the true meaning of statistics. People have generally been indoctrinated to believe that the world is simpler than it is. I'd like people to understand the difference between what I call mild randomness and wild randomness. Mild randomness is the thing that everyone thinks about where things go up and down a little bit in the financial market. Wild randomness is where one bad event in the stockmarket wipes out a long period of favourable events.

Do you think Greenspan and his colleagues will listen to you?
I don't know. A fair number of people with comparable influence are extremely favourable to my ideas.

Your work has covered many areas. Would you describe yourself as a pure or an applied mathematician?
A mathematical scientist. It's the official name of my chair at Yale and it was chosen with care. It is deliberately ambiguous. In a different era, I would have called myself a natural philosopher. All my life, I have enjoyed the reputation of being someone who disrupted prevailing ideas. Now that I'm in my 80th year, I can play on my age and provoke people even more.

Is that a benefit of being an elder statesman of science?
Elder statesmen of science don't produce new results: they only comment on other people's results. I am still active in research.

What are you working on now?
My work is more varied than at any other point in my life. I am still carrying out research in pure mathematics. And I am working on an idea that I had several years ago on negative dimensions.

What are they?
Negative dimensions are a way of measuring how empty something is. In mathematics, only one set is called empty. It contains nothing whatsoever. But I argued that some sets are emptier than others in a certain useful way. It is an idea that almost everyone greets with great suspicion, thinking I've gone soft in the brain in my old age. Then I explain it and people realise it is obvious. Now I'm developing the idea fully with a colleague. I have high hopes 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/