

Milestones

Benoît Mandelbrot

“CLOUDS ARE NOT SPHERES, MOUNTAINS ARE not cones ... and bark is not smooth, nor does lightning travel in a straight line,” wrote Benoît Mandelbrot, contradicting more than 2,000 years of misconceptions. Triangles, squares and circles seem to exist in our textbooks more than they do in reality—and before Mandelbrot, we hadn’t noticed that. Thus was born fractal geometry, the science of “roughness.” Simple rules used by nature (and men), thanks to repetition, generate the seemingly complex and chaotic patterns we call fractals. There, just as branches look like small trees, the small parts resemble the whole.

Self-taught and fiercely independent, Mandelbrot, who died Oct. 14 at 85, was both precocious and a late bloomer, producing the famous Mandelbrot set when he was in his 50s and get-



ting tenure at Yale when he was 75. Older mathematicians have resisted his geometric and intuitive methods, but the Fields Medal, the top prize in mathematics, was awarded in 2006 to someone who proved one of Mandelbrot's subconjectures. "I have never done anything like others," he told me a month ago, fooling me into not taking seriously his terminal-stage pancreatic cancer. He was the only teacher I ever had, the only person with whom I could discuss uncertainty without having anger fits.

Few people in history have had as broad and practical an impact as Mandelbrot. His contributions affect physics, engineering, arts, music, linguistics, biology (our blood vessels and lungs are fractal) and medicine. But he went unheeded by the very field in which he started, economics, where he proved in the 1960s that financial

theories vastly underestimate market risk—an underestimation that caused our current global crisis. —BY NASSIM NICHOLAS TALEB

Taleb is the distinguished professor of risk engineering at NYU-Polytechnic and author of The Black Swan, which was dedicated to Mandelbrot