

SPECIAL RELEASE ON MANDELBROT'S CONTRIBUTIONS TO STATISTICS

NEW HAVEN, CONN. Benoit Mandelbrot, Sterling Professor of Mathematical Sciences at Yale University and the "father of fractals," shared the 2003 Japan Prize for Science and Technology.

Mandelbrot has not been involved with statistics for its own sake but only when existing statistical techniques presented unexpected pitfalls.

Paradoxically, his work may have been most immediately useful in demonstrating that spectral analysis is blind to essential features of natural time series. Because of this very serious pitfall, more appropriate new techniques remain to be developed.

Most strikingly, his multifractal model of price variation combines spectral whiteness with statistical dependence that is very strong, conspicuous, and practically essential. Therefore the distinction between whiteness and independence, which is well-known but all too often dismissed as a theoretical refinement, is shown to have direct practical consequences.

Secondly, he showed that having a "1/f" spectrum is a very incomplete specification of a record: it is compatible with Gaussianity, high intermittency, multifractality, and other altogether different behaviors. A practical effect concerns the popular search for a single explanation of all 1/f noises encountered in data. Clearly, this search is futile.

More generally, Mandelbrot introduced (especially in Chapter 5 of "Fractals and Scaling in Finance") the notion of "states" of variability (both random and non random). The main three states are "mild," "slow," and "wild." Statistics has near exclusively focused on mild variabilities. However, fractal phenomena involves long tails and/or dependence, each sided by a power-law. Both are clear-cut symptoms of wild variability.