would have been helpful, as there are many navigational concepts mentioned, some without full explanation.

The last two chapters of the book, though relevant, are really appendices as they are outside the story of Dawes’ life. The first of these relates to astronomical tent observatories. Here we find (page 242) a discussion of how a tent observatory was used on Matthew Flinders’ 1801–1802 circumnavigation of Australia. With the help of a theodolite, a sextant and an Earnshaw astronomical regulator, Flinders and his brother determined longitudes from lunar distances. Since one of the authors is Curator of Astronomy at the Powerhouse Museum, I find it a little disappointing that there is no mention of the astronomical regulator being in the Museum’s collection. Then there is a sentence stating, “... they then used their lunar distances to check the ‘going rate’ of their clocks ...”. (page 242). This is incorrect, as only local time, which could be established by equal altitudes, was needed to find the rate of a clock. Flinders (1814) states this a number of times in his book about the voyage. For example, for Sunday 1 November 1801 he writes that

The rates of going with mean solar time of the four time keepers committed to my charge, were deduced by Mr. Crosley from three days observation of equal altitudes, with a sextant and quick-silver horizon, between the 21st and 27th of October. (page 40).

Notwithstanding the minor quibbles listed above, included mainly to show that the book has been carefully reviewed, this is an excellent book. It gives a full scholarly exposition of the life and achievements of William Dawes, who was a fascinating and important person in the history of Australian astronomy and Australian science. The book is highly recommended to readers of the Journal of Astronomical History and Heritage.

References

Dr. Nick Lomb
Centre for Astrophysics,
University of Southern Queensland,
Toowoomba, Queensland 4350, Australia.
E-mail: nick.lomb@myusq.edu.au

This book on philosophy explores ‘opaque conceptions’ and ‘undetermined zones’ in the works of major figures such as Francis Bacon, Descartes, Galileo, Leibniz and Newton (page 3). It takes on this exploration with what many in the world of astronomy and philosophy will view with a mixture of disdain and horror. Thus,

The various positions for and against Aristotle generated answers, which are only misleadingly cast as a rejection of his philosophy, when in truth they are a new appropriation and transformation of the Aristotelian tradition. (page 4).

Sgarbi goes further in stating that it may well be the case that the books of Kepler, William Gilbert, Blaise Pascal and Robert Boyle need to be re-evaluated. Do these “… self-declarations of originality correspond to the truth, or rather constitute a case of collective blatant self-deception.” (page 4).

Making this bold claim that some of the greatest thinkers of the past, who have been embraced as anti-Aristotelian were anything but that, is one of the world’s leading philosophers.

Author Marco Sgarbi is Professor of the History of Philosophy at Ca’ Foscari University in Venice. He is also Editor of the Bloomsbury Studies in the Aristotelian Tradition, of which this book is a part.

Sgarbi writes: “The perspective adopted in this research is unique in looking at … the major figures of natural philosophy … for their transformations of Aristotelian epistemology.” (page 9). The key here is transformations, not dismissal.

Sgarbi begins Chapter 1 by explaining that those who adhered to the teachings of Aristotle “Felt the urgency to fix their epistemological problems, and they did so by reflecting on the logical theory of regresses.” (page 13). It comprises two main stages, termed ‘a posteriori’ (from effects to cause) and ‘a priori’ (from cause to effects). The latter is also known as demonstration propter quid. But logicians in Padua around the year 1500 “… conceived an intermediary step and
called it negotiation of the intellect.” (page 15). This is where Sgarbi probes, to great effect, because “No one has so far focused on the origin and history of the intermediate process.” (page 13).

This is quite amazing, as in 1602 the Jesuit Johannes Brutscher based the entire discipline of logic on the intermediate stage of regressus. Another scholar, Paulus Vallius, wrote the intermediate stage must intervene for a cause to be known formally and distinctly. In 1588, Vallius stated

This intermediate consideration of the understanding, some call it negotiation of the intellect, others mental examination, others meditation, others application and intention of the mind. But in whatever way it is called, this consideration must intercede (cited by Sgarbi on page 41).

While Sgarbi does not make the analogy between this and music, I would suggest the work of Cyril Scott (1879–1970) is relevant. Scott (1933) wrote that

... the keynote of Nature’s music is its extreme subtlety. All is enchantingly indefinite, between the notes.

Here may be found, Scott wrote “... those spiritual intelligences ranging from smallest nature-spirits to loftiest cosmic archangel.”

It is in this intermediate space, either in the regressus or between the notes, that the intellect operates (possibly on a higher level) for a cause in Nature (i.e. natural philosophy) to become known.

In 1596, one of the last heirs of this Paduan tradition stated quite clearly how high the stakes delineated by Vallius were. Cesare Cremononini wrote that while mathematics understands its truth intuitively and immediately, natural philosophy requires the negotiation and mental examination of regressus. It was Francis Bacon who transformed the mental examination into a logical tool for discovery. This was taken up by Galileo.

The author opens the Galileo chapter by stating he was the first to point a telescope to the Moon and Jupiter. Thomas Harriot, who was the first telescopic astronomer, is not mentioned. Fortunately, the author’s study of Galileo does not depend on observational priority. Rather, he looks at what Galileo believed was the chief instrument for acquiring scientific knowledge. Galileo defines demonstrative regresses as

... a progression of reasoning in demonstration, which is made from effect to cause and vice versa for the more perfect development of the sciences. (page 72).

Sgarbi, quoting from a translation of Galileo’s Logical Treatises (which most historians of astronomy scarcely mention) notes he innovatively identified six essential conditions for regressus. In examining Galileo’s analysis, Sgarbi realizes that

What makes possible the transition of demonstration from effect to that from cause is without doubt the mental examination or negotiation of the intellect proposed by the Paduan Aristotelians, even if scholarship has tended to neglect this point. (page 74).

Galileo in fact “… transformed the intermediate stage of regressus into a mathematical form of reasoning.” (page 75). He applied this reasoning to the problem of why falling motion accelerates.

The author further believes that Galileo applied this mathematical analysis to his 1602 work Treatise on the Sphere, which was deeply influenced by Alessandro Piccolomini books from the sixteenth century:

Piccolomini is sceptical as to the possibility of knowing the real causes
of celestial motions – in other words, of providing a causal explanation in the Aristotelian sense. (page 80).

He relegates the role of astronomers (that is, mathematicians) to preserving appearances by calculation and prediction of the positions of the heavenly bodies. The true nature of motion is the province of natural philosophers. The attitude evinced by Galileo in light of all this is a revelation: he endorses the distinction between natural philosopher and astronomer.

This is explicitly attested in Galileo’s sentence—most of the time overlooked by scholars—in which he states that “… we will deal only with hypotheses, striving to confirm and prove them with appearances.” (page 81).

In Galileo’s work Two Chief Systems, he shows (through the mouthpiece of Salviati) … how he implements mathematics within the Aristotelian regressus … This is the only passage in Galileo’s writing in which he clearly outlines his contribution to reforming Aristotelian epistemology. (page 86).

The key point Sgarbi is making here is that Galileo is not abjuring Aristotle, but rather reforming it. To apply mathematics this way, … Galileo has to renounce the perfect overlap between mathematics and natural philosophy, despite his famous profession that the book of nature is written in mathematical characters. (page 88).

Galileo thus became a pivotal figure in the age of epistemology, “… paving the way for a new understanding of nature.” (page 91).

Even though there is no evidence in Aristotle’s texts that metaphysics is a universal science capable of demonstrating principles, Isaac Barrow (the Lucasian Professor of Mathematics at Cambridge before Newton) believed it was quintessentially Aristotelian:

The metaphysical foundation for mathematics substantiates the fact – in Barrow’s view – that nature is written in numbers and geometrical figures, exactly as Galileo believed. (page 147).

Petrus Ramus, by contrast, correctly “… argued against metaphysics as a universal science.” (page 147).

In his 1631 book The Practice of the Analytic Art, Thomas Harriot reverses the traditional logic of regressus. This break with Aristotle was accepted by Hooke, whose definition of analysis is taken directly from Harriot, who in turn was inspired by the ancient writers Theon of Smyrna and Pappus. The difference is that Hooke applied it “… not only to mathematics but also to natural philosophy.” (page 164). This analytic method is the one adopted by Isaac Newton, who stated that “… the method of experimental philosophy is that of regressus.” (page 198). Sgarbi, reading a manuscript by Newton in the Cambridge University Library, shows that “… Newton for the first time characterizes what was for the Aristotelians the intermediate stage of regressus.” (page 198).

In the case of the law of gravity, it is possible to apply such a law … In the synthetic stage of regressus … according to Newton, this method will allow natural philosophy to advance in its discoveries, and to achieve the credentials of a perfect science. (page 201).

This success was made manifest in astronomy by the gravitational explanation of the orbits of the planets, and perforce all matter in the Universe.

This brief review of Sgarbi’s arguments give merely a taste of the intellectual tour de force represented by this important book. I find Sgarbi’s conclusions convincing (although others might conclude he suffers from what the sixteenth century English astronomer Thomas Digges politely sees as putting the cart before the horse, i.e. theory before data).

There are two typos: on page 136, “attribute” should be “attributed”, and on page 203 “Hook” should be “Hooke.” The Index is not up to the calibre needed for a book of such complexity. It only contains names, so a search of concepts is exceptionally difficult.

Reference

Dr. Clifford Cunningham
University of Southern Queensland,
3915 Cordova Drive,
Austin, TX 78759, USA.
E-mail: Cliff.Cunningham@unisq.edu.au

Visionen neuer Wissenschaft: Zur Dialogischen Dichtung von Dante Alighieri und Johannes Kepler, by Laetitia Rimpau (Heidelberg, Universitätsverlag Winter,