Power laws in economics, linguistics and natural sciences

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Distributions with power tails remarkably demonstrate themselves everywhere. They appear in experimental studies, in statistical analysis and in theoretical modeling. As (non-exhausting) examples of basic empirical laws let me mention the Zipf law in linguistics and demography, the Richter law in earthquakes, the Pareto law in economics. At present there are numerous attempts to understand the universality of power laws. The modeling comes from as different sources as Newton mechanics (Holtzmark law in astronomy and plasma physics), Stochastic differential equations (Sorin Solomon approach to the Pareto law), dynamics of self organized criticality (Bak and others), critical exponents in phase transition (Willson's renormalization group), non-extensive statistical mechanics (Tsallis), the lack of preference law (Maslov), fractals and dimensionality (after Mandelbrot), continuous time random walks and related fractional dynamics. The aim of the project is to assess the interrelations between different methods and to try to understand the underlying structure of various approaches. As a possible concrete starting point of this general task I would suggest to analyze the distributions in geophysics (earthquakes) and evolution via the lack of preferences law approach proposed recently by Maslov to tackle the Zipf and Pareto laws. At the moment I have a second year PhD student working on the Zipf law, which would give an additional opportunity to discuss and interact on the subject.