

The Guardian

To Explain the World review – a dry study of history’s greatest scientists

Nobel prize-winner Steven Weinberg’s history of knowledge covers well trodden ground, barely straying from physics and astronomy

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Theoretical physicist Steven Weinberg at the 2013 SXSW festival in Austin, Texas. Photograph: Jordan Naylor/Getty Images for SXSW

“I confess that I find Aristotle frequently tedious, in a way that Plato is not,” writes Steven Weinberg, “but although often wrong Aristotle is not silly, in the way that Plato sometimes is.”

It’s a school report to make the philosophers blush, but with his latest book, *To Explain the World*, Weinberg makes it clear he isn’t out to polish anyone’s pedestal. No, he has turned to the notes and theories from classical Greece to reveal how far our understanding, and investigative techniques, progressed between antiquity and the age of enlightenment. For, as Weinberg argues, while Aristotle prized theories based on mental rumination alone, it was the emergence of the scientific method, rooted in physical experimentation, that has allowed us to discover, explain and harness the laws of nature.

Whisking us back to Plato and his bearded peers, Weinberg – a co-winner of the 1979 Nobel prize for his work in particle physics – kicks off with an exploration of their take on the

world, from the notion that matter is composed of four elements (earth, air, fire and water) to elaborate schemes of planetary movement, based on a reverence of circular motion and the firm idea that the Earth was at the centre of it all. Things progressed with the Hellenistic thinkers - using only their eyes, rudimentary equipment and a BC equivalent of the back of a fag packet, they had a decent stab at working out the vital statistics of our planet. Among them, Eratosthenes estimated the circumference of the Earth using two poles and the distance between Alexandria and Syene - a measurement, Weinberg intriguingly points out, that was made “probably by walkers, trained to make each step the same length”. The image of a troupe of Pythonesque ministers pacing the highway might be hard to resist, but the fact that Eratosthenes concluded the circumference to be 50 times that distance (when it is actually 47.9 times the distance) is not to be laughed at.

While Weinberg’s prequel to modern science is largely focused on Europe, the contributions of medieval Islamic scholars, often from further afield, also get a look-in, among them al-Haytham, who surmised that refraction is down to light travelling through different media at different speeds. Yet, disappointingly, Weinberg’s focus barely strays from physics and astronomy, while his analysis throughout seems centred more on exploring the “what” and “how” of theories past than the subtle considerations that influenced their creation.

The “who” is also lacking: Galileo and Newton are rare in emerging with a hint of character; delving into the work of Tycho Brahe, Weinberg sidesteps his colourful personality with nary a mention of his metal prosthetic nose.

Others, arguably, may wish they’d escaped attention. Dropping his lecture notes in a zealous moment of reputation-bashing, Weinberg pooh-poohs Francis Bacon’s contribution to establishing the scientific method, while Descartes only narrowly escapes being dismissed as a chronically mistaken navel-gazer by virtue of inventing his undeniably useful Cartesian coordinate system.

But if Weinberg’s attempt to contextualise the origins of the scientific method is a rather ho-hum affair, he certainly gets top marks for showing his workings. A lengthy, separate section is devoted to the methods and maths behind the theories he describes, with diagrams to boot. It’s a refreshing contrast to other tomes on the topic, whose authors fluff over the detail like coy magicians unwilling to have their hats examined for fear of loosing a rabbit.

The route Weinberg travels as he wends his way is a well trodden one - as many a bookshop shelf attests. But with *To Explain the World*, Weinberg reminds us to be humble not only about what we know, but how we know it. It’s a nuance, but an important one. For as the old saying goes, “Everything’s easy when you know how”.

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