



2nd International Nanotechnology Conference & Expo

April 3-5, 2017 Dubai, UAE

T-patterns in human and neuronal interactions and on DNA: Self-similarity and translation symmetry in time and space

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The research presented here began in the seventies in Ethology, the biology of behavior, focusing on animal and human interactions and led to the development of a particular kind of statistical repeated hierarchical self-similar multi-variate (fractal) patterns on a single dimension, called T-Patterns, with corresponding T-pattern detection and Analysis (TPA) Windows software called THEME™ (PatternVision Ltd). T-patterns have since been detected in many different kinds of animal and human behavior and interactions (see Casarrubea et al, 2015, comprehensive review, J. Neuroscience Methods; Anolli et al eds. 2005, IOS Press; Magnusson et al eds. 2016, Springer). In a fractal universe, self-similarity may be expected anywhere and a search for T-patterns in the firing of neurons in close proximity in the olfactory bulb of rat brains, registered using implanted electronic chips, resulted in the detection of numerous complex multi-neuron T-patterns with highly significant statistical validations and external validation through strong correlations with breathing and physiological state (Nicol et al, 2015, J. Neuroscience Methods). The structure of T-patterns, moreover, turns out to have striking similarities with DNA patterns such as genes and with proteins and TPA of such data is ongoing with the Theme software. The T-pattern and the specially developed algorithms are described and illustrative results are presented. The possible existence of T-patterns as well in the time domain of molecular processes is discussed as well as some functional analogies between T-patterns in human behavior within human societies and DNA and protein T-patterns in biological cells or Cell City.

Biography:

Magnus S Magnusson, PHD, Research Professor, created the T-pattern model with detection algorithms (THEME™, PatternVision). Co-directed a two-year DNA analysis project. Numerous papers and invited talks and keynotes at conferences within ethology, mathematical sciences, neuroscience, bioinformatics, proteomics, mass spectroscopy and at leading universities in Europe, Japan and the US. Deputy Director 1983-1988 in the National Museum of Natural History, Paris and 1988 to 1993 invited Professor at the University of Paris (V, VIII & XIII) in Psychology and Ethology (biology of behavior). Since 1991 founder and director of the Human Behavior Laboratory, University of Iceland, leading member of a formalized network of 24 universities based on "Magnusson's analytical model" initiated at the University of Paris V, Sorbonne, Paris, in 1995.