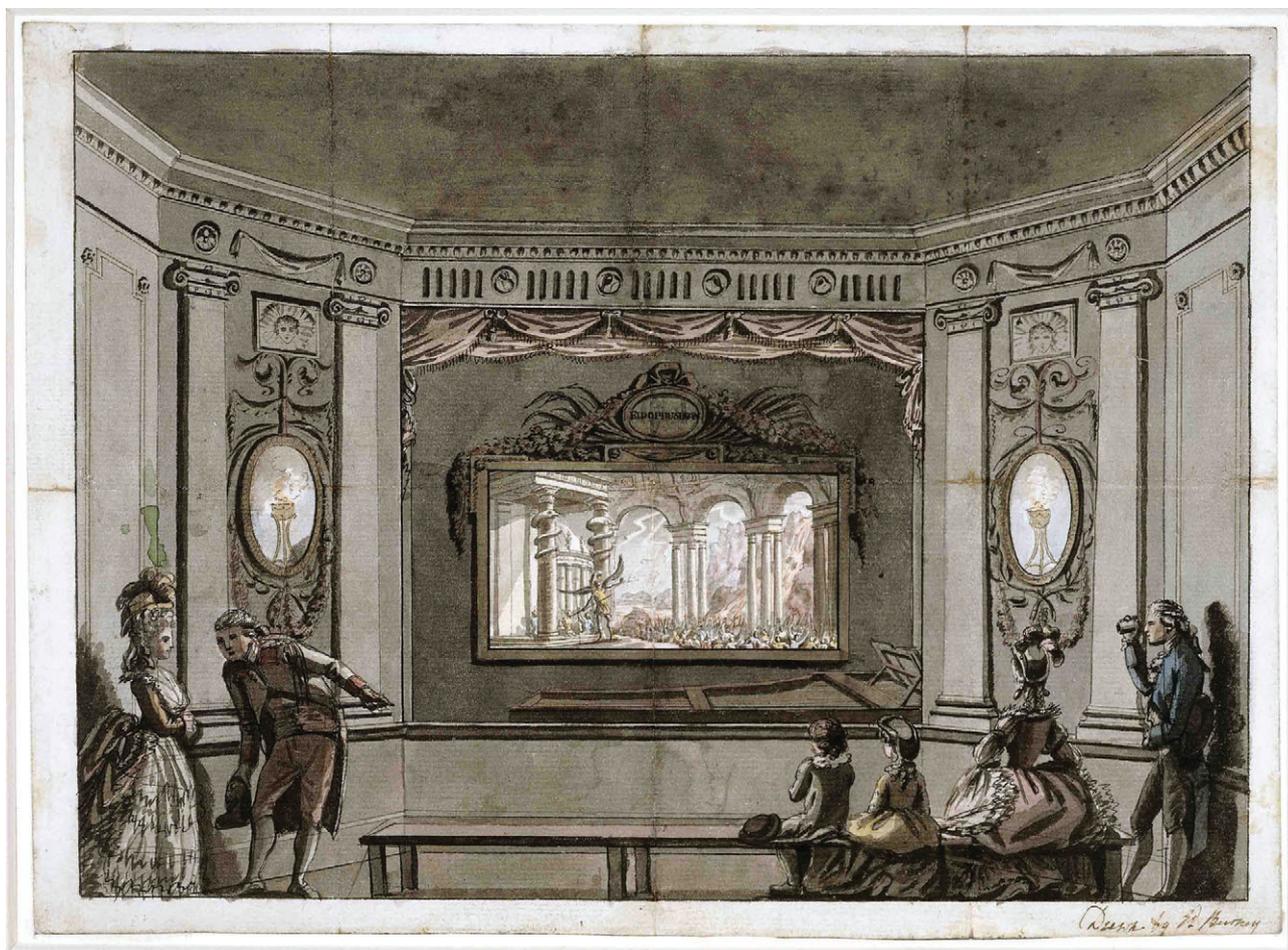
1 Edward Francis Burney,
The Eidophusikon showing
Satan arraying his Troops on
the Banks of a Fiery Lake with
the Rising of the Palace of
Pandemonium from Milton, c.
1782. **Watercolour on paper,**
19.7 × 27.3 cm. London: British
Museum. Photo: © Trustees of
the British Museum.

both the French and the British royal academies. His London career oscillated for ten years between the exhibition room and the theatre, and his reputation rested on success in both venues. De Loutherbourg's place in history, however, has been complicated by his career in two countries and by his versatility. Is he a French artist or an English one? Does he belong to the history of painting or theatre? Was he an artist or a mechanic?[3] Also perplexing to anyone attempting to assess de Loutherbourg's significance is his reputation as a 'mystagogue', an occult philosopher, deeply read in alchemy, Behmenist theosophy, Kabbalah, Masonry, Rosicrucianism, and Swedenborgianism.[4] For a short time, he left painting altogether to follow the notorious Count Cagliostro, after which he became, briefly, a mesmeric healer. De Loutherbourg's irregular career can leave biographers bewildered by a remarkable artistic talent apparently wasted on diversions and occult experiments. In this context, the Eidophusikon may appear as one more example of de Loutherbourg's eccentricity.

I would suggest, however, that puzzlement over de Loutherbourg's interests helps to measure the cultural distance between his time and ours. As I hope to show, the Eidophusikon was no mere diversion but central to de Loutherbourg's career and to his conception of himself as an artist and a thinker. As I also hope to demonstrate, the Eidophusikon's aesthetic and philosophical complexity – its seamless incorporation of mechanistic, empirical and spiritualistic theories of nature – reveals something distinctive about the place of art and technology at the end of the eighteenth century. It may be tempting to see the Eidophusikon as looking back to seventeenth-century mechanistic philosophy and forward to nineteenth-century idealism, but my point

is that it was the paradoxical mix of the mechanical and empirical with the aesthetic and spiritual that defined the approach to the natural world in this moment.

Artist and Scenographer

The son of an artist, Philippe de Loutherbourg displayed an early love of painting. His father, however, imagined a career for him in engineering, while his mother wanted him to become a minister. The youth was enrolled at the Strasbourg gymnasium, an eminent Lutheran centre, where, perhaps seeking to please both parents, he studied mathematics in order to prepare for engineering, and studied philosophy, languages and theology to prepare to take orders. At fifteen, however, he moved to Paris to become an artist, studying with Carle van Loo and Francesco Giuseppe Casanova. Nonetheless, his early studies in mechanics and what one early biographer calls 'the deepest and most abstruse points' of mystical philosophy were to prove important in his later work, and were crucial to the conception and construction of the Eidophusikon.[5]

In Paris, de Loutherbourg established himself as a prodigy. At twenty-one, he began exhibiting at the Salon where he attracted the interest of Denis Diderot. He was nominated as a *peintre du roi* in 1766 and elected to the Académie in 1767, the youngest man to achieve that recognition. De Loutherbourg was a prolific exhibitor; his submissions to the Paris Salons included battle paintings in the style of his master Casanova, and landscapes derived from the pastoral examples of Nicolaes Berchem or the sublime scenes of Salvator Rosa. In his treatment of light and atmosphere, however, de Loutherbourg followed the example of the great contemporary marine and landscape painter Claude-Joseph Vernet, whose paintings were the product of years of *plein air* oil sketching, beginning when he was a young man in Rome.[6] Vernet's work emphasized varying times of day, seasons, and dramatic aerial effects produced by sunrises, sunsets, storms, and moonlight. Echoing Vernet's example and anticipating the subjects he would later develop in the Eidophusikon, de Loutherbourg debuted at the Salon in 1763 with paintings of the four times of day, followed in 1765 by pendants depicting *A Morning after the Rain* and *The Beginning of a Storm at Sunset*.

In his Salon criticism, Diderot complimented de Loutherbourg's 1765 offerings, speaking of his 'beautiful light, beautiful effects', and 'sublime imitation of nature'. At the same time, Diderot observed in de Loutherbourg's work a tendency toward the formulaic and an occasional heavy-handedness. Diderot concluded his 1765 review by comparing de Loutherbourg to Vernet, noting that the young man's landscapes had less 'tonal refinement' than Vernet's work, but that, nonetheless, their effects were 'fully achieved'.[7] In 1767, however, in commenting on one of de Loutherbourg's submissions, Diderot wrote, 'The sky is one of this artist's heaviest and worst; it is a big chunk of lapis lazuli ready for the stonecutter's blade.' Perhaps more wounding, however, was a sardonic invocation of Vernet: Diderot wrote 'Either Loutherbourg's sky is lumpy and ponderous or comparable skies by Vernet have too much lightness, liquidity and movement. Monsieur de Loutherbourg, go back and look at the sea; you've visited some stables, that's clear, but you have never seen a storm at sea.'[8] Such criticisms of his landscape painting, and in particular his use of colour, would follow de Loutherbourg throughout his career.

In November 1771, for reasons that most likely concerned a disastrous marriage, de Loutherbourg left Paris for London, abandoning his pregnant wife and five children.[9] Travelling with the pyrotechnicist Giovanni Battista Torré, he arrived with a letter of introduction to David Garrick from Jean Monnet, retired director

of the Opéra Comique, describing him as one of France's most distinguished painters. Garrick, who was manager of the Theatre Royal in Drury Lane, hired de Loutherbourg to design scenery for entertainments and pantomimes, which, unlike plays, were primarily visual spectacles. Remarkably, Garrick allowed de Loutherbourg complete artistic control over the *mise-en-scène*.[10]

De Loutherbourg's movement into theatre design is not quite as inexplicable as it might first appear. Diderot had already linked the two arts in his writings about theatre, arguing that theatrical scenes should follow the example of dramatic painting with each scene consisting of visually expressive tableaux that would follow each other in a seamless succession As Michael Fried points out, Diderot's attraction to de Loutherbourg's landscapes was due to their extreme effects and their dramatic, climatic subjects.[11] De Loutherbourg's scenography, like the Eidophusikon which was to follow, fulfilled Diderot's desire to make theatrical scenes look like sublime paintings, and to incorporate them into an unfolding visual narrative.

One of de Loutherbourg's greatest theatrical triumphs in this mode was his 1778 production of *Wonders of Derbyshire, or Harlequin on the Peak*, a series of sixteen set designs based on studies of the Derbyshire Peak District that de Loutherbourg had made the previous summer. The sets were fabricated by the Drury Lane carpenters and painters from de Loutherbourg's models, several of which are preserved in the Victoria and Albert Museum. While landscape sets in this period, like many landscape paintings, were typically generic and conventional, these models demonstrate that de Loutherbourg depicted trees, rocks and water in exquisite detail. The sets highlight the sublime Derbyshire scenery, including the cave known as Peak's Hole, where rope makers worked, and the famous mountain Matlock Tor. Henry Angelo, a friend of de Loutherbourg, observed, 'Never were such romantic and picturesque paintings exhibited in that theatre before.' They 'gave you an idea of the mountains and waterfalls, most beautifully executed, exhibiting terrific appearance'.[12]

De Loutherbourg's stage designs revolutionized plays as well as pantomimes. He is credited today with creating the realist stage. As Christopher Baugh has explained, rather than presenting actors in front of a scene, de Loutherbourg's designs integrated them into the setting, heightening the illusion of reality and transforming the relationship between the actor and the audience.[13] Prologues and epilogues disappeared; the stage, set off by a proscenium arch, receded. The auditorium became progressively darker, focusing attention on the spectacle and absorbing spectators into the scenic illusion. Theatre became as much a visual as a verbal medium.

'A new species of painting'

The Eidophusikon should be understood as de Loutherbourg's masterpiece in landscape, the summation of all the innovative stage magic he had wrought at Drury Lane as well as in his earlier exhibition paintings. At the show's opening in February 1781, he displayed five scenes (*plate* 2):

1. 'Aurora, or the effects of the dawn, with a view of London from Greenwich Park'
2. 'Noon, the Port of Tangier in Africa, with the distant view of Gibraltar and Europa Point'
3. 'Sunset, a view over Naples'
4. 'Moonlight, a view of the Mediterranean'
5. 'A Storm and Shipwreck'

Sometime during the run, the second scene – Tangier with a distant view of Gibraltar – was replaced with a subject from the recently declared war with the Dutch, 'The Bringing of the French and Dutch Prizes into the Port of Plymouth'.[14] Between scenes, de Loutherbourg entertained the audience with transparencies and musical performances.

Describing the show's effect, *The Morning Herald* reported that 'the eagerness of curiosity is so great, that as the scenes follow each other in a quick succession, the spectators too frequently rise from their seats, as to destroy the perspective effects of the picture'.[15] Commenting on the illusion, the *London Courant* exclaimed that had de Loutherbourg lived at the time of Galileo, he might have been charged with 'conjuration' as one who 'by the black arts, had captivated the sun, moon, and stars, and collected clouds, thunder, and lightning, by the aid of the Devil'.[16]

2 Advertisement for the First Season of the Eidophusikon, 1781. Letterpress, dimensions unknown. London: British Library (937.f.2/8(99)). Photo: © The British Library Board.

The success of the spectacle was such that de Loutherbourg produced a sequel that opened in December 1781 and ran until the end of May 1782. Again he displayed five scenes (*plate 3*):

1. 'The Sun rising through fog, an Italian seaport'
2. 'The Cataract of Niagara, in North America'
3. 'The setting of the Sun, after a rainy day, with a view of the Castle, Town and Cliffs of Dover'
4. 'The Rising of the Moon, with a waterspout exhibiting the effect of three lights, with a view of a rocky shore on the coast of Japan'
5. 'Satan arraying his troops on the banks of the fiery lake, with the rising of Pandemonium, from Milton'

The two seasons, we can note, chart a pattern: images of four times of day (dawn, noon, sunset, and night) followed by a sensational finale. In the first offering, the finale features the storm and shipwreck, and in the second, the rising of Pandemonium. This depiction of Pandemonium, the Eidophusikon's most dramatic illusionist triumph, is the scene portrayed in Francis Burney's 1782 watercolour, mentioned above (see *plate 1*).

One of the most complete contemporary descriptions of the Eidophusikon's illusions comes from the artist William Henry Pyne. His account of the first season's opening scene, 'Aurora, or the effects of dawn', conveys a sense of how subtle and dynamic the spectacle was:

> This scene on the rising of the curtain, was enveloped in a mysterious light which is the pre-cursor of day-break, so true to nature, that the imagination of the spectator sniffed the sweet breath of morn. A faint light appeared along the horizon; the scene assumed a vaporish tint of grey; presently a gleam of saffron, changing to the pure varieties that tinge the fleecy clouds that pass away in morning mist; the picture brightened by degrees; the sun appeared, gilding the tops of the trees and the projections of the lofty buildings, and burnishing the vanes on the cupolas; when the whole scene burst upon the eye in gorgeous splendour of a beauteous day.[17]

Pyne's account of the first season's sublime climax – the storm and shipwreck – suggests why that scene in particular thrilled de Loutherbourg's audiences. The storm, Pyne writes, was 'awful and astonishing'. The 'conflict of the raging elements' was 'described with all its characteristic horrors of wind, hail, thunder, lightning, and roaring of the waves, with such marvellous imitation of nature, that mariners have declared, whilst viewing the scene, that it amounted to reality'.[18]

The effect of the scene of the storm and shipwreck on the audience was uncanny in that it erased the distinction between image and reality.[19] In comparing de Loutherbourg's storm to one raging outside, Thomas Gainsborough, who often visited the Eidophusikon, declared that the artificial tempest surpassed the natural: 'De Loutherbourg, our thunder is best'.[20] At another performance a woman in the audience pointed fearfully to a storm gathering outside the theatre. 'The consternation', Pyne writes, 'caused many to retire to the lobby, some of whom, moved by terror or superstition, observed "that the exhibition was presumptuous". We moved to the gallery, and opening a door, stood upon the landing place, where we could compare the real with the artificial storm . . . it was sagely determined that

man was an extraordinary creature, who could create a copy of Nature, to be taken for Nature's self.'[21]

An article that appeared in the *European Magazine* in March 1782 described the Eidophusikon as a 'new species of painting', one that transcended 'common painting' by introducing the element of time. These 'canvases', according to the writer, 'copy the gradual workings of nature in her most important scenes'.[22] In a similar vein, *The Morning Chronicle* called the scenes of the first season 'beautiful beyond description . . . closer imitations of nature than any efforts of art we ever beheld before'.[23] These comments suggest that the Eidophusikon was received, as indeed it was promoted, as a new and improved kind of landscape painting. Moreover, the choice of

subjects – dawn, the sun rising through fog, moonrise, a sunset after rain, storms at sea, lightning and fire – reveal how much the 'canvases' owed to Vernet's landscapes and de Loutherbourg's variations on them.

The early accounts of the Eidophusikon emphasize de Loutherbourg's fusion of art and technology. One review, for example, called the scenes of the first season 'the most beautiful representations of nature that were ever effected, by mechanism, and painting'.[24] Another noted that in the show, de Loutherbourg's 'great merit as a painter' was married to 'his skill as a mechanist', and a third observed the happy union of 'the painter and the mechanic'.[25] As Pyne's account makes clear, de Loutherbourg's effects were indeed mechanically-produced. Scenes were animated by changing lights that played over moving parts and coloured scrims. These visual effects were accompanied by sound effects, such as thunder that was created using a suspended copper sheet, rain imitated by turning a box filled with seeds and pebbles, and an eerie whistling wind made by a pair of drum heads rubbing together. Sets were composed of painted flats and three-dimensional models of buildings, trees and rocks. The Greenwich scene, for example, was built from rows of cut-out pasteboard, with a foreground made from pieces of cork that had been cut to suggest a sand-pit covered in moss and lichen, and with individually constructed ships and trees. The moving clouds that played an important part in the effect were images imprinted in semi-transparent colours on a long linen strip some twenty times the span of the stage. The strip was gradually unrolled by a winding machine, with backlighting arranged so that the images cast drifting shadows over the landscape.[26]

As in Drury Lane spectacles, the Eidophusikon's effects relied heavily on dynamic lighting. To vary the quality of light, de Loutherbourg created a machine in which screens of red, purple, blue, and yellow coloured glass rotated in front of lamps hidden in the proscenium arch, thereby projecting changing colours onto the scene. Meanwhile, shifts from front- to backlighting supplied transitions for times of day and atmospheric effects.[27] Remarking on the illusionistic lighting, the *European Magazine* observed that de Loutherbourg achieved 'a harmony in all the movements which completes the deception – There is no harsh, irregular or hasty transition – the progressions are uniform, and have the slowness and constancy of the operations which they imitate.'[28] In the Pandemonium scene, the effect of the coloured lights was particularly dramatic. Pyne reported that in this presentation, the lights 'threw their whole influence upon the scene, as it rapidly changed, now to a sulphurous blue, then to a lurid red, and then again to a pale vivid light, and ultimately to a mysterious combination of the glasses, such as a bright furnace exhibits in fusing metals'.[29] De Loutherbourg's use of lighting effects demonstrated how one could paint with light.

De Loutherbourg charged five shillings admission, a standard fee for a London attraction, though not inconsiderable when compared to the one shilling charged for admission to the annual Royal Academy exhibition. After two seasons, however, he sold the attraction to his assistant, a man named Chapman, who appears to have taken it on tour. Nothing is heard of the Eidophusikon again until spring 1785 when the Pandemonium scene, along with several other unrelated attractions, was exhibited at Exeter Change for one shilling.[30] The following year Chapman reopened the attraction at Exeter Change with several of de Loutherbourg's scenes, including Pandemonium, and the storm and shipwreck, now linked to the recent, tragic loss of the Halsewell off the Dorset Coast.[31] Before closing to refurbish his attraction, Chapman hired a guitar-playing Polish dwarf. The 'Count', as he was called, was

described by the *Morning Herald* as, like the Eidophusikon itself, a 'prodigy of nature'.[32] For this amplified programme, Chapman charged three shillings for prime seats, two for others. When Chapman reopened the attraction in Spring Gardens in 1793, again at three and two shillings admission, the show included magic tricks and acrobatic acts. Six years later Chapman advertised a 'new Eidophusikon' in Panton Street, once more priced at three and two shillings. This show included some new scenic illusions, such as a view of Liverpool Harbour, and a variety of other attractions, including a glass harmonica, recitations, popular songs, and a performance by a 'Learned Dog'.[33] On the night of 21 March 1800, a fire started in a nearby brothel and Chapman was burned out.[34] Thus ended the Eidophusikon's nineteen-year history. The downward spiral from elite entertainment to commonplace variety show was typical for eighteenth-century attractions of this sort, and suggests why so few of them survive.

Nature's Clockwork

The Eidophusikon was a hybrid medium that drew both from theatrical lighting technologies and from the clockwork mechanisms of the seventeenth and eighteenth centuries. A revival of interest in clockwork mechanisms began when the famous Swiss artificers Pierre Jaquet-Droz and his son Henri-Louis opened their *Spectacle mécanique* in 1776 at the Great Room in Covent Garden.[35] One of their spectacles was an animated scene called 'The Grotto', a 'mechanical picture' such as those sometimes

4 B. A. Dunker, finished by Lardy, *Représentation des Ouvrages de Mécanique Inventés et Executés par les Sieurs P. J. Droz et H. L. J. Droz célèbres artistes de Chaudefond*, 1775. Etching and engraving on paper, 40 × 50 cm. London: British Library. Photo: © Trustees of the British Museum.
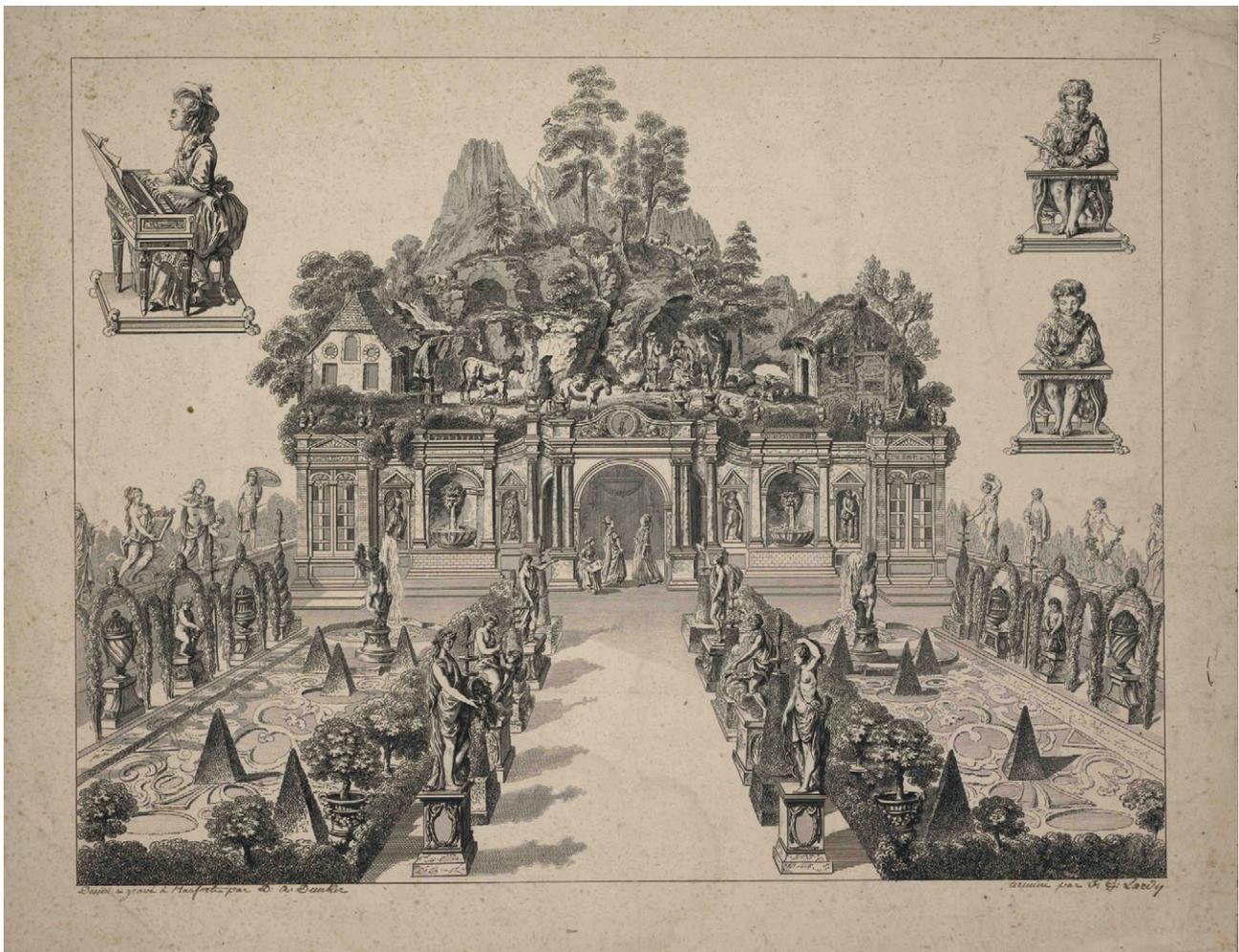
incorporated in musical clocks but one far more elaborate than the usual clockwork scene (*plate* 4).[36] About 140 cm square, 'The Grotto' was promoted as a 'contrast of art and nature'. In the foreground was a formal garden with parterres and a path lined with topiary trees and classical statues. The path led to an architectural pavilion, behind which rose a Swiss pastoral scene that included a cottage, mill, and rivulet, followed by a distant vista of Alpine peaks. A mechanical sun rose, passed over the meridian and set in exact accord with the seasons of the year. A countryman mounted on an ass crossed from the cottage to the mill, after which a shepherd emerged from a cave and played tunes on a flute. The shepherd's tunes roused a sleeping shepherdess who, taking up a guitar, joined the flautist in a duet. Afterwards the countryman, his ass laden with flour, walked back to his cottage. Meanwhile the trees in the formal garden budded, flowered, and fruited while fountains played, singing birds flew, and animals made appropriate sounds. In the middle of the pavilion, a country girl played minuets on a dulcimer while two young ladies danced, as the prospectus put it, 'with great regularity and grace'.[37]

The promotional description of 'The Grotto' as 'a contrast of art and nature' is curiously ambiguous. Does this formulation refer to the contrast between the formal garden in the foreground of the 'mechanical picture' and the rustic scene in the distance? Or does it refer to the whole mechanical apparatus as an imitation of nature? Numerous contemporary thinkers imagined all of creation as a vast moving machine, populated by smaller machines, a category that included humans as well as animals. The laws of nature as expounded by Isaac Newton were regular, predictable, and mechanical. Such a perspective is represented in Joseph Wright's famous *Philosopher Lecturing on an Orrery* (*plate* 5). In this image, in which Newton's clockwork solar system is demonstrated by the mechanical device of the orrery to a group of attentive laymen, 'natural' and 'mechanical' are synonymous.[38] For those who held to René Descartes' mind/body dualism, only the workings of the mind were exempt from mechanism. Others, however, such as Julien Offray de La Mettrie, argued that mind and body were animated by the same principles. 'Let us then conclude boldly', La Mettrie writes in *L'Homme Machine* (1747), 'that man is a machine, and that in the whole universe there is but a single substance differently modified.'[39] For La Mettrie, the word 'organic' bore no relationship to our ideas of the biological. The only thing differentiating the organic from the inorganic, in La Mettrie's philosophy, was motion. Machines that moved, therefore, were demonstrating the deepest principles of organic nature while also blurring the line between animate nature and the inorganic. Perhaps, then, 'natural' and 'mechanical' were synonymous; the elaborate 'Grotto' is to be understood as something like an orrery, that is, a machine built in imitation of the great machine of nature.

The Jaquet-Droz 'Grotto' has been lost. But three other objects from the *Spectacle* of 1776 survive and can be found at the Musée d'Art et d'Histoire at Neuchâtel, Switzerland, where they still perform. These complex, almost life-size automata are constructed from thousands of individual pieces. Barefoot and dressed in silk robes, two boy figures demonstrate graphic skills. One dips his pen in ink, shakes it, and proceeds to write, leaving appropriate spaces between words, differentiating between lower- and upper-case letters, crossing t's and dotting i's. The second traces the profiles of the kings and queens of France and England along with other images, such as a dog and a cupid in a chariot pulled by a butterfly. The third, a young lady, plays a harpsichord, her fingers striking the proper keys, her foot tapping the measure, her eyes moving, and her bosom swelling emotionally in response to the

**5 Joseph Wright of Derby,
The Orrery, c. 1766. Oil on
canvas, 147 × 203 cm. Derby:
Derby Art Gallery. Photo: ©
Bridgeman Images.**

music. The most complex figure, the writing boy, is made up of 6,000 pieces and can write forty lower- and upper-case letters.

The Jaquet-Droz dolls invoke the work of another virtuoso engineer: Jacques de Vaucanson and his renowned artificial duck.[40] Completed in 1739, Vaucanson's duck not only moved like a duck, quacked like a duck, and ate like a duck, but also shat like a duck. Vaucanson claimed to have mechanically reconstituted the biological process of digestion. He insisted that the oats swallowed by his duck were truly digested in a 'chemical laboratory' and excreted through the 'circumvolutions of pipes'.[41] Able to waddle, flap its wings, and wiggle its tail, the duck produced realistic movements due to a multiplicity of small moving parts. One wing alone, Vaucanson claimed, contained no less than 400 parts.[42] Vaucanson's duck was exhibited in London at Spring Gardens in 1742 along with two musical automata: one a flautist, the other a drum and fife player (*plate* 6). These figures actually played their instruments. They had hundreds of tiny levers to operate their tongues, lips and fingers, and angles in their mouths so that the air exhaled through a bellows was properly channelled.

The success of the artificial duck inspired Vaucanson to attempt further feats of mechanized biology. In 1741 he embarked on the creation of a mechanical man that would include 'all the animal operations' of a living human being including respiration, digestion, and the circulation of the blood as well as the movement of muscles, tendons, and nerves.[43] Vaucanson's work on this project was never completed, however, since later in the year he was appointed by Louis XV as Inspector of Silk Manufacture. In this capacity he designed an automatic loom, the first device for programmed patternmaking in textile production. It operated by using long

strips of stiff paper punched out with holes to guide the loom's Jacquard weaving mechanisms. Powered by a horse, an ox or an ass, the ingenious loom proved, as Vaucanson provocatively declared, that an animal might make 'cloth more beautiful and more perfect than most silk workers'.[44] The loom was a great success, but by the end of the century, it was powered by steam, not animals.

Because they embodied materialized principles of natural science, the Vaucanson and Jaquet-Droz mechanical wonders were more than mere amusements; like the orrery, they were philosophical machines, objects of enlightenment. We should note, however, that the key impact of the three Jaquet-Droz automata does not seem to have been simply their anatomical or physical realism so much as their psychological credibility. Henry Angelo claims that all who saw the Jaquet-Droz exhibition, including George III, were particularly

6 François Vivares, after a drawing by Hubert Gravelot, frontispiece for Jacques de Vaucanson, *An Account of the Mechanism of an Automaton or Image Playing on the German Flute*, London: T. Parker, 1742. Cambridge, MA: Harvard University (Hyde Collection 1600–1800, Houghton Library). Photo: © Imaging Services, Widener Library.

fascinated by the writing automaton; as something of an afterthought he also notes there was 'a beautiful Swiss landscape. . . . This was pleasing, but not, like the other [the writing automaton], incomprehensible to everyone.'[45] The writer and draughtsman automata implied to the viewer that the mind might be programmed like a machine. Moreover, the harpsichordist automaton's moving eyes and swelling bosom suggested that emotion, too, might be an automatic neurological reaction.[46] Significantly, all three automata – the penman, the sketcher, the harpsichordist – were conceived as artists of various kinds, suggesting that creativity itself might be demonstrated to be a mechanical function. In short, these philosophical machines not only tested the boundaries between mind and matter but also between mental inspiration and mechanical programming.

From Henry Angelo, we learn that de Loutherbourg knew and socialized with Henri-Louis Jaquet-Droz while the latter was in London exhibiting his automata.[47] Nevertheless, while it may have been inspired by the Grotto, the Eidophusikon's simulations of atmospheric effects were achieved through light and not simply by the mechanical movement of a representation of the sun. The Grotto, synchronized to reveal the sun's position at different times of the year, was an explanatory device. De Loutherbourg's machine, on the other hand, incorporated a ghost, light, and its fluid, ever-changing progressions and transformations seemed magical. As Gainsborough's exclamation – 'De Loutherbourg, our thunder is best' – suggests, the Eidophusikon in some respects had more in common with the uncanny quality of the Jaquet-Droz draughtsman, writer and musician than with clockwork display of 'The Grotto'.[48]

The Eidophusikon was both an empirical demonstration of nature's mechanical laws and an illusionistic replication of nature's appearance. Paradoxically, the more successful any technological simulation of nature is, the more uncanny it becomes. The sensation of the uncanny arises, Freud claims, when one is uncertain if an object or experience is natural or artificial, living or dead, animate or inanimate, familiar or unfamiliar, all of which he saw paradigmatically embodied in automata.[49] The Eidophusikon revealed the uncanny lurking within eighteenth-century rationalism. In its mechanistic simulations of the times of day and natural cataclysms, it threatened to dissolve the rational into the illusory, the material into the metaphysical, and the physical into the psychological. The Eidophusikon demonstrates that the contradictions it produced and held in suspension were not antithetical to eighteenth-century rationalism, but part of its very make-up.

Spiritual Machinery

Light may well have had spiritual significance for de Loutherbourg. Educated at Strasbourg, a centre for mystical theology, de Loutherbourg, like William Blake, Richard Cosway and other contemporaries, seems to have been particularly influenced by the ideas of the German Lutheran mystic Jacob Boehme (1575–1624).[50] For Boehme, light was a manifestation of divine love. This revelation impressed itself on Boehme when he became entranced by a beam of sunlight reflected on a metal bowl. Boehme developed his revelation into a dynamic, dialectical theory of the spiritual structure of the universe that combined features of Kabbalah, astrology, alchemy, and astronomy.[51]

In this theory Boehme identified seven 'properties' of the universe. These properties, generated by a continuing process of divine self-realization, were both objective features of the deity and stages through which the soul needed to pass to

come to an understanding of divinity. Moving from the first principle – associated with materialism, constriction, and death – to the seventh, 'Sophia' or wisdom, the soul progressed through an alchemical process of spiritual refinement. Boehme identified Sophia with the moon which, possessing the power of reflection, mirrored the six preceding stages. But progress, as Boehme conceived it, was cyclical. Each time the cycle was completed it began again, playing out an eternal progression from darkness to light, birth to rebirth.

The seven stages through which the soul progressed, according to Boehme, corresponded to the three members of the Trinity: Father, Son, and Holy Spirit. The Father, the foundational 'dark world', encompassed the first three stages, while the Holy Spirit or 'light world' was associated with Sophia, the final stage. Between the darkness of the Father and the light of the Holy Spirit was the realm of the Son or earthly life,

encompassing the fourth, fifth, and sixth 'properties', associated respectively with fire, water, and sound. This middle realm came into being, according to Boehme, in a flash of spiritual fire, an element he associated with the alchemical transformation of earthly compounds, including metals, stones, gems, and the volatile substances of sulphur, salt, and mercury.[52] The natural embodiment of this positive aspect of fire, identified as an aspect of spiritual desire, was the sun, which had for Boehme the power to liberate the soul from darkness and material bondage. But the middle realm of the Son or earthly life was also the sphere in which the forces of good and evil, spirit and matter, light and dark, and life and death struggled. It was the mid-point in the process of spiritual manifestation, the pivot around which the worlds of the Father and the Holy Spirit revolved, just as the planets revolved around the sun in the Copernican system to which Boehme subscribed.

Boehme's theosophical ideas enjoyed a renaissance in the later eighteenth century when they were taken up and elaborated by mesmerists, alchemists, and spiritualists of every kind including Masons, Rosicrucians, and Swedenborgians. De Loutherbourg was deeply involved with all these movements; he was a member of the London Theosophical Society among other groups, and owned multiple volumes of Boehme's works, as well as those of contemporary followers of Boehme such as the Rev. Richard Clarke.[53] In addition, he had an extensive collection of alchemical, Kabbalistic, Rosicrucian, and Swedenborgian texts.[54] Considering his immersion in Boehme's religion of light, de Loutherbourg may have conceived the Eidophusikon as a metaphysical drama embodied in a series of illusionistic landscape scenes.

The protagonist of de Loutherbourg's spectacle is, of course, the sun. Emerging at dawn to illuminate the darkness, de Loutherbourg's sun triumphs in noon's bright splendour, later suffuses the evening's afterglow, and finally, reflected by the moon, associated by Boehme with wisdom, illuminates the evening. While de Loutherbourg's uninitiated audience might have seen simply a magical simulation

8 Detail of *Keep within Compass*, 1784, showing a shipwreck.

of the times of day, de Loutherbourg himself and others immersed in Boehmenist thought would perhaps have understood the spectacle's first four scenes as a recapitulation of a spiritual progress.

But what about the two seasons' sensational finales: the climactic scenes of shipwreck and the raising of Pandemonium? How might they have been understood in relation to Boehmenist theosophy? The shipwreck does not, so far as I have been able to determine, reference any particular passage in Boehme, but the subject – one treated many times by de Loutherbourg in his paintings – was a traditional emblem of the perils of overreaching ambition or pride, as, for example, in Carrington Bowles's 1784 Masonic and moralizing print *Keep within Compass* (*plate 7* and *plate* 8).[55] Another common emblem of the perils of pride was the Miltonic scene of Satan constructing his palace, Pandemonium. From early in his theosophical development Boehme was intrigued by the story of Lucifer's fall, which he understood as resulting from the Deity's need to give form to its contrary 'so that the will might find, feel, and behold itself'.[56] Blinded by pride, Lucifer and the fallen angels created a dark, constricted universe in which fires burnt without illumination.[57] Insofar as each version of de Loutherbourg's finale portrayed pride, the Pandemonium scene might be understood as parallel to the storm and shipwreck scene, which it replaced, a warning against the perils of spiritually constructing a self-enclosed world of pride.

The Eidophusikon's drama of movement, its dynamic, ever-changing scenes, may also reflect Boehme's emphasis on the endless process of spiritual enlightenment. Boehme's writings suggest that spiritual enlightenment can reach no final form, no final resolution; to do so would result in a reification, an idol and a falsity. De Loutherbourg's 'new species of painting', one that added 'motion to resemblance' and repeated its demonstration again and again, may well have been conceived as a parallel spectacle of theosophical wisdom, a kind of spiritual perpetual motion machine.[58]

Colour, too, may have held spiritual significance for de Loutherbourg. Changing light effects such as the movement from darkness through the pink light of dawn to the white light of noon in the Greenwich scene, or the modulations in the Pandemonium scene from blue through red to what Pyne described as a 'pale vivid light . . . such as a bright furnace exhibits' could readily be understood as having both theosophical and alchemical meaning.[59] Here perhaps the frequent criticisms of de Loutherbourg's unsubtle colours in easel painting might be reconsidered. The relationship between painting and alchemy was longstanding. Indeed alchemy was revived in the late Middle Ages partly in an effort to understand the properties of minerals in the making of dyes and pigments.[60] Moreover, we know that as a gymnasium student de Loutherbourg pursued alchemical studies, which he used in preparing colours that, as one report has it, were 'more vivid and durable' than those known to others.[61] Diderot's complaint that de Loutherbourg's colours were too bright and unmodulated was repeated in the 1780s by John Wolcott in his satiric 'odes' to the Royal Academicians, which described de Loutherbourg's 'brass skies', 'golden hills', 'marble bullocks', and 'glass pastures'.[62] Nonetheless, de Loutherbourg's distinctive colours tantalized the young J. M. W. Turner, who haunted the older artist's studio in the hope of learning how they were produced.[63] Moreover, like Johann Wolfgang von Goethe, who also studied at Strasbourg and whose *Theory of Colours* was inflected by alchemical symbolism, de Loutherbourg seems to have thought of colour in terms of the alchemical transition from black (*prima materia*) to white. John Gage speculates that de Loutherbourg's curious remark that there were only two primary colours – blue and yellow – can be explained by understanding that he was thinking simply in terms of tone and the alchemical transition from dark to light. Insofar as it is a 'middle tone', red would not be 'primary'.[64]

Perhaps, then, precisely the same impulses that led de Loutherbourg to produce what
many saw as mineral-like and metallic oil pigments became, when transmuted into
effects of changing light in the Eidophusikon, a triumph of colourist art.

Infused with a theosophical dimension, the Eidophusikon would not have been
merely a hybrid technology. It would have been, at the deepest level, a contradictory
one: an engine at once mechanical and spiritual. Its machinery depended on
clockwork that demonstrated the mechanical operations of the natural world, as
understood by La Mettrie and others; its illusion, however, depended on immaterial
elements like light and colour, infused with spiritual significance. De Loutherbourg's
theosophical explorations of light and colour anticipated the Boehmenist projects of
Philipp Otto Runge: both Runge's famous colour sphere *Die Farbenkugel* (1810) and his
never completed *gesamtkunstwerk, Tageszeiten* or *Times of Day* (see *plate 9*).[65] Just as Runge
used the times of day, flowers, light, colour and landscape to express Boehme's states
of spiritual awakening, so de Loutherbourg, in my understanding, sought to express
Boehme's theories by finding their metaphorical equivalents in nature.

Because it reproduced the effects of nature so powerfully, the Eidophusikon passed beyond the mechanical simulations of Vaucanson and the Jaquet-Droz, and into the realm of the phantasmatic explored by the illusionists Philip de Philipstal and Étienne-Gaspard Robertson with their phantasmagoria. The Eidophusikon also anticipates the immersive techniques used by Louis-Jacques-Mandé Daguerre in his diorama paintings. Finally in its combination of movement, light, and sound, the Eidophusikon points, as I have suggested, to modern cinema.

Technologies of Illusion

Contemporary artists received the Eidophusikon with enthusiasm. According to Pyne, Sir Joshua Reynolds 'honoured the talents of the ingenious contriver, by frequent attendance . . . and recommended the ladies in his extensive circle to take their daughters, who cultivated drawing, as the best school to witness the powerful effects of nature'.[66] Thomas Gainsborough, as I have noted, also attended shows frequently. Pyne reports that he was so enthralled 'that for a time he thought of nothing else – he talked of nothing else – and passed his evenings at that exhibition in long succession'.[67] What did painters such as Reynolds and Gainsborough see in the Eidophusikon's illusions that spoke to them as artists? Let us note that in its emphasis on movement and process, the Eidophusikon differed from conventionally static forms of British landscape painting, which tended to dwell on topography or the picturesque, and which generally conceived of pictures either as 'views' or 'prospects'. Like the *plein air* sketches of Vernet that influenced the young de Loutherbourg, the Eidophusikon portrayed atmospheric effects. Moreover, in its power to represent the incidental and the transient through movement, the miniature theatre surpassed the *plein air* sketch.[68] Perhaps it was this ability to capture – or, more precisely, mimic – the evanescent that entranced Reynolds and Gainsborough.

The enthralling dynamism of the Eidophusikon can perhaps be related to a widespread eighteenth-century desire to animate the image. Discussing this impulse, Lynda Nead points to Horace Walpole's gothic fantasy *The Castle of Otranto*, in which the
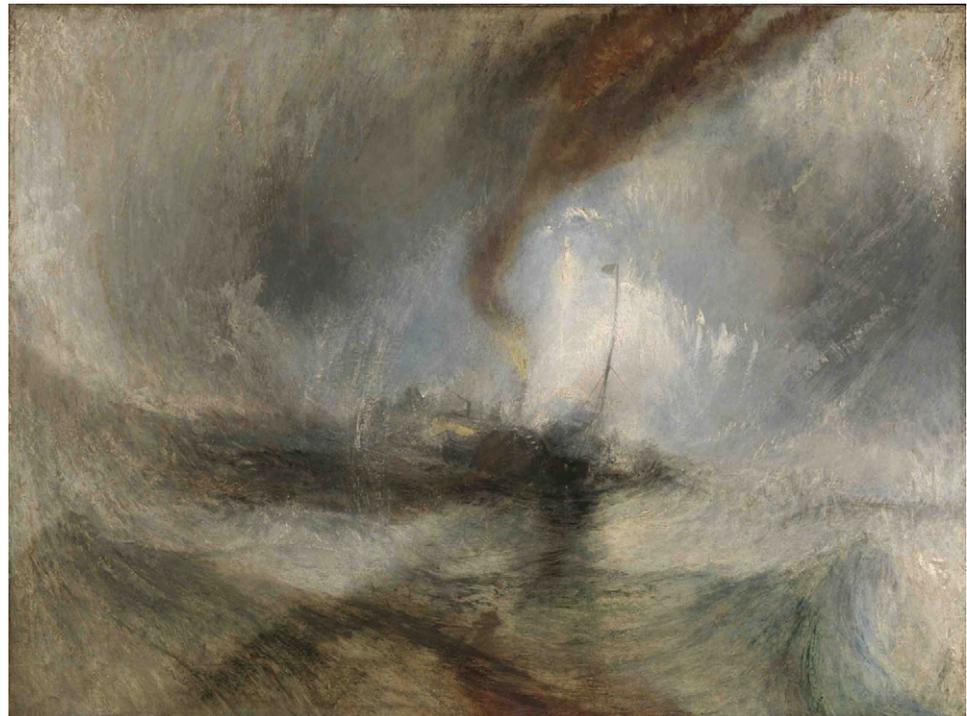
10 J. M. W. Turner, *Snow Storm – Steamboat off a Harbour's Mouth*, 1842. Oil on canvas, 91.5 × 122 cm. London: Tate. Photo: © Tate Images.

subjects of portraits sigh, moan, and finally step out of their frames.[69] We can also recall Diderot's desire for dramatic stage tableaux unfolding into pictorial narrative. In the case of landscape, one can note gardens such as those at Stourhead, designed to guide visitors through a series of constantly changing Claude-like compositions, and to William Gilpin's Wye Valley tour in which boatloads of sightseers observed the passing landscape as a changing series of picturesque views. The Eidophusikon can also be seen as looking forward to such paintings as Turner's *Snowstorm – Steamboat off a Harbour's Mouth* (1842), a dramatic image that strains the conventions of pictorial composition to convey the sensation of wind and turbulent swell of the sea (*plate* 10).[70] We find the fantasy of animation, too, in what John Constable proudly called his 'breezes', those furious brushstrokes that encrust the surfaces of his later landscapes in an effort to suggest movement.

Unlike conventional 'views', the Eidophusikon revealed that the conditions under which a landscape was seen affected not only the object's aspect but also the observer's response. Appearances were relative. Movement, light and colour played central roles in the perception of nature and the depiction of nature's 'moods'. By the early nineteenth century, as Jonathan Crary and others have noted, vision was understood as embodied, subjective, and mobilized by desire.[71] Perspectival painting with its ideal, static viewpoint confined the image within the frame. Paintings such as Turner's *Snowstorm* attempt to erase the frame altogether and project the viewer into the image. The coupling of perception with emotion explains Turner's remark to a visitor when asked about this picture, 'I did not paint it to be understood, but I wished to show what such a scene was like.'[72] Anticipating the fusion of emotion with the perception of nature pursued by artists such as Constable and Turner, the Eidophusikon combined scientific empiricism with the subjective impulses of emotion.

The urge to recreate nature through landscape painting is symptomatic, I believe, of an awareness of humanity's separation from nature. This separation might be taken as an index of human progress and mastery, a triumph over nature's powerful indifference. At the end of the eighteenth century, however, alienation from nature was increasingly felt in art and literature as a deprivation and loss, a development that can be associated, as I have suggested elsewhere, with the transformation of both the human and the natural environment through industrial capital.[73] Large-scale, immersive landscape experiences such as the panorama and diorama exploited the sense of loss and in the process turned subjective states of feeling such as wonder or awe into technologically reproducible commodities.

In part because of its comparatively small size, the Eidophusikon did not fully partake of this commerce in emotion. In fact, like all automata, its success as an illusion depended on the viewer's awareness of artifice. As uncanny as the Eidophusikon's illusions could be, the impulse for audience members was, as Pyne's anecdotes indicate, to compare its mechanical effects with those of nature, and to wonder at the fact that 'man was an extraordinary creature, who could create a copy of Nature, to be taken for Nature's self'.[74] Rather than being fully immersive so that members of the audience truly lost themselves in its illusions, the Eidophusikon ultimately directed viewers' attention to de Loutherbourg's genius as an artist, his deep understanding of nature, and his ability to represent it with unprecedented realism.

Although popular with contemporaries such as Gainsborough and Reynolds, the Eidophusikon and its progeny were not necessarily appreciated by later artists. Upon returning home from Daguerre's diorama in 1823, for example, Constable wrote to his friend John Fisher, 'It is very pleasing & has great illusion', however, 'it is without the pale

of Art because its object is deception'.[75] By the time Constable was writing, the thrill that eighteenth-century artists had experienced in the presence of illusionistic technologies had diminished. Such illusions were no longer new. Perhaps more importantly, what had been a source of artistic excitement – the production of the illusion of nature – was now seen as 'deception' and dismissed as outside the territory of 'Art'. As Constable's remark suggests, a distinction had emerged between art and popular entertainment, between art and technology. Such distinctions enabled professional artists to separate their work from popular spectacles such as panoramas and dioramas, and from such technologically grounded procedures of image-making as the daguerreotype and other photographic methods. In short, by the middle of the nineteenth century, high art had come to define itself against the illusionistic machinery of popular visual culture.

The growing divide between art and technology in the nineteenth century points to economic and social changes as well. In the eighteenth century, mechanical simulations like automata had been seen by Vaucanson and La Mettrie as embodying a rational and materialist understanding of the body and nature. By the end of the nineteenth century, however, human beings were being treated by theorists such as Thomas Malthus, Charles Babbage, and Andrew Ure as in effect bodies without spirit, economic units in the ever-expanding universe of industrial capital.[76] Technologically reduced to 'labour', workers such as the silk weavers of Lyon or the cotton spinners of the Midlands could be – and were – seen as machines. As Patricia Fara notes, even Josiah Wedgwood, a notably humane industrialist, wanted to convert his workers into machines that would not err.[77] Duplicable and dispensable, l'*homme machine* had arrived.

In this context, the Jaquet-Droz automata – in which human expression had been recoded and mechanically reproduced – can be taken as emblems that illuminate the historically determined process of proletarianization.[78] Vaucanson's mechanized looms, employing punch cards to create complex Jacquard patterns, offered one example of the ways in which all kinds of artisanal craft were increasingly being displaced by mechanization. In this context, artists and poets such as Constable, Blake, Wordsworth, Haydon, Coleridge, and the Shelleys embraced an aesthetic that prized individuality, originality, and genius. The Eidophusikon's hybrid nature, its fusion of the mechanical and the spiritual, perhaps represents a radically unstable moment that anticipates their rejection of the mechanical. William Blake, himself a Boehmenist, located that rejection most explicitly when in *Jerusalem* he contrasted the spiritual 'wheels' of Eden with the 'Loom of Locke' and the 'Water-wheels of Newton'. Later, critics and painters such as John Ruskin would continue the campaign against the mechanical, looking back to the allegedly more humane Middle Ages for inspiration.

The place where art and mechanism remained closely linked throughout the nineteenth century was in the sphere of popular culture and mass entertainment. Panoramas, dioramas, magic lantern shows, and, by the end of the century, the kinescope, stereoscope and cinema created a mass viewing experience defined by the collective immersion in scenic illusion.[79] Poised between art and technology, art and entertainment, science and spectacle, the Eidophusikon, as de Loutherbourg presented it, was an elite exhibition. But as the Eidophusikon's history shows, the five-shilling audience would eventually be replaced by a three- and two-shilling crowd paying to see a show that included animal acts and popular songs as well as 'Moving Pictures representing Phenomena of Nature'. And the audience for inexpensive, mass-produced popular entertainment would continue to grow, eventually coming to include the very people whose artisanal skills and jobs had been rendered obsolete by technology and whose livelihoods now depended on factory work.

Notes
I have been fortunate in having had opportunities to present my work on the Eidophusikon to a number of scholars whose responses have been invaluable. I would like to thank John Brewer, Iain McCalman, Marcia Pointon, John Bender, Ewa Lajer-Burcharth, James S. Ackerman, Anne Higonnet, Mark Rose, and Emily Zinn.

1   The most complete contemporary accounts of the Eidophusikon are: Anon, *The Whitehall Evening Post*, 1 March 1781; Anon, 'A view of the Eidophusikon', *The European Magazine*, March 1782, 180–1 (which describes the programme of season one in some detail); Ephraim Hardcastle [William Henry Pyne], *Wine and Walnuts; or, After Dinner Chit-Chat*, London, 1823, 2 vols, I: 281–304. Important secondary sources include: Austin Dobson, *At Prior Park and Other Papers*, London, 1912, 111–17, 227–81; Rüdiger Joppien, 'Die Szenenbilder Philippe Jacques de Loutherbourgs Eine Untersuchung zu ihrer Stellung zwischen Malerei und Theater', PhD dissertation, University of Köln, 1972, 342–66; Richard D. Altick, *The Shows of London*, Cambridge, MA and London, 1978, 117–27; and Iain McCalman, 'The art of de Loutherbourg's Eidophusikon', in Ann Bermingham, ed., *Sensation and Sensibility: Viewing Gainsborough's Cottage Door*, New Haven, CT and London, 2005, 181–97. Olivier Lefeuvre's recent indispensable catalogue of de Loutherbourg's work provides a thorough account of the Eidophusikon and includes a collection of eighteenth- and nineteenth-century documents related to it: *Philippe-Jacques de Loutherbourg, 1740–1812*, Paris, 2012, 76–80, 370–3.

2   On de Loutherbourg's biography and career see Lefeuvre, *Philippe-Jacques de Loutherbourg*; Joppien's PhD dissertation and his equally important Kenwood exhibition catalogue *Philippe-Jacques de Loutherbourg, 1740–1812*, London, 1974.

3   See Anne Puetz, 'Foreign exhibitors and the British School at the Royal Academy, 1768–1823', in David Solkin ed., *Art on the Line: Royal Academy Exhibitions at Somerset House, 1780–1836*, New Haven, CT and London, 2001, 229–41.

4   William Beckford was the first to call de Loutherbourg a 'mystagogue' in recounting the special effects the artist produced for Beckford's 1781 Christmas revels. See Guy Chapman, *Beckford*, New York, 1937, 104–5; Beckford's feverish prose has tended to colour our image of de Loutherbourg. While de Loutherbourg did indeed present himself at times as a magus or mystagogue, he saw no contradiction between his scientific and occult interests and his Christianity. His tombstone describes him in italics '*As a Man, and as a Christian*' who associated science with 'Faith, Piety and Liberality'. Quoted in *The European Magazine, and London Review*, 73, 1818, 28.

5   This account is based on an anonymous essay, 'Anecdotes of Mr. de Loutherbourg', *European Magazine*, March 1782, 181, which may have been written by de Loutherbourg himself. See William Whitley, *Artists and Their Friends in England, 1700–1799*, New York and London, 1968, 2 vols, II: 352; and Lefeuvre, *de Loutherbourg*, 371 and 377.

6   Joshua Reynolds recalled seeing Vernet painting from nature in Rome in the 1750s, and a group of oil studies of Roman and Neapolitan scenes were included in the sale of Vernet's effects in 1790. See Philip Conisbee et al., *In the Light of Italy: Corot and Early Open-Air Painting*, New Haven, CT, 1996, 113.

7   Denis Diderot, *Diderot on Art – I: The Salon of 1765 and Notes on Painting*, trans. John Goodman, New Haven, CT and London, 1995, 120–1.

8   Denis Diderot, *Diderot on Art – II: The Salon of 1767*, trans. John Goodman, New Haven, CT and London, 1996, 230 and 238. A year after Diderot's suggestion that he 'go back and look at the sea', de Loutherbourg went to the south of France to sketch coastal scenery. After his arrival in London in 1771, de Loutherbourg also visited coastal ports in England (1784 and 1794) and made pilgrimages to standard picturesque sites such as Derbyshire (1778 and 1783) and the Lake District (1783). The subjects from these trips made up the coloured etchings and aquatints that he published in two volumes: *The Picturesque Scenery of Great Britain* (1801) and *The Picturesque and Romantic Scenery of England and Wales* (1805). Unfortunately no oil sketches, if there were any, survive from these trips.

9   Lefeuvre, *de Loutherbourg*, 28–9.

10   Christopher Baugh, *Garrick and Loutherbourg*, Cambridge and Alexandra, VA, 1990. See too Baugh, 'Philippe de Loutherbourg: Technology-driven entertainment and spectacle in the late eighteenth century', *Huntington Library Quarterly*, 70: 2, 2007, 252–3.

11   Michael Fried, *Absorption and Theatricality: Painting and Beholder in the Age of Diderot*, Berkeley, Los Angeles, CA and London, 1980, 76–80.

12   Henry Angelo, *Reminiscences of Henry Angelo*, London, 1828–30, 2 vols, II: 326.

13   Baugh, 'Philippe de Loutherbourg', 266.

14   Altick, *Shows of London*, 122.

15   Quoted in Altick, *Shows of London*, 212

16   *The London Courant*, 4 May 1781.

17   Pyne, *Wine and Walnuts*, 1: 286. Pyne would have been twelve years old at the first performances of the Eidophusikon. Altick suggests that Pyne's knowledge of the attraction was gained by viewing the third (or even later) season. Altick, *Shows of London*, 521, note 20.

18   Pyne, *Wine and Walnuts*, I: 292. This scene was recreated at the Australian National University's Super Computer Facility in 2006 by Darran Edmundson and Iain McCalman. It can be viewed at http://vimeo.com/32698316

19   In Freud's classic formulation, uncanny objects blur the line between the lifeless and the living, the real and the artificial, which Freud saw exemplified in waxworks and automata. Sigmund Freud, 'The Uncanny', *The Standard Edition of the Complete Psychological Works of Sigmund Freud*, trans. and ed. James Strachey, London, 1955, 24 vols, 17: 217–52.

20   William Whitley, *Thomas Gainsborough*, London, 1915, 354.

21   Pyne, *Wine and Walnuts*, 1: 298.

22   'A view of the Eidophusikon', *The European Magazine*, March 1782, 80–181. If de Loutherbourg is the author of this account and the 'Anecdotes of Mr. de Loutherbourg' as Whitley and Lefeuvre suggest, it means that de Loutherbourg himself imagined his Eidophusikon to be a new species of painting and a development of his work in landscape painting.

23   *Morning Chronicle and London Advertiser*, 28 February 1781.

24   *Morning Herald and Daily Advertiser*, 1 March 1781.

25   *Morning Chronicle and London Advertiser*, 28 February 1781; 'Anecdotes of Mr. de Loutherbourg', 182.

26   Pyne, *Wine and Walnuts*, I: 296–7.

27   Pyne, *Wine and Walnuts*, 1: 289.

28   'A view of the Eidophusikon', 181.

29   Pyne, *Wine and Walnuts*, 1: 303.

30   *Morning Post and Daily Advertiser*, 4 May 1785.

31   Altick, *Shows of London*, 122. Iain McCalman notes that as a showman, de Loutherbourg was in competition with other popular attractions which may have spurred him to sensationalize his programme. See his 'Specters of quackery: The fragile career of Philippe de Loutherbourg', *Cultural and Social History*, 3, 2006, 241–54.

32   *The Morning Herald*, 6 May 1786.

33   Altick, *Shows of London*, 125.

34   For an account of the fire see 'Dreadful Fire', *Morning Post and Gazetteer*, 24 March 1800. The account of the fire says that Chapman claimed a £600 loss, but it does not say that the Eidophusikon was completely destroyed (unlike the nearby pub). On 7 August 1817, the *Caledonian Mercury* reported that 'Loutherbourg's Eidophusikon, or animated scenery' was at the Pantheon. Whether this was the remnant of the original Eidophusikon or a reconstruction is unclear. Seats for this attraction were two shillings and one shilling. In 1854 a 'Royal Eidophusikon' appears to have opened in Liverpool with scenes of the 'Holy Land' and the 'Turkish Empire' (*Liverpool Mercury*, 7 July 1854). In 1857 the Royal Eidophusikon reopened in Manchester (*Manchester Times*, 6 June 1857). Clearly this was not de Loutherbourg's spectacle. Nevertheless, the use of the word 'Eidophusikon' in the title of these attractions demonstrates the long-lasting artistic significance and commercial impact of de Loutherbourg's original. Altick reports that in 1785 the American artist Charles Wilson Peale created a version of the Eidophusikon in Philadelphia (Altick, *Shows of London*, 126).

35   Altick, *Shows of London*, 59–60, 119. On the international success of the Jaquet-Droz exhibition see Altick, 62–6; and Marcia Pointon, *Brilliant Effects: A Cultural History of Gem Stones and Jewellery*, New Haven, CT and London, 2009, 225–43. On the work of the Jaquet-Droz, see Charles

Perregaux and F. Louis Perrot, *Les Jaquet-Droz et Leschot*, Neuchatel, 1916; and Adelheid Voskuhl, *Androids in the Enlightenment: Mechanics, Artisans, and Cultures of the Self*, Chicago, IL, 2013, especially 37–85.

36 On one such tableau méchanique see Hanneke Grootenboer's essay: 'The Clock Picture as a Philosophical Experiment: The Tableau Méchanique in the Physics Cabinet of Bonnier de la Mosson', in this issue of *Art History*.

37 The full description of the Grotto was written by the Jaquet-Droz to be distributed at the performances of their automata. It is reproduced online along with the engraving by the British Museum at: http://www.britishmuseum.org/research/collection_online/collection_object_details.aspx?objectId=1336666&partId=1. Marcia Pointon gives a thorough account of the exhibition of the four automata, suggesting the importance of the Grotto for the Eidophusikon (223–43). I am grateful to her for assisting me in my research on the Jaquet-Droz.

38 E. J. Dijksterhuis, *The Mechanization of the World Picture*, trans. C. Dikshoorn, Oxford, 1961. My understanding of mechanical philosophy is also indebted to D. J. de Solla Price, 'Automata and the origins of mechanism and mechanistic philosophy', *Technology and Culture*, 5, 1964, 9–23.

39 Julien Offray de La Mettrie, *Man a Machine*, trans. G. C. Bussey, Chicago, IL, 1912, 148.

40 Vaucanson's duck and musical automatons were described at length in Diderot and d'Alembert's *Encyclopédie* under 'Automate'. See *Encyclopédie ou Dictionnaire raisonné des sciences, des arts et des métiers, par une Société de Gens de lettres*, 17 volumes of text and 11 volumes of plates, Paris, 1751–72, 1: 896–7.

41 Jacques de Vaucanson, *An Account of the Mechanism of an Automaton or Image Playing on the German Flute*, trans. J. T. Desaguliers, London, 1742, 23. Unlike his musical androids, Vaucanson's duck was a false automaton for it did not truly digest the oats. Nevertheless, Vaucanson's dream of creating a machine that could perform biological functions seems to have started with the duck. The bibliography on Vaucanson is extensive. In addition to his own account, see André Doyon and Lucien Liaigre, *Jacques Vaucanson: Mécanicien de Genie*, Paris, 1967. An important analysis of the duck and its meaning for the eighteenth century and our own is Jessica Riskin's 'The defecating duck, or, the ambiguous origins of artificial life', *Critical Inquiry*, 29: 4, Summer 2003, 599–633. Recent histories consulted on automata and their significance to eighteenth-century art and culture include Myles W. Jackson, *Harmonious Triads: Physicists, Musicians, and Instrument makers in Nineteenth-Century Germany*, London and Cambridge, MA, 2008; Minsoo Kang, *Sublime Dreams of Living Machines: The Automaton in the European Imagination*, Cambridge MA and London, 2011; Barbara Maria Stafford, *Artful Science: Enlightenment Entertainment and the Eclipse of Visual Education*, Cambridge, MA and London, 1994, 190–215; and Adelheid Voskuhl, *Androids in the Enlightenment*.

42 Vaucanson, *Account of the Mechanism of an Automaton*, 21

43 Quoted in Doyon and Liaigre, *Vaucanson*, 110.

44 Quoted in Doyon and Liaigre, *Vaucanson*, 210.

45 Angelo, *Reminiscences*, II: 329.

46 On musical automatons and their relation to early physics, see Jackson's *Harmonious Triads*.

47 'Many an evening', Angelo recalls, 'have we been diverted with three clever men; Loutherbourg, with his fun and tricks, which were in exhaustible; and the two mechanicians, Martin [*sic*] and Jaquet D'Ross [*sic*]'. 'Martin' was a Belgian mechanic named John Joseph Merlin who worked at Cox's Museum in Spring Gardens and who in 1783 opened a mechanical museum at Hanover Square filled with scientific toys of his own invention. 'Jaquet D'Ross' was Henri-Louis Jaquet-Droz, the son of Pierre. Angelo, *Reminiscences*, II: 328–9. See also Altick, *Shows of London*, 72–6; and Pointon, *Brilliant Effects*, 203–21.

48 Interestingly, during the Christmas season of 1781 de Loutherbourg transformed Fonthill, the young William Beckford's father's country estate into, in Beckford's words, a 'realm of Fairy' or 'demon temple' by illuminating it with strange 'necromantic' lights. This immersive environment is described in H. A. N. Brockman, *The Caliph of Fonthill*, London, 1966, 38; Jean-Claude Lebensztejn, 'L'Eidophusikon et Vathek', *Furor*, 21, April 1991, 3–20; Simon During, 'William Beckford in hell: An episode in the history of secular enchantment', *Huntington*

Library Quarterly, 70: 2, 2007, 269–88; and Iain McCalman, 'The virtual infernal: Phillippe de Loutherbourg, William Beckford and the spectacle of the sublime', *Romanticism on the Net*, 46, May 2007. http://id.erudit.org/iderudit/016129ar.

49 See note 19.

50 The most easily accessible collection of Boehme's work can be found online at: http://www.jacobboehmeonline.com/. On Boehme's thought, see Kevin Fischer, *Converse with the Spirit: William Blake, Jacob Boehme, and the Creative Spirit*, Madison, WI and Teaneck, NJ, 2010; and J. B. Gibbons, *Gender in Mystical and Occult Thought*, Cambridge, 1996, 90–1.

51 In the eighteenth century, particularly in Britain, there were numerous attempts to make concordances among the many esoteric traditions by establishing similarities among them. See Nicolas Goodrick-Clarke, *The Western Esoteric Traditions: A Historical Introduction*, Oxford and New York, 2008, 9, 120–7. The London Theosophical Society, which was founded in 1783 by the Rev. Jacob Duché, and which counted de Loutherbourg as well as William Sharpe and John Flaxman among its founding members, married the ideas of Boehme with those of Swedenborg. See Jocelyn Godwin, *The Theosophical Enlightenment*, Albany, NY, 1994, 103.

52 See for instance Boehme, *Aurora*, XXII: 77–106; and *The Signature of All Things*, IV.

53 Goodrick-Clarke, *Western Esoteric Traditions*, 86ff. On de Loutherbourg's involvement with theosophy, Swedenborgianism, Masonry, Rosicrucianism, alchemy, mesmerism, and his friendship with Cagliostro see Godwin, *Theosophical Enlightenment*, 100–1, 103, 112–14, 132–3, 153, 228. See also Iain McCalman, *Last Alchemist: Count Cagliostro, Master of Magic in the Age of Reason*, New York, 2003, 161ff.; and his 'Mystagogues of revolution: Cagliostro, Loutherbourg and Romantic London', in James Chandler and Kevin Gilmartin, eds, *Romantic Metropolis: The Urban Scene of British Culture, 1780–1840*, Cambridge, 2005, 177–203; and Marsha Keith Manatt Schuchard, 'Freemasonry, secret societies, and the continuity of the occult traditions in English literature', The University of Texas at Austin, PhD dissertation, 1975, 2 vols, University Microfilms, Ann Arbor, MI, in particular I: 340–2, and II: 374–6. On de Loutherbourg's magnetic healing powers see Mary Pratt, 'A list of a few cures performed by Mr. and Mrs. De Loutherbourg…without medicine', London, 1789, 1ff. On mesmerism in London and de Loutherbourg's involvement with it, see Patricia Fara, 'An attractive therapy: Animal magnetism in eighteenth-century England', *History of Science*, 33: 2, 2009, 127–75.

54 On the contents of de Loutherbourg's library, see Coxe, *A Catalogue*. Coxe's catalogue is reprinted in Lefeuvre, *de Loutherbourg*, 354–6. The items related to Boehme are numbers 7, 8, 23, 66, 68, 69, 70, 71, and 126. De Loutherbourg owned William Law's edition of Boehme's works (item 126), illustrated with diagrams by Dionysius Andreas Freher (1649–1728).

55 The Masonic compass teaches men to circumscribe their passions and keep their desires within bounds. The shipwreck scene in the lower left corner of *Keep Within Compass* is accompanied by the motto: 'Attempt according to your strength, Close by the Shore to keep, Tis safer than to hoist up Sails, And Plunge into the Deep'. On the meaning of the shipwreck in Romantic painting see Lorenz Eitner, 'The open window and the storm-tossed boat: An essay in the iconography of Romanticism', *Art Bulletin*, 37: 4, December 1955, 279–90.

56 Boehme, *Aurora*, VIII: 22–6, 82–7; XII: 131–41; XIII: 1–64; 146–64; XIV: 1–135; XV: 1–97; XVI: 88–116.

57 Boehme, *Three Principles of Divine Essence*, V: 30. On the possible influence of Boehme on Milton see Margaret Lewis Bailey, *Milton and Jakob Boehme: A Study of German Mysticism in Seventeenth-century England*, New York, 1914.

58 On the fascination with perpetual motion see Simon Schaffer, 'The show that never ends: Perpetual motion in the early eighteenth-century', *British Journal for the History of Science*, 28: 2, June 1995, 157–89.

59 In saying this I do not wish to rule out entirely the possibility that de Loutherbourg was also drawn to alchemy for pecuniary reasons, having been impressed by Cagliostro's transmutation of copper pennies into pure silver. See Constantin Photiadés, *Count Cagliostro: An Authentic Story of a Mysterious Life*, London, 1932, 225. On alchemical processes and their meanings see Lawrence M. Principe, *The Secrets of Alchemy*, Chicago, IL and London, 2013. On the competitive

relationship between art and alchemy, see William R. Newman, *Promethean Ambitions: Alchemy and the Quest to Perfect Nature*, Chicago, IL and London, 2004.

60 John Gage, 'The peacock's tail', in *Colour and Culture: Practice and Meaning from Antiquity to Abstraction*, London, Boston, MA and Toronto, 1994, 139–53.

61 'Anecdotes of Mr. de Loutherbourg', 181.

62 'Peter Pindar' [John Wolcott], *Lyric Odes to the Royal Academicians for MDCCLXXXIII*, 'Ode IV', *The Works of Peter Pindar, esq.*, London, 1794, 28–9. Similar criticisms were made by 'Anthony Pasquin' (John Williams) in his *Memoirs of the Royal Academicians* of 1796. These criticisms also conform to what K. Dian Kriz has attributed to a growing artistic nationalism in Britain and with it a dismissal of 'French glitter'. See Kriz's *The Idea of the English Landscape Painter: Genius as Alibi in the Early Nineteenth Century*, New Haven, CT and London, 1997, especially 106–10.

63 Walter Thornbury, *The Life of J.M.W. Turner, R.A.: Founded on Letters and Papers furnished by his Friends and fellow Academicians*, London, 1904, 115.

64 John Gage, *Colour in Turner: Poetry and Truth*, New York and Washington, DC, 1969, 181–2.

65 See in particular Karl Möseneder, *Philipp Otto Runge und Jacob Boehme*, Marburg/Lahn, 1981. Runge planned four large canvases depicting the times of day to be installed in a Gothic chapel where, accompanied by music, they would coalesce into an immersive environment. *Plate 9* is a small version or study for the large version of *Morning*, the first painting of the never completed series. In its use of sound, spectacle, and music woven into a single artistic fabric, the Eidophusikon is also a *gesamtkunstwerk*.

66 Pyne, *Wine and Walnuts*, 1: 281

67 Pyne, *Wine and Walnuts*, 1: 296. John Gage suggested that J. M. W. Turner also assisted at the Eidophusikon when it was in Fleet Street. See 'Turner and the picturesque', *Burlington Magazine*, 107, 1965, 24–15. Altick investigated this claim and dismissed it (Altick, *Shows of London*, 126).

68 This subject has also been broached by Silvia Bordini, 'Pittura come spettacolo: le "or del giorno" tra pesaggio romantic e nuove technologie', *Richerche di Storia dell'arte*, 25, 30 March 1985, 5–15. See too Bermingham, 'Introduction', in *Sensation and Sensibility*, 22–3.

69 Lynda Nead, *The Haunted Gallery: Painting, Photography, Film, c. 1900*, New Haven, CT and London, 2007, 45ff.

70 Turner seems to have been particularly interested in immersive visual effects. See Bermingham, 'Landscape-o-rama: The exhibition landscape at Somerset House and the rise of popular landscape entertainments', in *Art on the Line*, 127–44.

71 Jonathan Crary, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century*, Cambridge, MA and London, 1990 and *Suspensions of Perception: Attention, Spectacle, and Modern Culture*, Cambridge, MA and London, 2000.

72 Martin Butlin and Evelyn Joll, *The Paintings of J.M.W. Turner*, New Haven, CT and London, 1984, 2 vols, 247.

73 See Bermingham, *Landscape and Ideology: The English Rustic Tradition, 1740–1840*, Berkeley and Los Angeles, CA, 1986.

74 Pyne, *Wine and Walnuts*, I: 298.

75 John Constable, *John Constable Correspondence*, ed. R. B. Beckett, Ipswich, 1968, 7 vols, IV: 134.

76 On industrialism and automation see Maxine Berg, *The Age of Manufactures 1700–1820: Industry, Innovation and Work in Britain*, London and New York, 1994; Simon Schaffer, 'Babbage's intelligence: Calculating engines and the factory system', *Critical Inquiry*, 21, Autumn 1994, 203–27; Andrew Zimmerman, 'The ideology of the machine and the spirit of the factory: Remarx on Babbage and Ure', *Cultural Critique*, Fall 1997, 5–29.

77 Patricia Fara, review of Minsoo Kang's *Sublime Dreams of Living Machines*, *American Historical Review*, 117: 5, December 2012, 1652.

78 Gaby Wood, *Edison's Eve: A Magical History of the Quest for Mechanical Life*, New York, 2002, passim.

79 See Walter Benjamin, 'The Work of Art in the Age of Mechanical Reproduction', *Illuminations*, ed. and intro. Hannah Arendt, trans. Harry Zohn, New York, 1969, 234–5, 239–42.