

Visualising Transformations of Geographical Time-Space by Transport Systems. The Case of Germany, 1990-2030.

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Abstract:

The relation of time to space is ever changing. Innovations in transportation technologies such as High-Speed Rail (HSR) instantiate abrupt alterations on this relation. Within confined space constructs, the advent of HSR can cause distortions in the overall system of relational proximities. Usually, a HSR network is extended gradually with partial links that renders it a difficult task to meaningfully visualise the overall change in the time-space fabric. Therefore, better understanding of methods to operationalise the visualisation of effects of new transportation infrastructure on the time-space dimension is needed. This paper seeks to examine these methods through their strengths and weaknesses using the undertaken and planned German HSR network expansion from 1990 to 2030. The methods employed are choropleth, anamorphosis, spring and shriveling maps. Choropleth maps are the most widespread cartographic maps on a 2-dimensional scale visualising data often on administrative spatial units such as countries etc., using colours for differentiation. Anamorphic maps (cartograms) are maps that represent the geographic shape of areas adjusted for the size of a variable of interest per area. The administrative boundaries of areas are thus warped, stretched or shrunk. Spring maps, invented by Plassard and Routhier (1987) as well as Tobler (1997), show transport networks with fixed locations as nodes and edges (connections between nodes) in the form of springs that are the more sinuous the longer the (travel-time) distance is. Developments of the model have been made by Buchin et al. (2014). Shriveling maps, conceptualised by Mathis (1990) and implemented by L'Hostis (1996, 2009), also keep locations fixed at their geographical position and draw connections with length proportional to travel time by using the third dimension. We focus on the assessment and comparison of these four methods by exposing their advantages and drawbacks along the four properties of geographical time-space as identified by L'Hostis and Abdou (2021): 1) The acceleration causing the shrinking of geographical time-space with the introduction of faster transportation means over historical time. 2) The use of transportation networks to perform movements in geographical space. 3) The co-existence of transport modes characterised by different speeds. 4) The spatial inversion Tobler (1961) and Bunge (1962), caused by extreme forms of detour, where a journey starts in a direction opposite to the end destination; this phenomenon happens at all geographical scales, with for instance expressways, rail transport and aerial transport.

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