

Living structure as a theoretical foundation for teaching and learning cartography

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Abstract:

Living structure is a physical structure that exists pervasively in our surrounding for example in buildings, gardens, streets, and cities or the Earth's surface in general (Alexander 2002–2005). It can be defined mathematically as a structure in which there are numerous substructures with an inherent hierarchy. Across different levels of the hierarchy there are far more small substructures than large ones, while on each level of the hierarchy the substructures are more or less similar in size. These two notions of “*far more smalls than larges*” and “*more or less similar*” underlie respectively the two fundamental laws of living structure: scaling law (Jiang 2015) and Tobler's law. Tobler's law is also commonly called the first law of geography (Tobler 1970) that charmingly states “*everything is related to everything else, but near things are more related than distant things*”. The scaling law or the recurring notion of far more smalls than larges is also referred to as spatial heterogeneity, one of the two spatial properties, the other being spatial homogeneity or autocorrelation. This presentation is intended to advocate the living structure as a theoretical foundation for teaching and learning cartography. We begin with two widely received facts about a map: (1) A map has a similar structure to the territory, and (2) A map is the map of the map of the map, and so on endlessly (Korzybski 1933). The similar structure is in fact the living structure that should be retained on all scales of maps ranging from the largest to the smallest. We then illustrate living structure using simple examples. As the bulk of the presentation, we demonstrate that different maps or mapping processes including for example map generalization, thematic mapping, and even cognitive mapping are essentially a head/tail breaks (Jiang 2013) process that is applied to the underlying living structure. We further argue that under the notion of living structure, goodness (or quality) of maps is a matter of fact rather than an idiosyncratic opinion. To decide objectively which map has a higher degree of livingness (or quality) and which map has a lower degree, we can carry out the mirror-of-self experiment (Alexander 2002–2005, Wu 2015) by asking such a question: which one of the two maps you would choose to be a picture of your own self? Note that this is not a simple perception test commonly used in psychology, but to examine the existence of living structure and its relatively degree.

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