one thread of many, and it competes against his fascination with the natural sciences, art, poetry, modern dance and popular culture. Is one strand enough to understand him by?

The book's relentless focus on astronomy is to the detriment of a more comprehensive view of Cornell as an artist and as a man. Very little is said about his personal life, with only fleeting references to his reclusiveness, his close relationship with his brother and mother and his romantic trysts in later life. To compensate, Hoving extends her prose, clogging up the flow of the narrative. She feels obliged to describe the minutiae of individual artworks, to pepper the text with vignettes on cosmology and astronomy, and to make the case for a few of

the more tenuous links between his work and astronomy. To be fair, Hoving's arguments are on the whole convincing and at times enthralling, and her access to the debris of Cornell's life puts her in a unique position to back up many of her claims. But her thesis could have been made in half the number of pages. This is certainly a case in which less would have been more.

Yet, with its high-quality production and beautiful and wide-ranging illustrations, the book is extremely absorbing. I see it as Hoving's attempt to construct her own box, a carefully crafted piece laden with excerpts and images that penetrate Cornell's world and his obsessions. Furthermore, it is a showcase for the enthusiasm with the modern that

pervaded American popular culture during the twentieth century. By including newspaper articles and advertisements of the time in which astronomy and the space race were prominent, Hoving shows that Cornell was mirroring what he saw around him.

At a time when the interplay of science and art is ever more present in cultural life, and we begin to ask ourselves whether much of what is done is any good, *Joseph Cornell and Astronomy* gives us a good example of what works best: quiet fascination and obsession allied with genius. ■

Pedro Ferreira is a professor in astrophysics at the University of Oxford, Keble Road, Oxford OX1 3RH, UK, and author of *The State of the Universe*. e-mail: p.ferreira1@physics.ox.ac.uk

A romp through science fiction

Nanovision: Engineering the Future

by Colin Milburn

Duke University Press: 2008.
296 pp. \$22.95, £17.99

Nanotechnology, we are often told, will change every aspect of our lives. It is easy to hype such claims because of the long timescales for approving a new technology for commercialization. The science itself can sound like science fiction at times, and fears about how nanotechnology will be realized in the future crop up in works of fiction. In *Nanovision*, historian of science Colin Milburn proposes that such speculation is an integral part of nanotechnology.

Milburn examines nanotechnology in a wealth of science-fiction texts, investigating such themes as the manipulation of matter, artificial life forms and the spread of nanobots as a 'grey goo' that ultimately consumes Earth. Many writers portray the science in a negative light, as the enabler of humankind's destruction or enslavement. Other imaginative works simply exploit differences between the physical laws that rule the nanoworld and the macroworld we live in, such as the effect of surface tension on a microscopic fictional organism. Milburn also looks at individuals who have straddled the fields of science and sci-fi, including molecular engineer and futurologist Eric Drexler, and carbon-nanotube discoverer Richard Smalley, who envisioned an elevator made of nanotubes stretching from Earth into space.

The book fills gaps that most nanoscientists have in their knowledge about the history of a field that has evolved so fast as to effectively obscure its founders. However, Milburn tries

too hard to prove the mix of science and fiction. In focusing on nanotechnology, he neglects the fact that forward thinking, technology forecasting and hyped claims are common to many scientific disciplines, such as genetics, energy research and space flight. More worryingly, he confuses theoretical science and fiction, missing the point that theories are not just speculation but are underpinned by mathematics, physical laws and reproducible calculations. His analysis also takes too literally the timetables and roadmaps contained in grant proposals and the like; documents that scientists consider to be indicative rather than prescriptive.

Some parts of the book, even the introduction, are difficult to follow. The writing is shrouded in the complex language of post-modern literary theory, and is often as dense as a hard-core physics paper. Milburn's references to gendered themes of male domination, even when discussing scientific instruments such as the scanning tunnelling microscope, are

sometimes involuntarily comical. Yet he ignores the large number of women in nanoscience and their views: no female nanoscientists are cited in the book.

Nanovision is not the place to seek clues about where nanotechnology is going, as it contains few scientific developments past the start of this decade. Beyond the hype, many useful applications — ranging from self-cleaning surfaces to sunscreen lotion containing nanoparticles of titanium dioxide, to nanocomposite materials in the car industry — are already on the market. Furthermore, in contrast to fears that the world will be devoured by grey goo, studies have shown that public perceptions of nanotechnology are mostly positive. Although there are real and tangible risks regarding the toxicity of nanomaterials, the scaremongering that fascinates Milburn is not such a pressing concern. But if you like a romp through themes that mix current nanoscience and literature in interesting ways, Milburn's book is a valuable read. Perhaps reality is stranger than fiction. ■

Stefano Tonzani is materials science editor at *Nature*.

Nanotechnology is often portrayed in fiction as destructive, but public perceptions are more positive.