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THE DEVELOPMENT OF PICTOGRAMS SCIENTIFIC VISUALISATION

OF

OTTO NEURATH'S PICTURE LANGUAGE AND ITS ACTUALITY

Whether we go to work by public transport, walk along the street or merely throw out the trash we always see pictorial signs. These pictograms have achieved the status of natural mediators; they are part of everyday life and they mean the same for everyone, regardless of race, sex, age and income. This visual language was born at the beginning of the 20th century thanks to the work of Otto Neurath.

 Neurath was an economist and sociologist who intended to develop a universal language system (called ISOTYPE), following the "unity of science" idea of the **Vienna Circle**. His aim was to visualise the changes in society with graphical signs, to educate the masses visually and to reveal socio-economic facts in plain, pictorial forms.

 In this paper I will examine how this visual language, the criteria of which are readability, pictoriality and value neutrality, has worked for everyone in the world since the 1920s. I will also investigate how science and visual arts work together in transmitting knowledge and visualising information and data. I will explore a methodological analogy based on the application of primary forms that can be identified in the architecture of Neurath's time, especially in Le Corbusier's theory of architecture and built heritage. Finally I will emphasise the actuality of the readability of cities that is due to the work of Kevin Lynch.

The context

To understand the theory of Otto Neurath, we have to examine the context, the institutional scientific community of his time, which had three main components.

First of all, Otto Neurath as a sociologist and an economist was an active member of the **Vienna Circle** (1929). If we want to summarise the core tenets of the members of circle, we can see that they were based on non-metaphysical thinking and a scientific conception of the world. The main goal was the integration of science and everyday life by means of formal logic.[1] The grounds for a new scientifically based philosophy are protocol statements – meaning simple observation reports – and logical connectives.[2]

The second main component is **The Museum of Society and Economics in Vienna** [Gesellschafts- und Wirtschaftsmuseum] which was the starting point for the ISOTYPE project in 1924. In Vienna during the interwar period there was a housing project for working class people. ISOTYPE was an "education by the eye". The aim of Neurath's museum was the visualisation of social facts for the uneducated masses.[3] The Vienna method involved the creation of a new, internationally standardised system using graphic symbols.[4] The main principles of ISOTYPE were developed from this Vienna method.

The third component is the Bauhaus school of architecture and design. Members of the Bauhaus school intended to apply scientific principles and correlate them with primitive colour relations and Platonic, basic forms. They wanted to reject the metaphysical tradition

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not only in philosophy but also in architecture – in the name of a modern way of life. This whole community shared the same ideological criteria.[5] It is well known that Neurath gave lectures at Bauhaus.[6] "Neurath's collaboration with the Bauhaus was based on a mutual scientific approach, as well as his personal interest in arts, architecture and workers settlements, as shared by others in the Vienna Circle. The mutual envisioning of a modern society was strengthened by both groups' opposition to existing nationalist, anthroposophist and metaphysical tendencies. After exchanging lectures between Dessau and Vienna, the two groups had developed such strong bonds that, after fleeing the Nazis, even the New Bauhaus in Chicago adapted logical positivism into its general design agenda. (68)"[7]
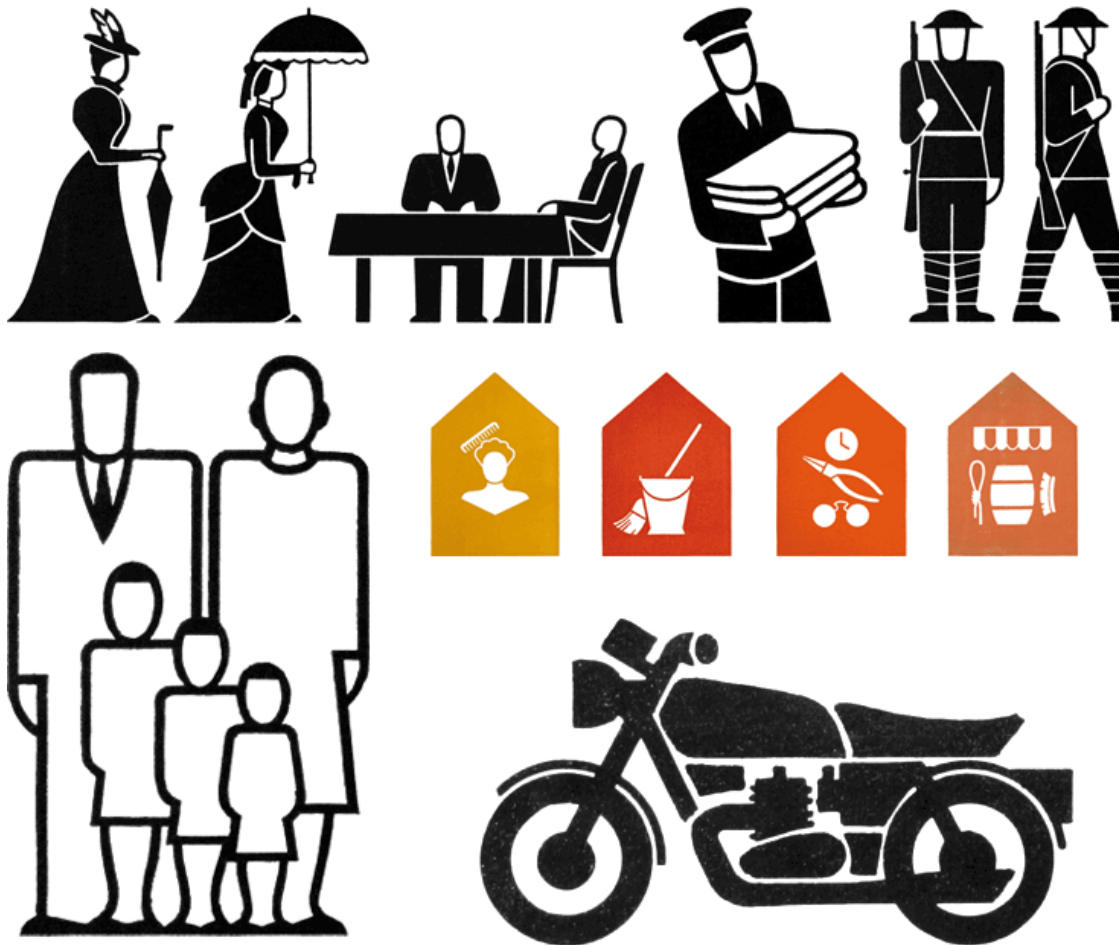

Figure 1. http://ministryoftype.co.uk/content/words/article/281-isotype/gerd-arntz.png

The International Picture Language – The language of the Global Polis

The idea of an international picture language is based on the process which Otto Neurath called "debabelisation".[8] He meant that if we want to achieve a unified visualised system, we have to eliminate any ambiguity of language and clarify the criteria of a universal visual communication system.

The process of creating this universal picture language was complex. It started with an analysis of the nature of languages. Every language, even the language of science, contains words and rules. Neurath's research showed that knowing a language is more complex than knowing words and rules, because words have different associations. An international

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picture language should serve to solve this problem by introducing universal meanings for graphical or pictorial signs. Nonetheless this is a task that calls for an interdisciplinary background, for "to make picture is a more responsible work than to make a statement, because pictures make a greater effect and have a longer existence"[9].

First Neurath makes a distinction between words and pictures. He emphasises that pictures are international, so they are independent of knowledge of languages. "Words make division, pictures make connection."[10] The reading of pictures is similar to everyday experience: mere observation with the eyes.

Pictures can make connections between inhabitants in the new kind of city. Kristóf Nyíri emphasises that "it was [...] the main discovery of twentieth-century philosophy that all knowledge, ultimately, is based on practical knowledge. Now pictures are better at teaching practical knowledge than are texts."[11] The place of new people of the new era is in the industrialised metropolis, which is based on democratisation and a globalisation of knowledge.[12]

Le Corbusier's Global Polis

To create an explanation of the global polis Le Corbusier used the automobile as his principle. This resulted in an aesthetic of the machine age. With the cessation of ornament, a new idea will control contemporary architecture and systems of thought: it is called machinism.[13] In order to grasp a concept, we need norms which are strictly regulated by principles. According to Le Corbusier, thanks to standardisation, the same approach should be applied to the problems of a house as to those of an automobile. The best example of engineer's aesthetics is the *Maison Citrohan*.[14]

The prototype where new materials and structures first appeared in the architect's work was the *Maison Dom-ino*. The name of this structural plan contains a play on words: domus meaning house in Latin, domino meaning units designed with a common industrial module that can fit precisely into one another. All the elements of the house consist of cast concrete structures which are mass-produced; therefore it already inherently owns an appropriate system of proportions.[15]

A more detailed explanation of the machine paradigm can be found in the third chapter of Le Corbusier's *The City of To-morrow and Its Planning*. Ships, automobiles and aeroplanes not only change aesthetics but they also change the rhythm of life. Industrial development and the mass influx of materials replace manual production methods. The similarity between Le Corbusier and Otto Neurath can be seen at this point.

Le Corbusier's main principles for city planning are the follows.
1. The*City,* as a business and residential centre.
2. The*Industrial City* in relation to the *Garden Cities* (i.e. the question of transport).
3. The*Garden Cities* and the *daily transport* of the workers

For city planning the basic principles are as follows:
1. "We must decongest the centers of our cities.
2. We must augment their density.
3. We must increase the means for getting about.
4. We must increase parks and open spaces.

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The residential blocks, of the two main types already mentioned, account for a further 600,000 inhabitants. The garden cities give us a further 2,000,000 inhabitants, or more. In the great central open space are the cafes, restaurants, luxury shops, halls of various kinds, a magnificent forum descending by stages down to the immense parks surrounding it, the whole arrangement providing a spectacle of order and vitality." [16]
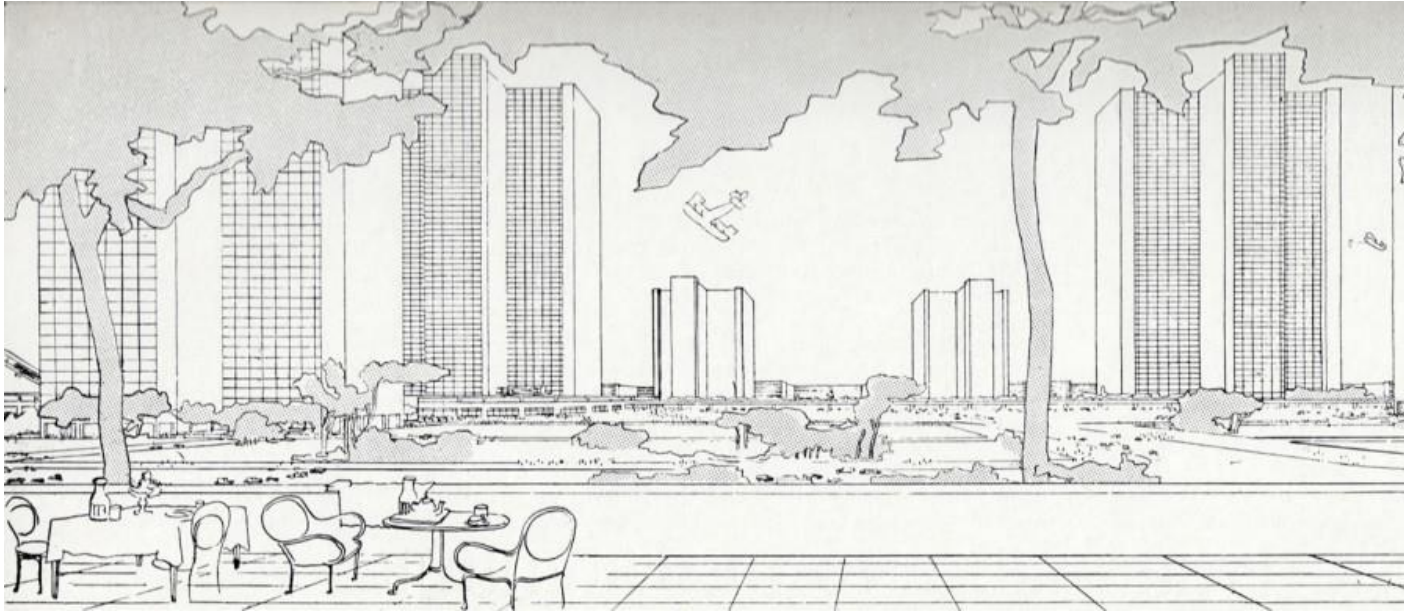

Figure 2. https://rosswolfe.files.wordpress.com/2014/06/40_lecorbusier1.jpg

To sum up, Le Corbusier's reaction to the development of scientific technique is analogous to the scientific concept of the *Vienna Circle*. The machine-induced changes in the science of construction have been of revolutionary significance since Le Corbusier articulated his famous five points, regarded as the basic principles of contemporary architecture.

1. "Pilotis – Replacement of supporting walls by a grid of reinforced concrete columns that bears the structural load is the basis of the new aesthetic.
2. The free designing of the ground plan – the absence of supporting walls—means the house is unrestrained in its internal use.
3. The free design of the facade – separating the exterior of the building from its structural function – sets the façade free from structural constraints.
4. The horizontal window, which cuts the facade along its entire length, lights rooms equally.
5. Roof gardens on a flat roof can serve a domestic purpose while providing essential protection to the concrete roof."[17]

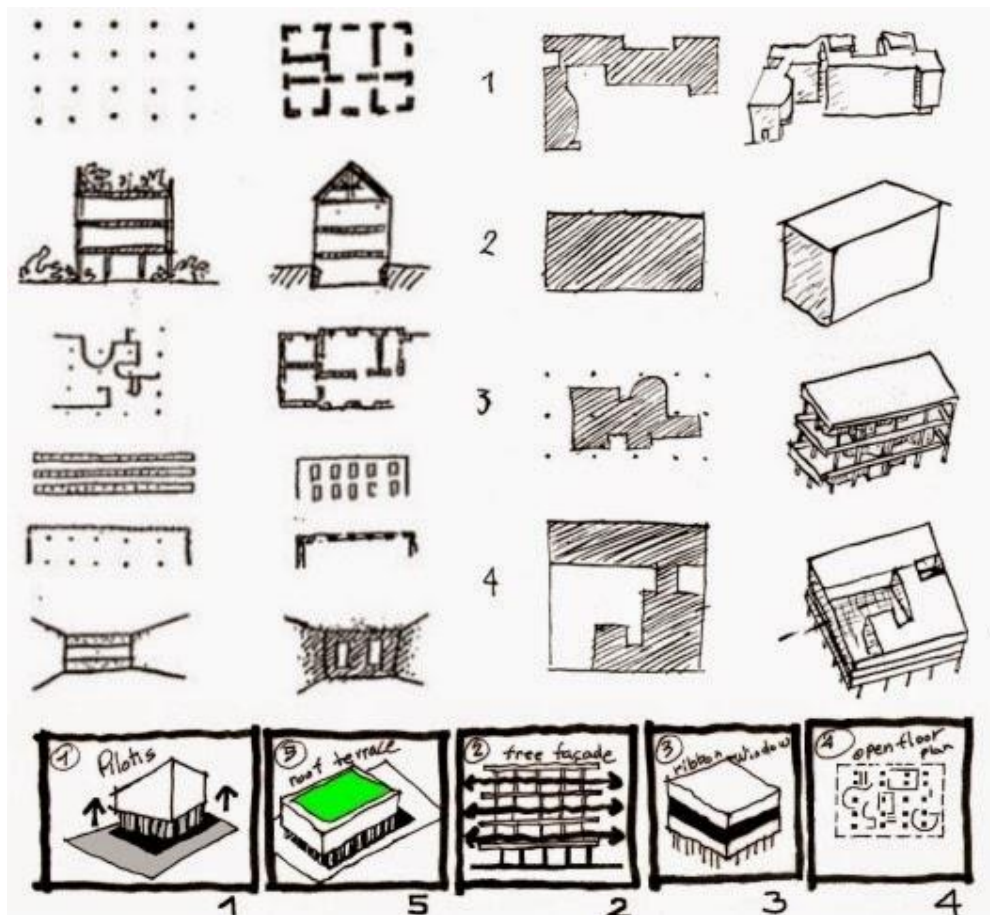This is the architectural background of, and the environment for, the visualised language of Otto Neurath.

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Figure 3. http://1.bp.blogspot.com/-j-ri9jNCF9I/U-fHbtVPfoI/AAAAAAAAAFo/ehmJLAHUqO8/s1600/Pielesarquitectonicas01-LeCorbusier5puntos.jpg

Readability of cities

In order to analyse the readability of cities, I will consider some of the most important theories of city planning. One of the most influential is the architectural theory of Le Corbusier. It is well known that there is a common point between Otto Neurath's and Le Corbusier's life: they both were members of CIAM. The Congrès internationaux d'architecture moderne (International Congresses of Modern Architecture, 1928–1959) was an organisation of the most prominent architects of the Modern Movement. In their theoretical and practical architectural work they focused on urbanism, industrial design and social architecture.[18]

The theories of Otto Neurath and Le Corbusier with regard to visualisation are connected in three ways. First of all, with respect to the common task: to make scientific facts accessible for the masses. Secondly, with respect to the intermediary device: the mass media are very powerful. Thirdly, the aim of Neurath and Le Corbusier was the same: understanding the modern metropolis. These three links result in three core notions which are the hallmarks of the Modern Movement in Central and Western Europe: globalism, knowledge and everyday life.

In order to understand the closely related social and architectural trends between the two World Wars, we need to focus on these three concepts (which later became tendencies).

In Le Corbusier's oeuvre, a kind of classification can be observed. In explicating his theory of the city, three steps can be distinguished. The first is the conception of the functional city. Here Le Corbusier introduced new concepts of public housing based on the philosophical theory of Marxism and the artistic theory of constructivism. The second step is linked to the concept of globalism, which is connected to the major topic of discussion of the time: the Mundaneum debate. The world city is created by the process of globalism. This means rationalised planning, using the Platonic forms and conveying a universal and accessible visualised content by means of architecture. The last step is the most important in my comparison: the city of the new era, the global polis. This means emphasising comparative city planning and the importance of urbanism. The theory of the transformation of forms appears in connection with the linguistic reduction method favoured by the Vienna Circle.

The connection between Neurath and Le Corbusier was manifested in the theory of the global polis. Both take the criterion of readability in city planning into consideration, Le Corbusier in an urbanistic, Neurath in a visual linguistic way. Otto Neurath created pictograms as universal signs, the language for the rationalised, understandable modern metropolis, the global polis.
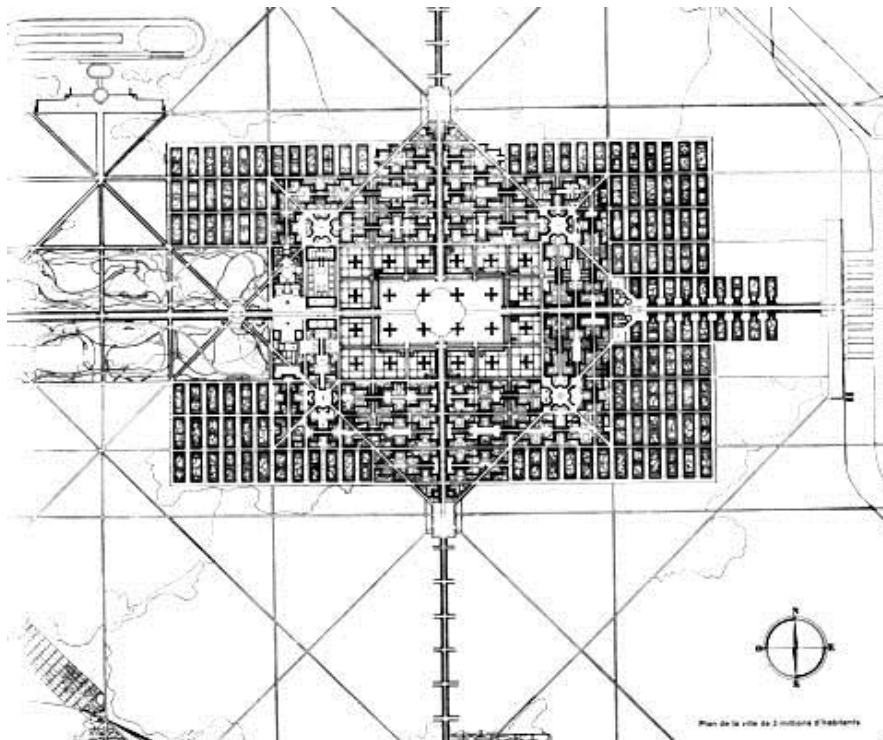

Figure 4. http://educ.jmu.edu/~tatewl/LE%20CORBUSIER/23.corbu.city.plan.jpg

The Image of the City

The International Picture Language was created by Otto Neurath for the Le Corbusian-type modern metropolises. In order to examine the actuality of the pictograms, they have to be analysed in terms of the work of Gyorgy Kepes and Kevin Lynch. Kevin Lynch's theory was developed under the direction of Professor Gyorgy Kepes at the Center for Urban and Regional Studies of the Massachusetts Institute of Technology in 1959. Gyorgy Kepes was a Hungarian-born artist, painter, designer and theorist. After emigrating to the US, he taught

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at the New Bauhaus in Chicago and after that at MIT. *The Language of Vision* (1944) is Kepes's best known work on design education.

"The language of vision, optical communication, is one of the strongest potential means both to reunite man and his knowledge and to re-form man into an integrated being […]

Visual communication is universal and international; it knows no limits of tongue, vocabulary, or grammar, and it can be perceived by the illiterate as well as by the literate… [The visual arts as] the optimum forms of the language of vision, are, therefore, an invaluable educational medium."[19]

We can see this tendency in Kepes' theory of colours too: "Colour remains as a universal keyboard of feelings. Colour representation reaches a higher level of objectivity".[20]

In addition to the city structure Kevin Lynch focused on the city's mental representation. This is based on the concept of imagability. But how could his programme be applied to the elements of the city? Lynch distinguished five different elements of the city: paths, edges, nodes, landmarks and districts.[21] Every major settlement is built up from these components, thus we can read them. So legibility and transparency are crucial to an understanding of cities. To understand the city, the activities of inhabitants must be observed. "Structuring and identifying the environment is a vital ability among all mobile animals."[22]

In modern cities (classical modern and newly built cities) people cannot get lost, because they are supported by navigation devices which are visual: maps, numbers of public transport vehicles, route signs, markers for busses or trams, etc.[23]

To summarise, the most important requirement for the problem of the image of the city is transparency. So we need objective, clearly visible signs not just to use them but to understand the city. These signs must be understandable for everyone, thus they must be visual.

Figure 5. http://www.futas.net/hungary/Budapest/images/kresz-tablak.jpg

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Conclusion

In this paper I have investigated the nature of the pictogram, the universal, visual language system (called ISOTYPE) created by Otto Neurath between the two World Wars. The main question was why and how we can understand these visual elements.

The economist and sociologist Neurath worked together with three important institutional scientific communities: the Vienna Circle [Wiener Kreis], The Museum of Society and Economics in Vienna [Gesellschafts- und Wirtschaftsmuseum] and the Bauhaus school of architecture and design. These three communities provide the context of my research.

Neurath and Le Corbusier followed the "unity of science" idea of the Vienna Circle in educating the masses and in city planning. Both of them worked on the metropolis, so a methodological analogy can be seen between a language of visual elements and the city. Le Corbusier emphasised the readability of cities, where "city" means the global polis. Otto Neurath created his ISOTYPE for Le Corbusian-type modern metropolises. Finally I examined the actuality of the pictograms, and I analysed it in the framework of the work of the Hungarian born György Kepes and Kevin Lynch.

 To sum up, it has been established that the role of pictures in the environment of a metropolis is mediative. Pictures make connections between inhabitants in the new kind of cities and between words and entities. So the following criteria must be sufficient for the universal picture language: neutrality, visuality, readability, pictoriality and intelligibility.

<p style="text-align:center">*</p>

[1] Vossoughian, Nader. *Otto Neurath: The Language of Global Polis*. NAi/D.A.P. 2010. p.57

[2] Galison, Peter. Aufbau/Bauhaus: Logical Positivism and Architectural Modernism. In *Critical Inquiry* Vol. 16, No. 4 (summer, 1990), pp.711.

[3] Neurath, Otto. *International Picture Language* (London: Kegan Paul). Facsimile reprint: Reading, UK: Department of Typography & Graphic Communication, University of Reading, 1980. (1936.) p.22.

[4] Rayward, Boyd W. (ed.) *European Modernism and the Information Society. Informing the Present, Understanding the Past. Ashgate*, Hampshire, 2008. p.280.

[5] Galison, 1990. p.711.

[6] Available: http://plato.stanford.edu/entries/neurath/visual-education.html Accessed: 28.12.2015

[7] Decaix, Patrick–Cornelia Redeker. *Otto Neurath Isotopia*. P.33. Available at: http://www.citiesonrivers.net/pdf/Otto%20Neurath%20Research%20for%20Research%20.pdf Accessed 28.12.2015

[8] Neurath 1936. p.13.

[9] Neurath 1936. p.15.

[10] Neurath 1936. p.18.

[11] Nyíri, Kristóf. *Pictorial Meaning and Mobile Communication.* 2003. Available at: http://www.hunfi.hu/nyiri/nyiri_pictmean_mob.pdf Accessed 28.12.2015

[12] Vossoughian, 2010. p.11.

[13] Le Corbusier. *Towards a New Architecture*. London, The Architectural Press 1927. pp.117–119.

[14] Mallgrave, Henry Francis: *Modern Architectural Theory*. Cambridge, Cambridge University Press 2005. p.258.

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[15] Le Corbusier 1927. p.219.

[16] Le Corbusier. *The City of To-Morrow and its Planning*. New York, Dover Architecture. 1987. p.31.

[17] Le Corbusier. *Five Points Towards a New Architecture*. 1926. Available at: http://www.learn.columbia.edu/courses/arch20/pdf/art_hum_reading_52.pdf. Accessed 28.12. 2015

[18] Steinmann, Martin (ed.) *CIAM: Dokumente* 1928–1939. Basel, Birkhäuser, 1979.

[19] Kepes, Gyorgy. *Language of Vision*. Chicago, Paul Theobald 1944. p.13.

[20] Kepes, 1944. p.169.

[21] Lynch, Kevin. *The Image of The City*. Cambridge, The MIT Press, 1960. p.41.

[22] Lynch 1960. p.3.

[23] Lynch 1960. p.4.