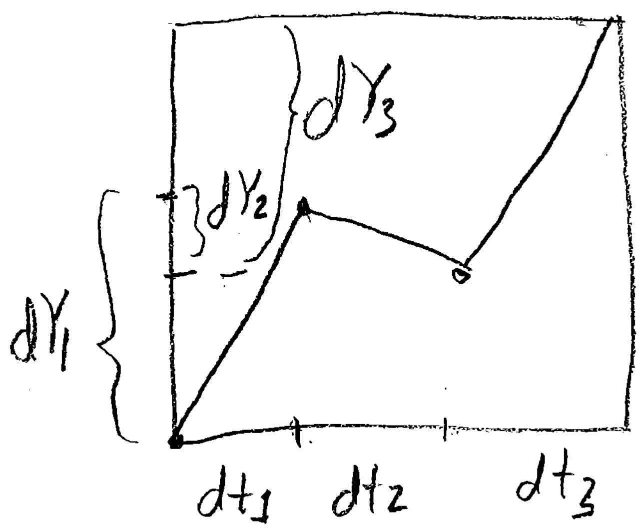
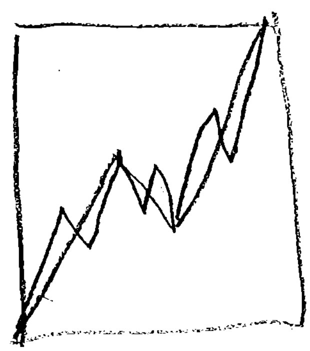
Multifractal finance cartoons

- dependent events
- large jumps falling off according to a power law, not the normal distribution

t = clock time



repeat this pattern



or

shuffling up & down

$$\frac{\log |dY_1|}{\log dt_1} = H_1$$

$$\frac{\log |dY_2|}{\log dt_2} = H_2 \qquad \frac{\log |dY_3|}{\log dt_3} = H_3$$

If $H_1 = H_2 = H_3$, this is Fractional Brownian motion.

If some of the H_i are different, this gives a multifractal which is both dependent and has jumps scaled by a power law.

- These give surrogates statistically identical to real data.

- Trading Time:

$$|dY_1|^D + |dY_2|^D + |dY_3|^D = 1$$

Solve for D. The trading time increments are

$$dT_1 = |dY_1|^D$$

$$dT_2 = |dY_2|^D$$

$$dT_3 = |dY_3|^D$$

Trading Time Theorem: Any multifractal cartoon is fractional Brownian motion when measured in multifractal trading time.