

Till the future is visited upon us

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Full text: Would-be time travellers had better study these books thoroughly before they begin their voyages into extra dimensions.

THE UNIVERSE IN A NUTSHELL

By Stephen Hawking

Bantam, 216pp, \$59.95

HOW TO BUILD A TIME MACHINE

By Paul Davies

Penguin, 148pp, \$26

The authors of these two books may be the two most successful homo-sapien authors of popular science in the universe. Thirteen years ago, Hawking's *A Brief History of Time* broke all sales records for a work of popular science. Davies has authored *The Fifth Miracle*, *God and the New Physics*, *The Mind of God*, *About Time* and about 20 more. Both men are also theoretical physicists who have made major contributions to our understanding of the universe.

These two new books continue the same excellent vintages. Davies's book is an approachable quick read, summarising our best speculations about how time travel might be possible. Hawking's has a broader scope it is a beautiful book about a big universe.

When my 11-year-old daughter read the title of Davies's book she scoffed. "How would he know? No-one has built a time machine yet." The little sceptic. Yes, the title is a bit of a stunt. It should be called: "If You Could Build a Time Machine, Here's Probably How It Would be Done". When I showed my daughter *The Universe in a Nutshell*, she looked puzzled, "How could he find a nutshell big enough?"

The chasm between our scientific understanding of the universe and our commonsense understanding keeps getting deeper. Curious people without a scientific background keep tumbling into it. These two books can help. They're for people who enjoy the counter-intuitive side of modern physics and the weirdest forms of plausible speculation.

Hawking is a brilliant scientist with a good sense of humour and he's one of the leading theoretical bushwhackers of the cosmos. In the beginning of the book, he writes: "To understand the origin and fate of the universe, we need a quantum theory of gravity, and this will be the subject of most of this book." And at the end: "That is the universe in a nutshell." In between he presents a lot of mind-bending stuff to chew on, but some of the jargon may get stuck in your teeth. In the 13 years since *A Brief History of Time*, Hawking hasn't been honing his prose, but he has hired a spiffy professional illustrator whose creations help the reader forget how difficult some of the ideas are. Hawking's book delves non-mathematically into the small invisible dimensions that we are beginning to explore with "M-theory", our best candidate for a theory of everything a combination of quantum mechanics and gravity set in an 11-dimensional background.

For readers wondering whether extra dimensions really exist, Hawking offers the following: "I must say personally, I have been reluctant to believe in extra dimensions. But as I am a positivist, the question 'Do extra dimensions really exist?' has no meaning. All one can ask is whether mathematical models with extra dimensions provide a good description of the universe." Apparently they do. Hawking reports from the front lines of research that if the complete theory of everything is a jigsaw puzzle, we have pieced together the edges of the puzzle but the centre is still an incomplete mathematical mess.

Chapter five of Hawking's book is dedicated to time travel. Since H.G. Wells's *The Time Machine* appeared in 1895, time machines have received a lot of press. Recent time-travel movies include *Groundhog Day*, *Terminator* and *Back to the Future* and as my erstwhile little sceptic points out, even the third book of the Harry Potter series includes time travel.

Despite (or because of) this popularity, only recently have theoretical physicists been able to study time travel without embarrassment. Hawking writes, "We disguise the fact by using technical terms that code for time travel." Instead of "Is time travel possible?" we investigate "Does space-time admit time-like curves that are closed?"

Davies's book is focused on time machines and it's a good read in fact it's the closest thing to a scientific page-turner you're likely to find this side of Alpha Centauri. Time travel is a difficult technical subject based on Einstein's general relativity, but Davies takes us through it nicely. In chapter one, "How to Visit the Future", Davies explains that since we're all being dragged into the future against our will, time travelling into the future is hardly remarkable. But if you move around a lot or if you live in a valley (stronger gravitational field) you will be dragged less quickly. That is how the twin paradox works. If one twin sits around watching TV while the other zooms around the universe, when they meet again, the jet-setter will be younger. That is how Charlton Heston in *Planet of the Apes* returned from space to the Earth's future.

Are time machines possible? Davies is optimistic and writes about how it's not as crazy as you might think. Hawking is more sceptical and suggests that "a person or space probe that tried to cross the horizon to get into the time machine would get wiped out by a bolt of radiation. So the future looks black for time travel." The bottom line is we're still not sure if it is possible to build a time machine. This may be disappointingly inconclusive for some, but this uncertainty is what makes time travel an active field of research. If Davies is right, time machines may be possible to build. But in that case Davies asks, "where are all the time tourists from the future, coming back to peer curiously at 21st-century society?" Davies's answer is, you can only go back as far into the past as the time of creation of the first time machine so only after we build a time machine will we have visitors from the future.

After the attack on the World Trade Centre, Hawking said, "I don't think the human race will survive the next thousand years unless we spread into space. There are too many accidents that can befall life on a single planet."

I hope these books will inspire young people to become the rocket scientists of the 21st century. If just one of them enables us to reach the stars before we destroy ourselves they will have saved humanity from extinction. Pretty good for fifty bucks.

Illustration

Caption: ILLUS: How time flies ... physicists used atomic clocks to prove that the big hand moves more slowly in a plane than on the ground. From *How to Build a Time Machine P*

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