

Stem Cell Research 2019: From the RNA world to protein and human mass societies: Self similarity and giant T patterned strings as candidate organizational principles_ Magnus S. Magnusson_ University of Iceland, Iceland

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This talk concerns spatial and temporal self-similarity across more than nine orders of magnitude, implicating a self-similar fractal-like pattern, called T-pattern, a natural or pseudo-fractal pattern, recurring with statistically significant translation symmetry. The T-pattern, the core of the T-system of structural concepts is a result of an ethological (i.e. biology of behavior) project started in the early 1970's primarily on social interaction and organization in social insects and primates including humans inspired mainly by the ethological work of Lorenz, von Frisch and Tinbergen for which they shared a Nobel Prize in Medicine or Physiology in 1973. Notably, in this context, their smallest subjects were social insects and thus no consideration of selfsimilarity. The present project has focused on developing time pattern definitions with corresponding detection algorithms resulting in the T-pattern type and the dedicated THEME software, which has allowed their abundant detection in many kinds of animal and human behavior and interactions and later in neuronal interactions within living brains, thus showing T-patterned self-similarity of temporal interaction between and within brains. The RNA world invented its evolving external memory as the purely informational giant T-patterned DNA strings and now there is only a DNA world. Similarly, billions of years later, humans invented their evolving external memory as the purely informational T-patterned strings (T-strings) of written language that have made possible, in a biological eye-blink, the development of modern science and technology and the creation of extremely populous and complex human mass-societies, the only mass-societies among large-brained animals and recent discoveries of the nanoworld of cells and molecules. Protein and human mass-societies seem to be the only ones using such durable giant T-strings external to their citizens. Human and protein masssocieties create their specialized citizens using various sub-sections of such T-strings, not found, notably in social insect societies. Extensive temporal and spatial self-similar patterning thus seems to exist in form and function from nano to human temporal and spatial scales suggesting structural, functional and organizational principles.

On the other hand, the types of patterns commonly used to describe the structure of DNA are generally too simple or rigid to describe and discover patterns of human interaction in real time. The RNA world has added external DNA memory and control chains and protein mass societies (cell cities) have

evolved followed by mass cell societies (body). Finally, mass societies of bodies have evolved, but only in insects and humans; in insects over millions of years, but in humans in a biological-blinking eye. Extra-individual T-patterned chains (respectively, DNA and text) are crucial in the mass societies of proteins and humans, but absent in all others, are extra-individual T-patterned chains (DNA and text respectively) that generally last much longer than individual citizens. These have allowed a near-total domination of LIFE based on DNA and the development of human mass societies with population sizes rivaling the most populated cities of proteins and the emergence in human mass societies of religions and mass laws as well as modern science and technology; and leading among other things to the discovery of proteins and their mass nano-societies. It seems possible that the study of each of these types of mass societies could provide new ideas and ideas for the other.