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Baroque Science. Ofer Gal and Raz Chen-Morris (University of Chicago Press, Chicago, 2013). Pp. xiv + 333. $45. ISBN 978-0-226-92398-7.

In *Baroque Science*, Ofer Gal and Raz Chen-Morris argue that while historians have styled a period of deliberate distortion and forced paradox in seventeenth-century culture and art, the same has not been true for historians of science, who have instead presented the era as one of emergent order and logic in science. Against this view, they identify a series of paradoxes in seventeenth-century science, founded in optics, mathematical natural philosophy, and the role of imagination and the passions in making knowledge. Chapter one identifies an "optical paradox" in the work of Johannes Kepler and considers its consequences for the Jesuit Christoph Scheiner and Descartes. Stressing a radical break between medieval accounts of vision and Keplerian optics, the authors argue that the latter dispensed with medieval idea of vision based on species or simulacra emanating from objects to the eye in favour of an account based solely on the reflection and refraction of light, in which vision is equivalent to the operation of a camera obscura. This impersonal account of vision led to an "estrangement of nature" (51) as the observer was removed from scientific observation, a paradox which lay behind Dutch painting and Cartesian doubt.

Chapter two explores the relationship between knowledge, mediation, and optical instruments prior to the era of Kepler. Medieval scholars sought to avoid an instability in interpreting divinely-placed signs in the world and deployed Aristotelian

classification to secure this. In so doing they adopted an Aristotelian position that vision was the foundation of knowledge, and one impervious to misjudgments. The chapter emphasizes the extent to which Kepler's views of light, vision, and instruments represented a dramatic break from the past. Chapter three then uses the contrast to cast a new perspective on debates between Galileo and the Jesuit Horatio Grassi on comets and between Robert Hooke and Johannes Hevelius on the relative merits of naked-eye observation and the telescope in astronomy. The authors argue that both Galileo and Hooke dethroned the eye from a place of primacy which Grassi and Hevelius still took for granted and which belonged to an older scholastic tradition.

The next section of the book, comprising chapters four to six, explores a second paradox, this time concerning mathematics. The authors argue that Kepler and Galileo inaugurated a new vision of mathematical natural philosophy based on treating nature as productive of order in motions amenable to mathematical description. But while Kepler imagined such a vision would reveal the traces of God's design in the universe, a simple order of laws behind apparent complexity, by the time of Newton, mathematics came to be seen as nothing more than an artful tool for approximating the phenomena of an irreducibly complex universe. Chapters explore this paradox through detailed examinations of the role of mathematics in seventeenth-century studies of motion and chapter six offers an interesting "archaeology of the inverse square law" tracing its roots in optics. The final section of the book, comprising chapter seven, offers a third paradox, namely that these epistemic changes of the seventeenth century led to a new relationship between the imagination, reason, and

the passions, involving imagination in the mediation of knowledge, but demanding a new science of the passions to manage this.

Baroque Science is an intellectual history of seventeenth-century natural philosophy, and as the authors indicate it adheres to a very established "canon" of scientific texts. Most of the basic features of the Scientific Revolution remain as features of Baroque Science. The authors emphasize a radical break with medieval science; Kepler, Galileo, Descartes, Hooke and Newton are the protagonists, and their success resides in new theories and epistemic innovations. Historical contexts (war, religion, politics, economy, etc.) are largely irrelevant to these changes, or at least rarely discussed. The scene of action is Europe. Readers may welcome these similarities or find them restricting, given how much recent studies more focused on the practice and culture of science have revealed about the intersections of science and the arts in the early modern period. In any case, *Baroque Science* will help to break down the barriers between histories of science, art, and culture in the seventeenth century, and does an excellent job of tying together diverse elements in the thinking of its protagonists through original readings of their optical, mathematical and intellectual epistemologies.

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