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JOSHUA
REYNOLDS
Experiments
in Paint

 THE
WALLACE
COLLECTION



Reynolds's Science of Experiment in Practice and Theory

MATTHEW HUNTER

"So desirous was Sir Joshua to arrive at excellence," James Northcote claimed of the first President of the Royal Academy of Arts in 1810, "that I have known him to work for days and weeks on his fancy subjects, on which he could practice every experiment at pleasure, while numbers of his portraits remained unfinished."¹ Northcote was not alone in describing Reynolds as a practitioner of experiment. The catalogue for the British Institution's retrospective exhibition of 1813 explained that Reynolds learned to paint in the grand manner against the grain of regnant taste by making "experiments not only unguided by any safe theory founded in previous experience, but constantly misguided by the false theories of others."² While painter Joseph Farington questioned his predecessor's mode of executing those trials, he too endorsed the centrality of experiment to Reynolds's enterprise. Each of the President's pictures "was an experiment on some project of improvement suggested by his incessant endeavours to reach something yet unattained either by himself or others."³

What did these commentators mean when they described Joshua Reynolds as a maker of "experiments"? This essay addresses that question by situating Reynolds, first, in relation to practices of experimentation conducted at leading societies of science and learning, including the Society for the Encouragement of Arts, Manufactures and Commerce (Society of Arts), the Lunar Society of Birmingham, and the Royal Society of London. Beginning with Reynolds's involvement with institutionalized trials – particularly in the years around 1760 – I show how concern for the control and documentation of experiments was then applied to the arts, both fine and industrial. Second, I compare and contrast Reynolds's experimental project with the work of Josiah Wedgwood, one of Enlightenment Britain's greatest experimentalists in the arts.⁴ Framing a dialogue, rather than opposition, between these partisans of Neoclassicism, I conclude by considering Reynolds's



FIG. 70
Joseph Wright 'of Derby'
*An Experiment on a Bird in the
Air Pump*, 1768
Oil on canvas, 183 × 244 cm
National Gallery, London,
NG725

experimental practices in light of his theoretical statements against experiment as outlined in one of the last 'Discourses' he delivered at the Royal Academy.⁵

The painting of modern experiments

Reynolds and his Augustan contemporaries inherited a world transformed materially by the seventeenth century's Scientific Revolution – a revolution accomplished in part as philosophers embraced the public trial of experiments as a privileged path to knowledge.⁶ Reynolds did not have to look far to find that valorization of experiment endorsed. Defined as a "trial of any thing; something done in order to discover an uncertain or unknown effect" in his friend Samuel Johnson's 1755 dictionary, experiment was an article of significant attention among Reynolds's artistic contemporaries.⁷ In the emerging exhibition culture of 1760s London, Joseph Wright of Derby made experiment a subject of his acclaimed candlelight paintings. A product of Thomas Hudson's studio as was Reynolds, Wright depicts a nocturnal gathering in *An Experiment on a Bird in the Air Pump* (fig. 70), focused around a trial with the pneumatic engine invented by Robert Boyle and Robert Hooke in the 1650s. Controlled by the philosopher at centre, Wright's depicted experiment poses as much a trial to the

physiological capacities of the swooning bird as a test to the encircled observers' moral sensibilities. Experiment, Wright's picture proposes, could be a promising subject for ambitious painting.⁸

For many period observers, however, Reynolds's pictorial experiments were more cause for alarm than celebration. As one writer claimed in 1792, "We have perpetually lamented, that what is technically called the *vehicle* should have led him to chemic experiments, which, whatever brilliancy they may lend his colours for the present day, certainly will add to the fading powers of time upon the finest tints".⁹ If Wright portrayed experiments, such accounts suggested, Reynolds's portraits *were* experiments – material essays into the unknown. The object of a plentiful literature in conservation studies, Reynolds's unconventional approach to painting technique can indeed be glimpsed through his *Miss Jane Bowles* (cat. 7).¹⁰ Feet gathered under the triangulated train of her white gown, the diminutive female sitter clutches a black-and-white dog to her chest as she gazes out from the picture-plane. Reynolds has used the canvas's thin preparatory ground to gain textural traction for the impasted shafts of sunlight piercing the foliage at upper right (detail opposite). That somber woodland has been built from a complex layering of media: the pigments were blended with walnut oil, pine resin,

FIG. 71

Title page to Jean-Henri Müntz,
*Encaustic: or, Count Caylus's Method of
Painting in Manner of the Ancients*, 1760
Collection of the Royal Society of Arts,
London

mastic gum and beeswax.¹¹ Even though this particular painting remains in good condition, Reynolds's penchant for "following practices which he knew perfectly well would seriously shorten the life of his pictures", as one modern conservator memorably put it, "can only be described as perverse".¹²

Experimental practice

The better to understand this distinctive form of practice, we can usefully consider the broader relationship between artistic and scientific experiment in the period. A good place to begin is London's Society of Arts. Founded in 1754, the Society aimed to spur British art and industry against perceived French superiority. Drawing funds from subscribing members to award monetary prizes for the manufacture in Britain of goods ranging from landscape paintings to sal ammoniac (a hard, white salt composed of ammonium chloride), the Society grew meteorically, expanding from less than twenty members in 1755 to over two thousand a decade later.¹³ Host to Britain's first exhibition of contemporary art (held near Charing Cross for two weeks in spring 1760), the Society used practices of experiment extensively to establish whether premium-seeking submissions had actually achieved target specifications. Consider the "Experiments ... to be made on the Composition for securing Ships Bottoms from Worms" agreed by the Society in early 1758. Each inventor of an anti-worm preparation vying for a prize of £50 sterling had to submit six planks in specified dimensions. With all six wooden units marked by identifying notations, four planks would be treated with the candidate's anti-worm preparation, two left untouched. Of the treated planks, two would be lodged underwater for twelve months on the Suffolk coast; the remainder would be sent to Jamaica "under the Inspection of a Person of Credit" and submerged there for six months. All six planks would be returned to

ENCAUSTIC: O R, Count CAYLUS'S METHOD OF PAINTING

In the MANNER of the ANCIENTS.

To which is added

A sure and easy METHOD for Fixing of
C R A Y O N S.

By J. H. MÜNTZ.



LONDON: Printed for the AUTHOR; and
A. WEBLEY, at the BIBLE and CROWN near
CHANCERY LANE, HOLBORN, 1760.

London by year's end, in the same condition "as they are taken out of the Water, in Order that they may be examined by the Society".¹⁴

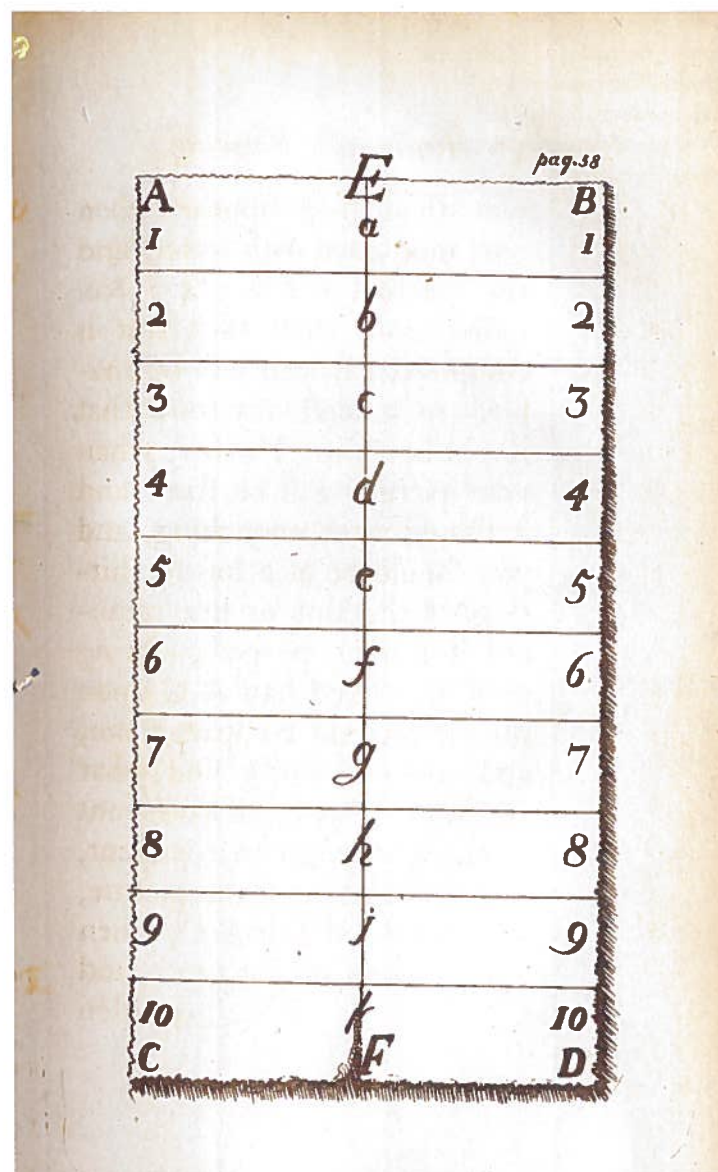
Experiment, as practised to establish the winners of the Society's prizes, could thus be a sophisticated, trans-Atlantic business. Matters of fact about a submission's efficacy would be established by designing trials lasting for stipulated durations; they would use notational systems, control specimens, variation on the conditions to which samples were subjected, and reliance on the networks of credit and trust that historians tell us were key to experimental science in the long eighteenth century.¹⁵ If tests of chemical preparations designed to protect ships' hulls sound far from Reynolds's artistic remit, comparable

FIG. 72

Explanatory painting guide from Jean-Henri Müntz, *Encaustic: or, Count Caylus's Method of Painting in Manner of the Ancients*, 1760, n.p. Collection of the Royal Society of Arts, London

experimental protocols also abounded in the institution's promotion of the fine arts. In January 1760, a committee chaired by painter Allan Ramsay (then, one of Reynolds's major rivals) met to assess a submission of copal varnish, a preparation made from tree resin indigenous to the Americas. To win the Society's prize, the varnish had to equal in quality those imported from Paris; it was to possess "great Hardness, perfect Transparency without discolouring any Painting it is laid over, being capable of the finest polish and not liable to crack".¹⁶ Charged with evaluating submissions, Ramsay's team devised a regime of "Trials". Ramsey and his collaborators would paint a design on to a panel and cut it down the middle. Half would be varnished by Ramsey using the candidate's submitted preparation, the other half varnished by the candidate himself, and the two pieces compared against the effects of the Parisian standard. A more extreme fine-art trial was set in April 1759: sculptor Joseph Nollekens was locked in a room, challenged to recreate a prize-seeking model of *Lot and his Wife* as proof it was truly his own work.¹⁷

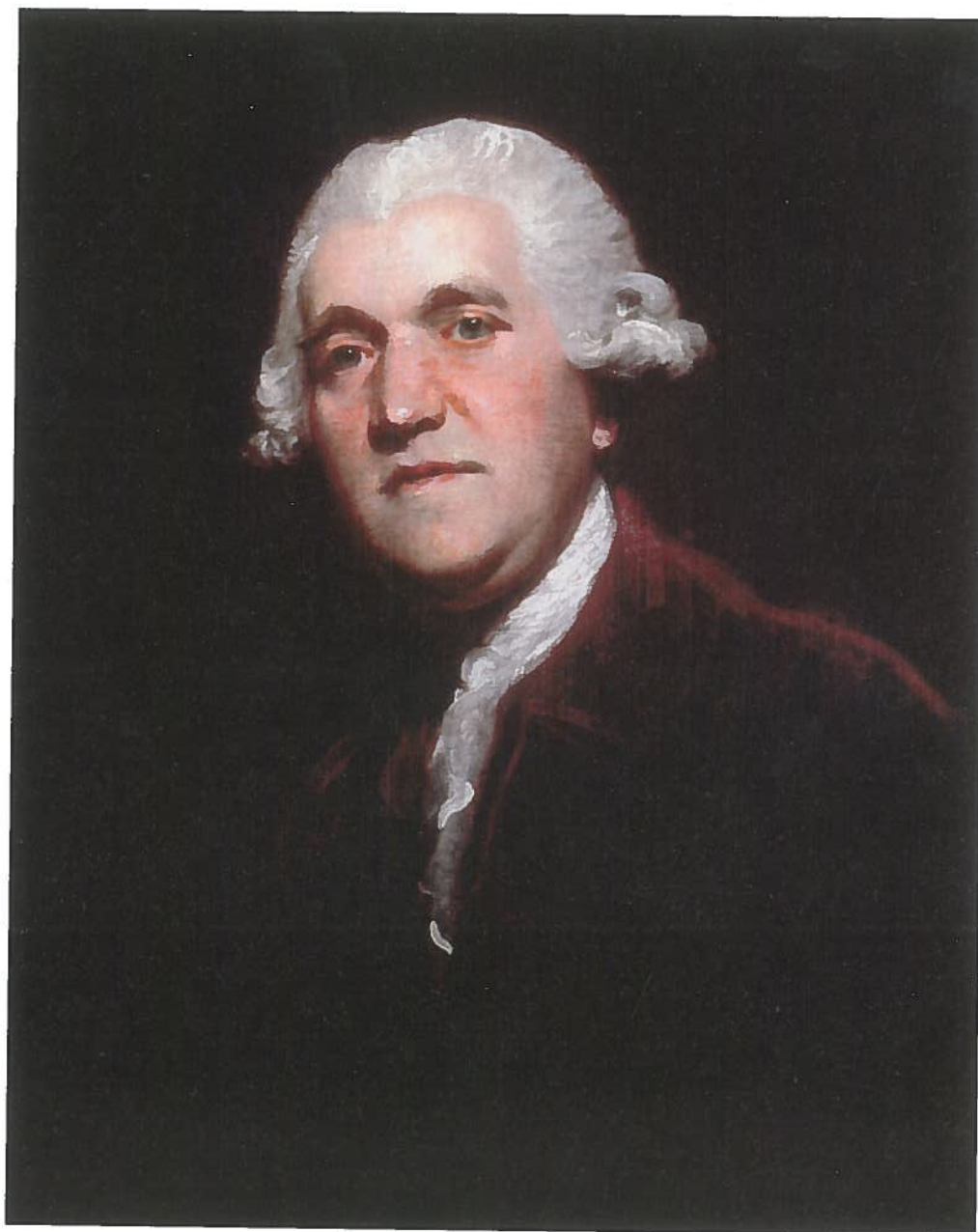
Elected a Society member on 1 September 1756, Reynolds participated directly in experiments of this kind – trials testing whether products or producers could deliver stipulated results under contrived duress. Alongside William Hogarth, Reynolds was nominated in 1757 to serve on a committee making trials of two hundred pounds of verdigris (a greenish-blue pigment derived from the chemical action of acetic acid on copper plates).¹⁸ Through the Society, Reynolds was also exposed to artistic experiments of a more open-ended nature. In May 1760, the Swiss-born artist Johann Heinrich Müntz submitted to the institution his treatise on encaustic painting (a technique in which pigments are applied to a waxed surface and heated to render them inviolate), along with two landscapes he had painted in the medium. Explaining how one picture had been "varnished with the white of an Egg; the other is a Symple dead-colouring fixed, as it came from the fire",



Müntz asked that his paintings be judged as "merely ... private experiments, (and not as proofs of my talents)".¹⁹

Experiment positively abounds in Müntz's submission. Simplifying the system that the comte de Caylus had earlier reconstructed from ancient texts, Müntz directs the aspiring painter to rub a pictorial support with wax, a process depicted in his volume's title page (fig. 71).²⁰ Painting on to the waxed surface with water-based pigments, Müntz's artist then heats the completed picture before a fire (represented at left in the title page) to absorb the dispersed colours into the wax.²¹ Yet, how could artists habituated to oil paint's lustrous hues predict the final appearance of pre-fired encaustic's muted tones? Müntz proposes a guide (fig. 72). Painting bands of colour across a numbered grid and recording the

FIG. 73
 Joshua Reynolds
Josiah Wedgwood, 1782
 Oil on canvas, 75 × 63 cm
 Wedgwood Museum, Barlaston,
 5004



pigments used, the artist is to cut this waxed guide along vertical axis E and fire one half, yielding a 'before-and-after' view of encaustic preparation.²²

Müntz's work is of particular interest for the understanding of Reynolds's evolving practice. Not only did Müntz challenge "Rynolds" (in idiosyncratic spelling) to take up his technique, but the future President was reciprocally charged by the Society to reckon with Müntz's project.²³ Reynolds was selected on a subcommittee in January 1760 assigned to assess Müntz's submission, alongside artists including Ramsay, James 'Athenian'

Stuart and Francis Hayman and the chemist Robert Dossie.²⁴ Although we have no record of his participation in the committee's deliberations, this contact with Müntz's technique is especially suggestive given Reynolds's own innovative wax-infused methods, which would also use the egg treatment promoted by Müntz.²⁵

Within the early Society of Arts, then, 'experiment' could denote a regime of trials by which materials were tested against stipulated standards. Did a chemical preparation possess the desired hardness and transparency of Parisian copal varnish? Such questions could be answered

FIG. 74
Notations for encaustic painting
in Wedgwood by Josiah Wedgwood
and others, c. 1760s
Wedgwood Museum, Barlaston,
MS 26 19117

by making experiments. As demonstrated by the submission from Müntz that Reynolds was assigned to adjudicate, trials carefully conducted and recorded could equally guide a maker into open-ended terrain where no standards were fixed, and where the outcomes were as much mythical, ancient techniques as ineffable modern desires.

Understanding Reynolds's experimental notations

No one working in the arts of eighteenth-century Britain explored this experimental ground more rigorously than Josiah Wedgwood. Portrayed by Reynolds in 1782, Wedgwood turns toward the beholder, his powdered wig glinting in strong, descending light (fig. 73). Eyes fixed on an invisible target in the middle distance, Wedgwood is shown by Reynolds in a mode of contemplative detachment. As a light body breaking through darkness in this dramatic depiction, he is more the eminent member of Birmingham's nocturnal Lunar Society than the savvy entrepreneur who helped transform the Staffordshire potteries into a leading frontier of the Industrial Revolution through the division of labour and exhaustive experimentation. Indeed, collaborating with resident chemists including Alexander Chisholm and Joseph Priestley, Wedgwood executed some five thousand trials on enhancements to body, glazing, painted decoration and other features of fired earthenware, documenting his efforts in a series of 'Experiment Books'. These meticulously documented trials can provide illuminating parallels with Reynolds's more enigmatic experimental records.

In an early volume, Wedgwood explains his system for recording experiments: each trial is labelled numerically and listed chronologically in the left-hand column (fig. 74). The materials used are expressed as numbers. This is a form of encryption; in Wedgwood's own words, the materials become incomprehensible "without the key, to any person who might [have] happened to take up the book, which is

				Colours for Encaustic painting.
				Not good - too much 34, and it was that of the shop, of too purple a colour, from having undergone too much heat in calcination.
3 38 9	961	8 10 4		Much the same
5 1 1	962	6 1		Not bright enough
	963	5 1		Bad
3 17 3	964	6 1 4	3	Too yellow and discoloured.
8 8 1	965	8 1		Bad red, wants brightness
	966	10 1		D°
	967	4 3		D°
	968	4 4		D°
	969	4 5		D°
	970	4 2		D°
	971	3 1		Not good, but better than the above
	972	4 1	23 burnt	Good colour, but too hard
	973	2 1 2		Too hard
	974	4 1 1		Too hard
	975	1 1 4 1	3	For a White too dry
	976	3 1	1 5	An excellent encaustic Enamel!
	977	2	23	Good, but rather too hard
	978	1 2		Too hard
	979	1 3		Little too hard
	980	1 4		A bad greenish color, too dry and pale
	980A	2 2	32 17	



FIG. 75
Jasper-ware sample created
by Josiah Wedgwood and
collaborators, c. 1773–76
Wedgwood Museum,
Barlaston, 4228

often, in the course of making the experiments, unavoidably exposed to such accidents".²⁶ Wedgwood left the central column blank for the terse narration of each trial's results: "Not bright enough", "Bad". At extreme right, vertical dots (not visible in the reproduction) indicate how the experimental results were subsequently sorted into "classes and sections ... to exhibit at one view all the trials made at different times for similar purposes"²⁷. Furthermore, each numbered experiment in the volumes corresponds to a material object – a sample stamped with trial number and firing location in the kilns – kept in cases and frequently updated as reference tools (fig. 75).

Wedgwood's protocols can help to clarify Reynolds's own experimental notations. At the beginning of his two 'Ledger Books' now housed at the Fitzwilliam Museum, Cambridge, Reynolds lists sitters' names in alphabetical order and by chronology of payments on their portraits.²⁸ At the end of the books, he records the methods and materials with which a selection of those pictures had been fabricated (fig. 76). Reynolds evidently shared Wedgwood's concern for secrecy since he narrated his

trials in a curious mixture of pidgin Italian, English and Latin.²⁹ The way the notes work can be exemplified by *The Young Fortune-Teller* (a double portrait painted for the Duke of Marlborough in the mid 1770s), the painting process of which Reynolds describes as: "First *olio*[,] *e poi colori con cera senza olio*" (first oil, then pigments with wax without oil).³⁰ Next, he lists the names of sitters whose portraits follow that procedure – Mr Weyland, Mrs Mardaunt, Mrs Morris, Viscount Tyrconnel.³¹

Important differences from Wedgwood's practice can surely be noted (compare figs. 74–76). Reynolds provides a chronological survey of evolving procedures, while Wedgwood records discrete trials and specific results, whether successful or not. A further difference may be observed in the archiving of experiments. Where Wedgwood keyed his notations to cabinets of numbered samples, Reynolds's paintings themselves were his experimental objects – artefacts soon shipped out of his studio and, in some cases, distributed across Britain's expanding empire. Especially interesting in this light is his *Experimental Canvas* (cat. 1),³² one of two such studio tools offered by a collector to the Royal Academy in the 1870s. Paint appears here in its rich, material potential. Anchored to the bottom edge as an amber archipelago, pats of pigment spread upwards as a floating mauve-colored dot, a sashaying deposit of unctuous knife-work at right centre, and a fat pucker of paint-media on the creamy ground at the right-hand edge. Although many of his inscriptions have been rendered illegible by fading and subsequent discoloured varnishes, Reynolds annotated these chromatic events as trials conducted over time, frequently linking paint sample and text together with intercepting circles – all the while rotating the canvas to exploit the surface at different orientations. *White with Picard's* [or *Head's?*] *Varnish* is discernible from the ivory splotch at centre; a preparation with copal varnish appears just below, and, if rotated, a mixture with orpiment becomes legible.

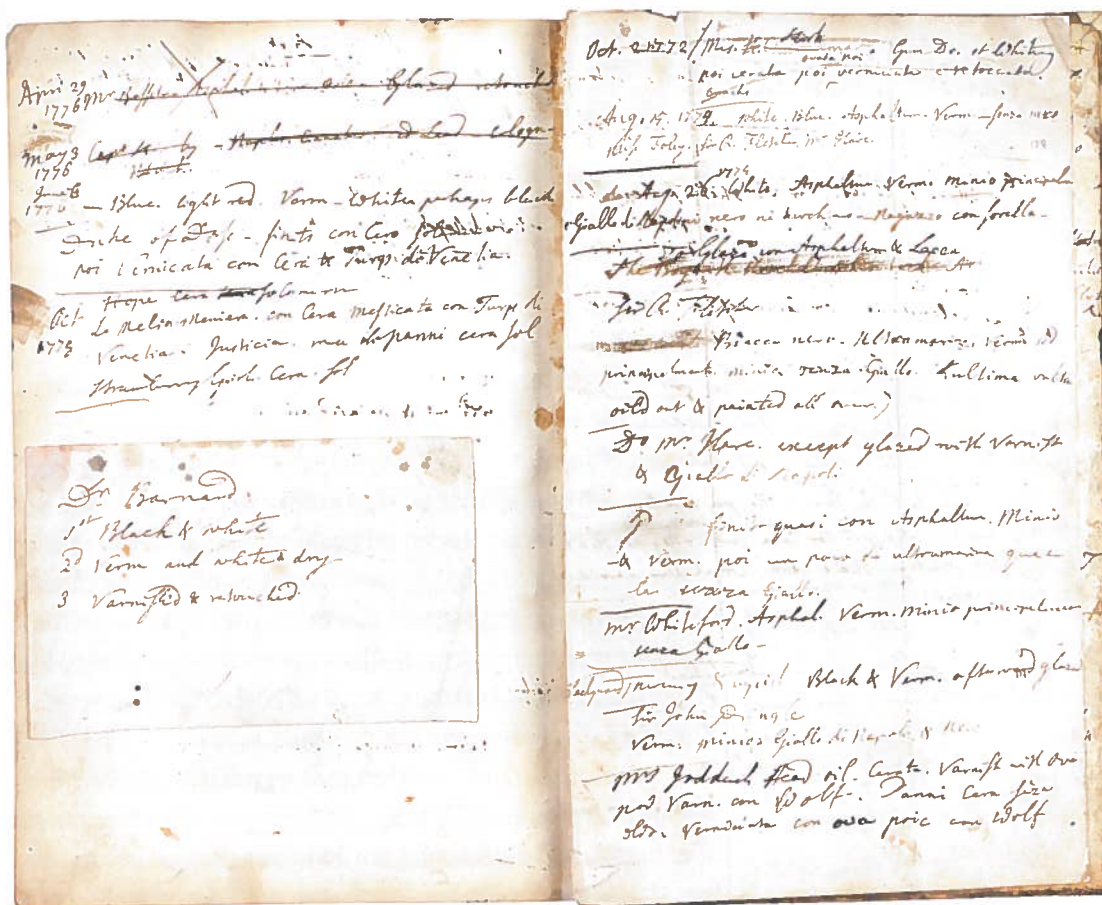


FIG. 76
Joshua Reynolds's Ledger
Book II, 1772-78, showing recipes
Fitzwilliam Museum, Cambridge,
MS.2-1916, 177v-178r

In this way, Reynolds's experimental canvas operates on principles akin to Müntz's encaustic trial-swatches. Just as Müntz's swatches enabled the painter to predict how pigments would appear after firing, Reynolds's experimental canvas (which had apparently been kept in his studio for reference) could help him to anticipate how documented preparations might change materially through time. Indeed, if reoriented by 180° (the object itself sanctions no particular alignment), a grid-like structure may be read across the top edge as three registers of blocky paint swatches, thereby moving the object more clearly into the taxonomic ordering privileged by Enlightenment thought.³³

Though conversant with experimental notations used by contemporaries, Reynolds's strategies also follow their own logic. Displaying sample wares at his storefront in Soho's Greek Street on the promise that customers could see exactly what they would get when they ordered from his catalogue, Wedgwood employed experiment to guarantee quality of product. As one historian has put it, he used "the available means of production – machines or workmen's hands – in such a way that chance and variation would

be eliminated".³⁴ By contrast, Reynolds's experimental enterprise pursued a different orientation to the luxury market, eschewing strict product-standardization for one-of-a-kind works open to serendipitous, experimental effects.

Experiment in theory

Conversant with but not identical to his contemporaries' experimental practices, Reynolds's pigment trials, notational methods and technical interests offer us an account of the President we have largely lost. That said, it is important to note that Reynolds himself warned students *against* experiment. "Though I have often spoke of that mean conception of our art which confines it to mere imitation," he instructed auditors of his thirteenth 'Discourse' in 1786, "I must add, that it may be narrowed to such a mere matter of experiment, as to exclude from it the application of science, which alone gives dignity and compass to any art."³⁵ Like imitation, experiment (which shares an etymological root and deep history with empiricism) could compromise painting's status as a broad-

mind liberal art through undue emphasis on sensorial effects instead of rational principles.³⁶ As he had forbidden his own assistants from using pigments in “experimental mixtures”, so Reynolds further warned both artists and natural philosophers to guard against untrammelled experimentation. “To find proper foundations for science,” he proposed in 1786, “is neither to narrow or to vulgarise it; and this is sufficiently exemplified in the success of experimental philosophy.”³⁷ Such remarks may sound strange in light of the argument I have presented. For not only had Reynolds thus aligned experiment pejoratively with the imitation of nature and opposed it to science, but he had taken sanction for that opposition from experimental philosophy, the period’s dominant approach to scientific knowledge. Reading such passages, it is understandable that Reynolds has been cast as “effectively working with separate premises” from his scientific contemporaries.³⁸

Yet, a more comprehensive view can be opened up when we see Reynolds’s desire to moderate experiment as moving in a tradition central to experimental philosophy’s own theoretical infrastructure. This point can be illuminated most clearly through the thought of Restoration polymath Robert Hooke (1635–1703), a figure of significant interest to Reynolds’s colleagues at the Society of Arts in the late 1750s.³⁹ As the Society’s members could have read in a text they acquired in June 1756, Hooke built upon themes found in the seminal writings of Francis Bacon to juxtapose two different methods for building scientific knowledge – synthetic induction from empirical particulars versus the analytical work of logical deduction.⁴⁰ According to Hooke, deduction proceeds from causes to effects and “is resembled fitly enough by that Example of an Architect, who hath a full comprehension of what he designs to do and acts accordingly”.⁴¹ By contrast, reasoning by induction moves slowly from sensible effects to general causes in the manner of “a Husbandman or Gardener, who prepares his Ground and sows his Seed, and diligently cherishes the

growing Vegetable ... till it comes to its perfect Ripeness and Maturity, and yields him the Fruit of his Labour”.⁴² The long-time Curator of Experiments at the early Royal Society and engineer of Boyle’s air-pump (fig. 1), Hooke tends to be associated with this patient, Baconian growth of knowledge through inductive synthesis of experimental results.⁴³ Yet Hooke himself was quick to acknowledge the limitations of that approach. “In truth the *Synthetick* way by Experiment, Observations, &c.,” he noted, “will be very slow if it be not often assisted by the *Analytick*, which proves of excellent use ... for that the discovery of a *Negative* is one way of restraining and limiting an *Affirmative*.”⁴⁴ The power of experimental philosophy, for Hooke, followed precisely from its reciprocating tensions between positive and negative, synthesis and analysis, induction and deduction – its containment of experimental data within an architectonic of rationalism.⁴⁵

Historians note that this desire to temper the force of empiricism within the experimental community persisted well into the eighteenth century, as followers of Isaac Newton sought to resolve “the vexing problem of how to embrace the New Philosophy of empiricism without becoming an empiric”.⁴⁶ It was also this drive to entrench rationality against the bodily realm of the empirical that Edmund Burke highlighted when characterizing the intellect of his friend and Royal Society Fellow, Joshua Reynolds. “Fond of reducing every thing to one system,” Burke observed, Reynolds’s inclination “to abstractions, to generalizing and classification, is the great glory of the human mind ... and is the source of every thing that can be called science.”⁴⁷ Reynolds’s hostility to “mere” experiment – to what he would describe in 1786 as a “false system of reasoning, grounded on a partial view of things” – should thus be seen as voicing concerns articulated robustly within the experimental tradition itself.⁴⁸ In fact, given Reynolds’s own suggestions in his thirteenth ‘Discourse’ for securing the “proper foundations” of art and science, it is tempting

FIG. 77
John Constable
*Cenotaph to the Memory of Sir
Joshua Reynolds*, 1833–36
Oil on canvas, 132 × 108.5 cm
National Gallery, London,
NG1272

to think that he might have taken inspiration from Hooke's thoughts on constructing the edifice of experimental knowledge. The connection is particularly intriguing since, under commission of Edward, 1st Earl of Conway, Hooke had acted as architect of Ragley Hall, the country house in Warwickshire that Conway's descendants would later fill with Reynolds's pictures. Those holdings are now partially represented at the Wallace Collection.⁴⁹

Conclusion

Asking after the period meanings of Reynolds's experiments – after his possession of “every thing that can be called science” – thus opens an instructively unfamiliar view. I have argued that, through his involvement at the Society of Arts in the late 1750s, Reynolds can be seen as moving in a practical milieu where experiment denoted as much systematic, public testing as private, open-ended trials made in pursuit of dazzling effects. Further, by approaching Reynolds's methods and archiving of experiments as different from, rather than inferior to, the projects of acclaimed contemporary experimentalists, we may equally apprehend his theoretical reservations about experiment as importantly continuous with the scientific tradition, not a break from it.

If these aspects of the artist's practice have often been overlooked by modern art historians, Reynolds's contemporaries and immediate successors saw things differently. By way of conclusion, it is suggestive to consider John Constable's *Cenotaph to the Memory of Sir Joshua Reynolds* (fig. 77). Framed from sylvan depths by an arch of trees and flanked by busts of Michelangelo and Raphael, the late President's funerary monument rises at the centre of the canvas. A painter of faces now denoted by name only (*Reynolds* is the lone word legible on the painted monument), the loss Constable mourns is greater than that of an artist then dead for some forty years. For, lecturing on landscape painting to the Royal Institution of Great



Britain in 1836, Constable could but tentatively avow what for Reynolds's generation had been a truism. “Painting is a science,” Constable claimed, “and should be pursued as an inquiry into the laws of nature. Why, then, may not landscape be considered as a branch of natural philosophy, of which pictures are but experiments?”⁵⁰ Known for his own experimental facture and innovative oil sketching *en plein air*, Constable here figures landscape paintings as “observational records in the service of ‘induction’ rather than of the testing of theories”, in E.H. Gombrich's assessment.⁵¹ Yet, read in the same year in which he completed his *Cenotaph*, the elegiac tone of Constable's lecture is palpable. It is as if, under the name of Reynolds, Constable mourns an art integrated as experiment into the thick of natural knowledge.

NOTES

- 1 Northcote 1818, II, p. 23.
- 2 British Institution for Promoting the Fine Arts in the United Kingdom, *Catalogue of pictures by the Late Sir Joshua Reynolds*, London 1813, pp. 12–13.
- 3 Joseph Farington, 'Memoirs of the Life of Sir Joshua Reynolds', in Reynolds, *The Literary Works of Sir Joshua Reynolds*, ed. Edmond Malone, 5th edn, 3 vols., London 1819, II, pp. cclxxvii–cclxxxviii.
- 4 See Hilary Young, *The Genius of Wedgwood*, London 1995.
- 5 For comparison with Wedgwood, see Neil De Marchi and Hans J. Van Miegroet, 'Ingenuity, Preference, and the Pricing of Pictures: The Smith-Reynolds Connection', in *Economic Engagements with Art*, ed. N. de Marchi and C. Goodwin, Durham 1999, pp. 379–412.
- 6 For an influential interpretation, see Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle and the Experimental Life*, Princeton 1985.
- 7 Samuel Johnson, *A Dictionary of the English Language*, 2 vols., London 1755–56, I, n.p.
- 8 See David H. Solkin, *Painting for Money: The Visual Arts and the Public Sphere in Eighteenth-Century England*, New Haven 1993, esp. pp. 225–46.
- 9 Anon., 'Sir Joshua Reynolds', *General Evening Post*, 25–28 February 1792, unpag.
- 10 Important studies include Charles Lock Eastlake, *Materials for a History of Oil Painting*, London 1847; M. Kirby Talley, Jr., "All Good Pictures Crack": Sir Joshua Reynolds's Practice and Studio', in Penny 1986, pp. 55–70; and Stephen Hackney, Rica Jones and Joyce Townsend, *Paint and Purpose: A Study of Technique in British Art*, London 1999.
- 11 *National Gallery Technical Bulletin* 2014, pp. 61–64.
- 12 Kirby Talley in Penny 1986, p. 55.
- 13 D.G.C. Allan and John L. Abbott (eds.), *The Virtuoso Tribe of Arts and Sciences: Studies in the Eighteenth-Century Work and Membership of the London Society of Arts*, Athens, GA, 1992, pp. xv–xvi.
- 14 Minutes of the Society, March 1757–February 1758 (RSA/AD/MA/100/12/01/02, 138), 18 January 1758.
- 15 See Steven Shapin, *A Social History of Truth: Civility and Science in Seventeenth-Century England*, Chicago 1994.
- 16 *Premiums by the Society, Established at London, for the Encouragement of Arts, Manufactures, and Commerce*, London 1759, p. 13.
- 17 RSA/AD/MA/100/12/01/04, 27.
- 18 RSA/AD/MA/100/12/01/01, f. 227. On testing verdigris, see Robert Dossie, *The Handmaid to the Arts*, London 1764, pp. 112–15.
- 19 J.H. Müntz to the Society of Arts, 7 May 1760: RSA/PR/GE/110/8/145, 7/5/1760, 1.
- 20 Anne Claude de Tubières-Grimoard de Pestels de Lévis, comte de Caylus (1692–1765) was an antiquarian and theorist of art. In *Mémoire sur la peinture à l'encaustique et sur la peinture à la cire* (1755), he advanced an interpretation of encaustic painting, reading Pliny the Elder's account in the light of recent archaeological findings and his own technical experiments; see Danielle Rice, 'The Fire of the Ancients: The Encaustic Painting Revival, 1755 to 1812', PhD. dissertation, Yale University, 1979, esp. pp. 10–37.
- 21 See Jean-Henri Müntz, *Encaustic, or, Count Caylus's Method of Painting in the Manner of the Ancients ...*, London 1760, pp. 7–8.
- 22 Ibid., pp. 31–32.
- 23 Ibid., p. 19.
- 24 See Minutes of the Society, 1760: RSA/AD/MA/100/12/01/05, 91.
- 25 Reynolds's name is absent in the meetings of the subcommittee on 25 June 1760 and 11 November 1760: Minutes of Various Premium Committees 1760–61; see RSA PR/GE/112/12/2: seq. 3. For Reynolds's innovative use of wax, see Hélène Dubois, "Use a little wax with your colours, but don't tell anybody": Joshua Reynolds's Painting Experiments with Wax and His Sources', *Hamilton Kerr Institute Bulletin*, 111, 2002, pp. 97–106.
- 26 Josiah Wedgwood, 'First Experiment Book', MS Wedgwood 26 19117, p. 1.
- 27 Wedgwood, MS Wedgwood 26 19117, p. 4.
- 28 See 'Ledgers' pp. 105–69.
- 29 On this multi-lingual practice and secrecy, see Kirby Talley in Penny 1986, p. 57; Dubois 2000, p. 98.
- 30 See Mannings, p. 425.
- 31 Joshua Reynolds, Fitzwilliam Museum MS 2. 1916, f. 178v.
- 32 See George Barker to the President and Council of the Royal Academy, 29 October 1877, Royal Academy of Arts Conservation File, 03/576.
- 33 See Michel Foucault, *The Order of Things: An Archaeology of the Human Sciences* [1966], New York 1970, esp. pp. 136–79.
- 34 Adrian Forty, *Objects of Desire: Design and Society 1750–1980*, New York 1986, p. 37.
- 35 Thirteenth 'Discourse', in *Discourses*, pp. 231–32.
- 36 For the etymological connections, compare Charles B. Schmitt, 'Experience and Experiment: A Comparison of Zabarella's View with Galileo's *De Motu*', *Studies in the Renaissance*, xvi, 1969, esp. pp. 85–91, and Raymond Williams, 'Empirical', in *Keywords: A Vocabulary of Culture and Society, Revised Edition*, New York 1983, pp. 115–17. For a definition of "science" in Reynolds's circles as "Art attained by precepts, or built on principles", see Johnson 1755–56, II, n.p.
- 37 Thirteenth 'Discourse', in *Discourses* 1997, p. 232. On Reynolds's restrictions on apprentices' experiments, see Northcote 1818, II, pp. 20–21.
- 38 Martin Kemp, 'True to Their Natures: Sir Joshua Reynolds and Dr. William Hunter at the Royal Academy of Arts', *Notes and Records of the Royal Society of London*, xlvii, no. 1, January 1992, pp. 77–88, esp. p. 78.
- 39 Interest in Hooke's work was strong among figures central to the Society of Arts. Prior to co-founding the Society, natural philosopher Henry Baker had republished Hooke's *Micrographia* (1665) as *Micrographia Restaurata, Or, the Copper-Plates of Dr. Hooke's Wonderful Discoveries by the Microscope: Reprinted and Fully Explained* (London 1745). Baker was also active in several efforts to acquire Hooke's publications in May 1756 (on 5, 12, 19 and 26 May), which were then secured on 2 June 1756. See Minutes of the Society 1754–1757 (RSA/AD/MA/100/12/01/01).
- 40 For Reynolds's own published references to Bacon, see Wark in *Discourses* 1997, pp. 46, 209, 217–28.
- 41 Robert Hooke, *Lectures and Discourses of Earthquakes*, in R. Waller (ed.), *The Posthumous Works of Robert Hooke*, London 1705, p. 330.
- 42 Ibid., p. 330.
- 43 See, for example, William Lynch, *Solomon's Child: Method in the Early Royal Society of London*, Stanford 2001.
- 44 Hooke 1705, p. 330.
- 45 For an interpretation of Hooke's thinking

through architecture, see Matthew C. Hunter, *Wicked Intelligence: Visual Art and the Science of Experiment in Restoration London*, Chicago 2013, pp. 204–24.

- 46 Craig A. Hanson, *The English Virtuoso: Art, Medicine, and Antiquarianism in the Age of Empiricism*, Chicago 2009, p. 164. For this kind of argument more broadly, see John Barrell, *The Birth of Pandora and the Division of Knowledge*, Basingstoke 1992, pp. 41–61.
- 47 Edmund Burke, quoted in Reynolds, *The Literary Works of Sir Joshua Reynolds*, 5th edn, ed. Edmond Malone, 3 vols., London 1819, I, p. xcvi.
- 48 Thirteenth 'Discourse', in *Discourses* 1997, p. 232.
- 49 M.I. Batten, 'The Architecture of Dr. Robert Hooke F.R.S.', *The Walpole Society*, XXV, 1936–37, esp. pp. 97–103.
- 50 *John Constable's Discourses*, ed. R.B. Beckett, Ipswich 1970, p. 68.
- 51 E.H. Gombrich, 'Experiment and Experience in the Arts', in *The Image and the Eye: Further Studies in the Psychology of Pictorial Representation*, Oxford 1982, p. 231.