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Capital cities as fractal models of the world culture

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Abstract

The article aims to study the phenomenon of the fractality of urban space. The topographical, architectural, visual, and symbolic space of a megacity, in particular a metropolitan megalopolis, is viewed as a fractal structure of several types and scales. The capital city historically contains patterns of geometric and conceptual fractals; the space of modern metropolitan megacities experiences active processes of formation of external fractal connections – within the symbolic borders of the country or the whole world. The study based on the theoretical propositions of fractal semiotics and the idea of conceptual fractality makes an attempt to examine internal fractal forms of the capitals' urban space and carries out an analysis of specific characteristics of the capital megalopolises as fractal models of the world. Using Moscow, Saint Petersburg and some other megacities as examples, the author of the article reveals the proxemic levels of the world culture and civilisation fractal and the corresponding urban planning and sociocultural practices that make capital cities act as fractal models of the world. The research proves that in spite of the fact that in some cases the construction of fractal urban loci has a simulative modality, this does not negate the fractal essence of metropolitan megalopolises.

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Keywords

Urban fractality, sociocultural fractality, conceptual fractal, multifractal, urban proxemics, fractal semiotics, fractal models of the world, capital city, metropolitan megacity, megalopolis.

Introduction

Cities that have the status of regional or national capitals possess special semantics based on multiple references to other – local and global – spaces, times, and cultures. Spontaneous and sometimes deliberate historical, ethnoterritorial and sociocultural links to the world culture are not only materialised in architectural, urban planning and artistic forms but they compose a complicated semiotic “hypertext” [Eco, *www*; Landow, 1997] of the city. Furthermore, the topographical, sociocultural and symbolic space of a megalopolis appears to be a multidimensional fractal matrix, in which fractal patterns of the world culture intersect and overlap at different levels of the urban spatial structure [Batty, Longley, 1994; Nikolaeva, 2014].

The term ‘fractal’ was coined by French-American mathematician Benoit Mandelbrot in his widely known book ‘Fractal Geometry of Nature’ [Mandelbrot, 1982], the phenomenon of fractality being further examined in a series of his works on fractality in mathematics, art and economy [Mandelbrot, 2020]. According to the informal definition, a fractal means ‘a structure consisting of the parts that are in some way similar to the whole’ [Feder, 2013, 19]. In the broadest sense, a fractal can be a specific formation of a very different genesis, containing on descending levels infinitely reproducible patterns of different scales, which to one degree or another repeat the characteristic features of the whole. These may be, on the one hand, geometrical patterns, structural connections and configuration, and on the other hand, social patterns [Khaitun, 2010], images, mental constructions, ideas, etc. The latter type of fractals is sometimes referred to as cultural [Downton, 2008, vol. 1, 28]. However, it would be more appropriate to define such fractality as conceptual [Nikolaeva, 2013, 69] since the patterns of that kind may be of any genesis within the fractal system they compose. In other words, fractal patterns can be expressed both in spatial forms (for example, in urban architecture) and in conceptual ones (for example, in a sociopolitical or administrative system) [Nikolaeva, 2014, 23-24]. Thus, in addition to spatial (constructive or – in the context of this article – topological and geographical) fractality, there is conceptual fractality that is based on self-similarity of the patterns-concepts (ideas, images, symbols, mythologies, mental constructions, etc.) [Nikolaeva, 2013, 69-70].

It is extremely important that the similarity of fractal patterns is not always absolute. Rigid invariance is inherent only in ideal, mathematical fractals. As for fractals of natural origin (mountains, rivers, trees, etc.) and those in the sociocultural world (organisational hierarchies, urban development, demographic areas, fashion, etc.), they are always stochastic (variable) or aleatory (contain distortions due to external ‘disturbances’) [Demenok, 2019, 155-158].

Several ‘nested’ fractal algorithms within one structure form a multifractal [Schroeder, 2012]. National and multinational cultures, apparently, have a multifractal character due to local/ethnic cultures and subcultures developing according to their private algorithms within the bigger cultural and administrative systems.

In the era of globalisation, a multifractal structure is typical for many big cities and towns, but the most widely fractal connections ‘the city – the world’ are implemented in the sociocultural space of metropolitan megacities. In fact, separate fractal elements and the capital megacity itself with all hierarchical levels of constructive, geographical and conceptual fractality prove to be a part of a higher-order fractal, representing not only the national cultural paradigm, but the world civilisation as a whole [Downton, 2008, vol. 1, 28]. Thus, any metropolitan megalopolis represents simultaneously one of the iterative levels of the ‘world’ multifractal (topographic fractal model) and the ‘world history’ / ‘world culture’ multifractal (diachronic fractal model). In this regard, the specific embodiments of the capital’s fractal properties deserve separate consideration. The research presented in this article is based on the theoretical propositions of fractal semiotics [Tarasenko, 2009] and the idea of conceptual fractality.

Multifractal structures of the metropolitan megalopolises

Similarly to how in the capital's administrative and semiotic space fractal connections with regional cultures arise within its borders, the territories of embassies and consulates of foreign states located in each capital of the world transform the capital into a fractal pattern of world political geography. The totality of verbal and visual texts of the city also adds up to a topographical fractal model of the world. Fractal references arise due to street names (for example, ploshchad Evropy (*Europe square*), Erusalimskaya (*Jerusalem*) street in Moscow; Angliyskaya (*English*) embankment, Italiyskaya (*Italian*) street, Svetskaya (*Swedish*) pereulok in Saint Petersburg), cafes and restaurants ('London Pub', 'Venice', 'Tokyo', 'Beijing', 'Parisien', etc. in Moscow), metro stations ('Prazhskaya' (*Prague*), 'Rimskaya' (*Rome*), 'Alma-Atinskaya' (*Alma-Ata*)), railway stations (Belorussky in Moscow, Finlandsky in Saint Petersburg, etc.), monuments (to Charles de Gaulle in Moscow, Peter I in the Dutch city of Saardam, Pushkin in Rome and Madrid, Shakespeare in German Weimar, etc.), museums (Museum of the East), ethnic districts (such as Chinatown in New York). Various signboards, shop windows, images on billboards – all contribute to the fractal 'hyper-text' of the capital city.

In this regard, a remarkable example of a fractal model of the world is located in Engels Street in Moscow. In a small block, tightly adjacent to each other, there are consistently: the 'Roman Thermae' bath complex, the 'O'hara' Irish pub, the 'Two sticks' Japanese restaurant, the 'Zatoichi' pan-Asian cuisine restaurant, the 'Japoshka' (Japanese) cafe, the 'Domik' cafe, the McDonald's fast food restaurant, the 'Капиталь' cafe, and the 'Temple Bar' restaurant. It is easy to see that this restaurant 'sloboda' (*district* in old Russian) symbolically covers the whole world: from Russia and Europe to America and Japan, while Russia is also represented by its pre-revolutionary sociocultural hypostasis.

It should be noted that the multifractal structure of the capital, which has a long history, always contains a 'white noise' – fragments of former fractals. An example of the historical memory of urban space is Moscow toponyms preserved from the fractal structure of 'the Soviet Union': Alma-Ata, Tallinn and Tashkent streets, Riga highway, Ukrainian, Samarkand and Lithuanian boulevards, etc., cinemas 'Baku', 'Ashgabat', 'Kyrgyzstan'. In the sociocultural space of the Russian capital, one can still find fragments of the once-existing conceptual hyper-fractal 'the Countries of socialism': Warsaw highway, Prague street, Ho Chi Minh square, Wilhelm Pieck street, cinemas 'Budapest', 'Havana', 'Ulaanbaatar', and so on.

In addition, in the modern metropolitan megalopolis, there are specific fractal formations – hypermarkets and shopping and entertainment centres, where plenty of boutiques of various world brands located next to each other create a fractal model of the global economic culture. Palm trees and sometimes a 'beach' and a pool-'sea' in recreation areas (as, for example, in the 'Khan Shatyr' shopping centre in Astana, Kazakhstan), an 'ocean' (the Oceanarium in the 'Dubai Mall') and ice (at the indoor rinks) represent a fractal climate model of the world. Thus, at the semiotic level, hypermarkets not only reproduce the fractal model of the global culture of consumerism, but also proxemically compose a cultural and geographical model of the planetary scale. And numerous restaurants in the capital, which represent the cuisine of different peoples on the planet, form a fractal model of world culture through several semiotic systems – verbal ('ethnic' names of restaurants such as 'Tanuki', 'Shesh-Besh', 'Tutto bene', etc.), spatial (ethnic interiors) and gastronomic (ethnic food).

In recent decades, it has become common practice to recursively repeat iconic monuments, being not just touristic attractions, but the capital's 'hyper-symbols' [Urry, Larsen, 2011] of national and state cultures that form the symbolic framework of the fractal model of the world culture. Copies of the Eiffel tower, the Statue of Liberty, etc. are placed in capital cities all around the world. For example,

the Statue of Liberty, which acts as a symbolic representation of American culture and is a fractal pattern of liberalism as an element of the world political culture, can be seen in Paris, Washington, Tokyo, Rio de Janeiro, Buenos Aires, Beijing, and further on.

Fractal patterns of the metropolitan area may contain more extensive cultural and geographical loci. In Kazan, which claims to be the ‘third capital’ of Russia, there is an unusual fractal (spatial and conceptual) pattern of the ‘second capital’ – Saint Petersburg. This is not just a street named Peterburgskaya. On the central pedestrian strip of this street, paving stones imitate waters of the ‘channel’, which is spanned by several pedestrian bridges that resemble the bridges of the ‘Northern capital’. Other examples include the Chinese ‘Garden of Friendship’ in Saint Petersburg, which is a smaller copy of the Shanghai ‘Garden of Joy’, and ‘foreign’ city districts (like ‘Little Italy’ in New York or ‘Little France’ in Strasbourg), which in one way or another reproduce the conceptual fractal patterns of their metropolis.

Obviously, some ‘copies’ of the capital’s hyper-symbols are explicitly simulative, which does not prevent them, however, from remaining fractal patterns, as in the case of the architectural imitation of Piazza D’Italia in New Orleans, LA or of the complex of Moscow’s Red Square and the Kremlin (‘St. Basil’s Cathedral’, ‘Grand Kremlin Palace’ and ‘Senate’) on the territory of the Turkish five-star hotel ‘Wow Kremlin Palace’. The ‘village of Florence’ built in the Chinese city of Tianjin belongs to the same category: several blocks repeat the architecture of Florence (the capital of Tuscany), the ‘Palazzo’ contains the ‘ruins of the Colosseum’ (Rome) and ‘St. Mark’s Square’ (Venice, the capital of the Veneto region) with canals and gondolas floating along them. Functionally, this fractal Italy is a shopping complex of modern fashion boutiques of famous foreign brands.

Finally, there are dozens of fractal patterns in the world that represent the entire geocultural world space geometrically and conceptually. These are so-called miniature parks located all over the world – from Europe to Asia, from the USA to New Zealand. In such parks, mostly in the open air, smaller copies of iconic architectural structures (Big Ben and the like), technical objects (the Eiffel tower, etc.), landscape attractions (mount Vesuvius, etc.) are built, which are hyper-symbols of different countries and refer to the corresponding city, most often the capital. Currently, there are more than 40 theme parks of this kind in the world, the scale of similarity varying from 1:72 to 1:9. The oldest miniature park ‘Bekonscot Model Village’, the creation of which dates back to 1929, is located in the UK. One of the newest is the Atameken miniature park in Astana, which is a three-level fractal structure, since it contains recursive copies of Astana itself, iconic architectural and natural objects of Kazakhstan (Alma-Ata, Karaganda, Baikonur, the Tian Shan mountains and the Caspian Sea), as well as hyper-symbol buildings from different countries (the Statue of Liberty, the Leaning tower of Pisa, Egyptian pyramids, etc.). Among the other ‘fractal’ parks, there is ‘Mini-Europe’ in Brussels and ‘World Park’ in Beijing. Strictly speaking, miniature parks are not so much geometric fractal copies of the world as its conceptual (sociocultural) fractal models.

All these types of fractality are combined in the most famous mega-archipelago in the world – ‘The World’, located in Dubai, the capital of the Emirate of the same name. The sand islands artificially built in the ocean represent a schematic map of the world, a reduced and fragmented projection of the continents. Among the 300 islands, there is Dubai, Great Britain, Germany, France, the USA archipelago, Australia, and others, as well as a number of Russian megacities (Moscow, Saint Petersburg, Ekaterinburg). The conceptual fractal of the mega-archipelago exceeds its geographical content, because it materialises a special island that does not exist on the geographical map of our planet – the Island of Fashion, but which as a sociocultural phenomenon defines the entire global civilisation of the modern world.

Conclusion

Summing up, it can be emphasised once again that in the era of globalisation, the sociocultural space of metropolitan megacities, filled with iconic elements and semiotic fragments of various cultures, not only represents its own national culture and history, but also is a stochastic fractal model of the entire world culture and civilisation.

In fact, a modern capital city with all its spatial, textual and symbolic patterns is a multidimensional fractal matrix, in which geometric, topographic, historical, sociocultural and artistic models of fractality intersect and are superimposed on different levels of the complex urban space. In spite of the fact that in some cases the construction of fractal urban loci has a simulative modality, this does not refute the fractal essence of metropolitan megalopolises.

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Столицы как фрактальные модели мировой культуры

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Abstract

Статья посвящена феномену фрактальности городского пространства. Топографическое, архитектурное, визуальное и символическое пространство мегаполиса, в частности столичного мегаполиса, рассматривается как фрактальная структура нескольких типов и масштабов. Столица исторически содержит паттерны геометрических и концептуальных

фракталов; пространство современных мегаполисов испытывает активные процессы формирования внешних фрактальных связей – в символических границах страны или всего мира. В исследовании, основанном на теоретических положениях фрактальной семиотики и идее концептуальной фрактальности, рассматриваются внутренние фрактальные формы городского пространства столиц и анализируются специфические характеристики столичных мегаполисов как фрактальных моделей мира. На примерах Москвы, Санкт-Петербурга и других мегаполисов раскрываются проксемические уровни фрактала мировой культуры и цивилизации и соответствующие им градостроительные и социокультурные практики, заставляющие столичные города выступать в качестве фрактальных моделей мира. Несмотря на то, что в ряде случаев построение фрактальных городских локусов имеет имитационную модальность, это не отрицает фрактальной сущности столичных мегаполисов.

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Ключевые слова

Городская фрактальность, социокультурная фрактальность, концептуальный фрактал, мультифрактал, городская проксемика, фрактальная семиотика, фрактальные модели мира, столица, столичный мегаполис, мегаполис.

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