The power of invention

A. Rupert Hall

The Magic of Numbers and Motion: The Scientific Career of René Descartes. By William R. Shea. *Watson Publishing International: 1991. Pp.371. $54.95.*

No one would deny the immensity of René Descartes' achievement in philosophy and mathematics, or the huge influence that he had on his successors. But in natural science the situation is different, although no one alive between 1650, the year of Descartes' death, and 1680 would have seen the distinction. Even into the second quarter of the eighteenth century, Descartes' views on the fabric of the Universe were still influential, having become modified by such neocartesians as Huygens and Leibniz; yet Huygens had called Descartes' world 'science fiction' and Leibniz had proved that the man had not correctly understood the very foundation of his physics, the concept of motion. Worse, newtonian mathematical physics and British empiricism had utterly subverted the world that Descartes had so cunningly contrived by *a priori* reasoning. "I have described the Earth and the entire visible Universe", Descartes declared, "on the model of a machine, without considering anything beyond figures and motion." But neither cartesian concepts nor cartesian mechanics stood up long to scrutiny, and the cogs of this machine simply would not turn. (Contrary to common belief, cartesian coordinates were not Descartes' invention.)

Portrait of Descartes by Frans von Schooten (1644). Descartes praised the portrait, "although the beard and the clothes bear no resemblance to reality".

Shea traces the intellectual path taken by Descartes from his first discussions with Isaac Beeckman at Breda in 1618. Descartes was then a gentleman-volunteer in the army of Prince Maurice, but it is impossible to imagine that he was ever serious about soldiering, and he was soon deep in the analysis of mathematical and scientific problems that, together with his work on epistemology and metaphysics, would occupy the rest of his life. The fruit of his labours was a concept of physical action, which in principle but not practice was mathematical and could be reduced to the idea of the pressure (motion) of particle on particle. Shea does not ignore the weakness of Descartes' working principles, which could almost be a play on words: if there is nothing (nothingness) between bodies, they must be in contact; potential motion (pressure) is the same as real motion, and so on. Nor does Shea conceal that after 25 years of intellectual odyssey, Descartes had become grudging in gratitude to others (for example, to Beeckman) and was ready to appropriate their ideas as his own. Yet his power of invention was so immense that he had little need for the notions or even information of others. Like others, Shea is unable to explain why Descartes could not accept William Harvey's account of the heart, which was stripped of non-mechanistic features. Instead, Descartes preferred an explanation of his own, which could not only be refuted by simple observation but was also mechanically absurd. In fact, Descartes had not understood Harvey's discovery of a great flow of blood about the body, and his claim that it was only those "ignorant of the force of mathematical demonstrations" who would reject his version was just vacuous bluff.

Such sweeping intellectual claims perhaps more readily bluff the young than those settled with comfortable ideas. For the young of the mid-seventeenth century, that time of bursting bonds, Descartes promised innovation, enlightenment and certainty, in much the same way as Darwin, Marx and Freud seemed to do several generations later. Descartes offered a key to the great mystery of the cosmos, entertaining the idea of a God-like power of creation (for he alone could imagine causes of things that could not be anything but the truth). In *Principia Philosophiae* (1644) he set out his own key to nature — "mechanical philosophy" — an approach that promised an end to verbal quibbles, meaningless distinctions, dormitive faculties, and even the tedious technicalities of astronomers and anatomists. By thinking, a man exists; by thinking clearly and distinctly, he can know all he needs to know. It is not surprising that this message of logical idealism for a time carried all before it. What a magnificent prospect, the limits of knowledge within sight. If Harvey differed from Descartes, so much the worse for his experiments, which so easily mislead.

Of course there is much more to Descartes than apriorism. There is his strong sense of religious purpose, about which Shea writes; his touch of mystic platonism; even a smattering of baconian curiosity. The best of his science was with light and optics. We can forgive Descartes his prevarications about the physical cause of the sine law in refraction for the sake of his superb investigation of the rainbow. Newton was notoriously unkind to Descartes here, whereas Shea is perhaps a little ungenerous to Descartes' predecessors, for cracking the mystery of the rainbow was one of the huge technical successes of mediaeval science. Descartes' long concern with light and optics is a main theme in the book and it is handled excellently.

Most treatments of cartesian science have been dull, misdirected or reverential; here we have an account that is lively, critical and thoroughly informed by both ancillary sources and Descartes' correspondence. The greater technical depths can be plumbed elsewhere, and it is a pity that the geometry has gone a little astray on pages 50 and 53 (it is readily amended). Nonetheless, the book is admirable for being historically contextual, sympathetic yet detached about Descartes' intellectual programme, and clearly organized (only here and there does the chronological thread become a trifle hard to follow).

I wish I could have read this book long ago: a comprehensive and fascinating introduction to a man whose writings must be absorbed before later seventeenth-century science, not least Newton's, can be fully appreciated. □

A. Rupert Hall is at 14 Ball Lane, Tackley, Oxford OX5 3AG, UK.