

BOOK REVIEW

Meghan C. Doherty, *Engraving Accuracy in Early Modern England: Visual Communication and the Royal Society*

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The importance of philosophical instruments like the air-pump and the microscope in the early modern period has been well established: wielded by natural philosophers, and sometimes by their technicians, they distorted nature to glean new insight into it. Meghan C. Doherty argues that the humble engraver's burin should be considered alongside these classic instruments of the history of science. Like the air-pump or microscope, the burin distorted. It was used to render the three-dimensional, full-colour world into two-dimensional monochrome, using visual conventions to intimate the tonal and textural qualities of natural objects. The images produced for the publications of Royal Society Fellows (the main focus of the book) provided their readers access to their 'objects of study' directly, replacing the natural objects themselves as the focus of scientific inquiry (p. 29). In this way, copperplate images 'fundamentally changed how nature was studied and subsequently understood in the seventeenth century' (p. 218). Not only were printed images able to circulate and be seen by many, but also prints and their making, Doherty demonstrates, created a visual standard that developed the procedures of natural-philosophical enquiry itself.

That standard was accuracy. In the early modern period, this referred to executing tasks with care. Doherty convincingly argues that careful action – accuracy – conceptually united the knowledge-making practices of experiment and image making for Royal Society fellows, which enabled properly made images to conform to an accepted, accurate, socially constructed standard. This accuracy grew from the Royal Society's Baconian programme with its emphasis on studying trades and artisanal practices 'as a necessary adjunct to new discoveries' (p. 14). In publications, images were accompanied by 'detailed discussions of method' that enabled the 'careful processes of carving' a copperplate 'to secure printed images' immediate and urgent relationships to knowledge' (pp. 32–3).

Crucial to the development of visual standards at the Royal Society was the development of the Royal Society's judgement of images. Chapter 1 examines three manuals to show that 'modes of accuracy the Fellows developed [were] as a result of prolonged engagement with artistic practices' (pp. 49–50). Such manuals helped fellows to develop their visual judgement in different ways: through learning how to draw, learning relevant art history, and learning about the engraving process. For example, Royal Society fellow John Evelyn's *Sculptura* (1662) provided readers with exemplary works that aided the recognition of a good print. Meanwhile, the engraver William Faithorne published a work that educated readers in 'best practice' in engraving and outlined common engraving errors (p. 80). Moreover, Doherty shows that artistic and scientific authors actively shaped

the looking habits of their readers for their illustrated works in parallel ways, demonstrating the similarities between Faithorne's instructions on engraving and Robert Boyle's instructions on determining the specific gravity of minerals and the use of an air-pump (pp. 81–8). Accuracy in print and experiment was thus co-produced through engagements between artisans and natural philosophers.

How visual judgement was employed by Royal Society Fellows and its effect on scientific images is then explored through three chapters of case studies that show different ways in which accuracy was achieved through image making. Chapter 2 shows that Robert Hooke's visual judgement was developed by a thorough engagement with contemporary drawing and engraving practices in London. Doherty makes a superb comparison between Faithorne's methods of portrait engraving and Hooke's *Micrographia* to show how his radically new images of the microscopic world became so readily acceptable to his contemporaries. By employing the conventions and methods of portraiture engraving, which emphasized likeness to the individual as its key quality, Hooke's images of fleas and poppy seeds were recognizable and accurate – they also bore the signs of being a likeness.

Chapter 3 turns to the making of John Ray and Francis Willughby's *Ornithology* (1678) to show that an accurate image, what Ray described as the 'best and truest', was not necessarily 'the result of direct observation' like Hooke's (p. 138). In various scenarios, printed images and dead specimens provided the 'recognisable and authoritative images' (p. 166) that the authors prioritized. Accuracy, then, was not directly tied to the observation of nature, but mediated through the burin and collecting practices.

Chapter 4 focuses on images in the *Philosophical Transactions* under Henry Oldenberg's editorship. Using the examples of debates on the nature of Saturn's rings and on the anatomical structure of human testicles, Doherty shows how 'a regime of accuracy was produced through the accumulation of images that circulated' among the 'pan-European community' of readers (p. 179). Images were an important touchstone for actors in these debates as points of reference and of study.

From these chapters, the burin does indeed emerge as a crucial scientific instrument, and accuracy as a key organizing concept of early image making and experiment at the Royal Society across a broad range of sciences. Indeed, Doherty presents her focus on accuracy as a precursor to Lorraine Daston and Peter Galison's truth-to-nature: 'Accuracy then is to truth-to-nature as truth-to-nature is to objectivity. These three terms define the goals of three centuries of scientific image-making' (p. 35). On this gloss, we gain a more coherent picture of the developing standards of scientific images.

However, the coherence of this picture is ultimately underdetermined by the evidence presented. Simply put, the three chapters (2–4) that focus on image making are insufficient to support the claim because of the work's relatively narrow focus on Royal Society fellows from 1660 to 1680. At the same time, the introduction and first chapter weigh in at almost half the total book length (pp. 11–95) making the work exposition-heavy and at times repetitive.

Though worth noting, this should not detract from Doherty's important argument. Accuracy was crucial to the early Royal Society fellows. It made them see knowledge in the printed marks of a burin point.