

Politics

that once we write it down properly and give a few lectures about it at suitable places that negative dimensions will become standard in mathematics.

Are there any physical manifestations of negative dimensions?

Oh yes. I described them in a paper I wrote in the late 1960s on how to measure turbulence. For that analysis, I had to consider different forms of turbulence and found that negative dimensions were important under certain conditions. It was only when I joined Yale in 1987 that a colleague who studied turbulence in the laboratory verified the things I'd been saying.

When you were 20, you said that you wanted to be the Johannes Kepler of a new branch of science. What did you mean?

What Kepler did was to make sense of the motion of planets around the sun. He replaced an earlier accumulation of fixes with a beautiful collection of three laws that truly explained the behaviour of planets. Kepler used the mathematics of ellipses, a great achievement of Greek mathematics, for something practical. My childish ambition was to find a field that nobody had studied, then study it using sophisticated mathematical tools which I would create and manipulate if necessary.

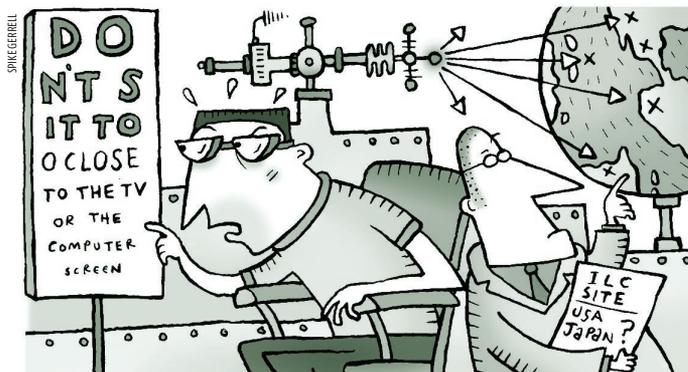
And have you succeeded in that ambition?

Yes. Before my first paper on cotton prices in 1963, the model in circulation was pretty bad. I proposed a different model. People came proposing cycles, epicycles and so on which would mimic my model to a point. But they were much more complicated and less complex.

Ludwig Boltzmann's famous formula for entropy is carved on his tombstone. Do you think a Mandelbrot set would be a fitting epitaph?

The Mandelbrot set covers a small space yet carries a large number of different implications. Is it a fitting epitaph? Absolutely. ●

Benoit Mandelbrot and Richard Hudson's The (Mis)Behaviour of Markets: A fractal view of risk, ruin and reward is published this year in the UK by Profile Business and in the US by Basic Books. Mandelbrot's website is at www.math.yale.edu/mandelbrot/



Westminster diary

Tam Dalyell on a close look at children's myopia, and homing in on a future particle accelerator

IN JULY I spent three-and-a-half days sitting as rector alongside the vice-chancellor and pro-vice-chancellors at the University of Edinburgh's graduation ceremony. From my vantage position on the dais, I was amazed at how many graduands wore spectacles. Having read the news item "Blame lifestyle for myopia, not genes" (*New Scientist*, 10 July, p 12), I felt compelled to see what the Department of Health's view on the matter was.

Rosie Winterton, the health minister responsible for optical services, said that although there was concern about increased levels of short-sightedness in young people, until now no studies had specifically linked myopia to close work such as watching television or using computers. Because the findings of the study referred to

in the article have not yet been published, the Department of Health cannot accept them. However, Winterton said children should be encouraged to sit a reasonable distance from a television or computer. If they are unable to see it clearly without sitting close, they should be given a sight test to see if they need glasses. The National Health Service gives children free sight tests and vouchers toward the cost of any glasses they may need.

A public health consultation is now under way and will lead to a white paper in the autumn. However, the government wants to tackle childhood obesity by persuading youngsters to do more physical activity, and this should also cut the time they spend in sedentary activities such as watching television or

using computers, said the minister.

I hope the white paper will lead to positive action such as a draft bill at the ready for any incoming government next year. New administrations tend to seize on such non-controversial legislation before making good their more contentious campaign promises.

PHYSICISTS meeting at a conference in Beijing in China in August announced plans for the next generation of particle accelerator to probe deep into the composition of matter (*New Scientist*, 28 August, p 4). But where is the so-called International Linear Collider (ILC), to be sited? Not, it seems, in Europe.

Lord Sainsbury, the science and technology minister, tells me an international forum of funding agencies is meeting under the chairmanship of Ian Halliday, chief executive of the UK's Particle Physics and Astronomy Research Council, to agree plans for the ILC. The forum has so far addressed issues of timescale and choice of technology, and a scheme based on a German design has been selected and agreed by all parties present. Attention will now focus on building up a global design capability, and the issues of funding and location.

Given that the Large Hadron Collider is currently being built in CERN, on the Swiss-French border near Geneva, the general view is that Europe should not host the proposed linear collider, and Sainsbury says it is more likely the ILC will be sited in the US or Japan. ●

ENIGMA 1315

Going for gold

Richard England

Messrs Archer and Bowman each fired three arrows. The arrows recorded six different scores between 2 and 10.

The cumulative score of each of them at any stage was always a prime number. Archer had the greater cumulative score

after each had fired one arrow and again after each had fired three arrows, Bowman had the greater cumulative score after each had fired two arrows.

What did Bowman score with each of his arrows? Give the scores in the order in which they were recorded.

£15 will be awarded to the sender of the first correct answer opened on Wednesday 15 December. The Editor's decision is final.

Please send entries to Enigma 1315, *New Scientist*, Lacon House, 84 Theobald's Road, London WC1X 8NS, or to enigma@newscientist.com (please include your postal address). The winner of Enigma 1309 is Peter Chapman of South Perth, Western Australia.

Answer to 1309 Fill, cut and fit. If both children play as well as possible it is a draw.