

New Paradigm in Mapping: A Critique on Cartography and GIS*

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Abstract:

"Two important characteristics of maps should be noticed. A map is not the territory it represents, but, if correct, it has a similar structure to the territory, which accounts for its usefulness. If the map could be ideally correct, it would include, in a reduced scale, the map of the map; the map of the map, of the map; and so on, endlessly, a fact first noticed by Royce."

Alfred Korzybski (1933)

As noted in the introductory quotation, a map was long ago seen as the map of the map, the map of the map, of the map, and so on endlessly. This recursive perspective on maps, however, has received little attention in cartography. Cartography, as a scientific discipline, is essentially founded on Euclidean geometry and Gaussian statistics, which deal with respectively regular shapes, and more or less similar things. It is commonly accepted that geographic features are not regular and that the Earth's surface is full of fractal or scaling or living phenomena: far more small things than large ones at different levels of scale. This paper argues for a new paradigm in mapping, based on fractal or living geometry and Paretian statistics, and – more critically – on the new conception of space, conceived and developed by Christopher Alexander, that space is neither lifeless nor neutral, but a living structure capable of being more living or less living. The fractal geometry is not limited to Benoit Mandelbrot's framework, but towards Christopher Alexander's living geometry and based upon the third definition of fractal: A set or pattern is fractal if the scaling of far more small things than large ones recurs multiple times. Paretian statistics deals with far more small things than large ones, so it differs fundamentally from Gaussian statistics, which deals with more or less similar things. Under the new paradigm, I make several claims about maps and mapping: (1) Topology of geometrically coherent things – in addition to that of geometric primitives – enables us to see a scaling or fractal or living structure; (2) Under the third definition, all geographic features are fractal or living, given the right perspective and scope; (3) Exactitude is not truth – to paraphrase Henri Matisse – but the living structure is; and (4) Töpfer's law is not universal, but scaling law is. All these assertions are supported by evidence, drawn from a series of previous studies. This paper demands a monumental shift in perspective and thinking from what we have used to on the legacy of cartography and GIS.

References:

- Jiang B. (2018), New Paradigm in Mapping: A Critique on Cartography and GIS, under review by some journal.
Korzybski A. (1933), On Structure, In: Korzybski A. (1994), *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics* (fifth edition), Institute of General Semantics: Brooklyn, New York, 54–65.

* This is the abstract out of the full paper (Jiang 2018), which is currently under review by some journal. This paper is based on my previous lectures, through which I called for new ways of thinking in cartography and geographic information science. The most relevant lectures are "Challenging the establishment of cartography and GIS", "A geospatial perspective on sustainable urban mobility in the era of big data", "Why topology matters in spatial cognition and analysis", "Why should scaling be the first law of geography", and "Why should spatial heterogeneity be formulated as a scaling law", which were presented on various occasions such as CSUM 2018: Conference on Sustainable Urban Mobility, May 24-25, 2018, Skiathos Island, Greece, COSIT 2017, L'Aquila, Italy, September 4-8 2017, GIS Väst: Annual Conference on the Sustainable City, 15 November 2016, Goteborg, Sweden, and the 8th International Forum on Spatial Integrated Social Sciences and Humanities, 23rd June 2017, Nanjing, China.