Architecture schools are fundamental deposits of knowledge and abilities, which have contributed productively for a long time to the growth of studies on architecture and the city.

The aim of this book is to share the results of research work carried out under the patronage of EAAE and ARCC in the main European and American architecture schools on the issue of the city and its recent transformations. Through the comparison of different points of view, the goal is to highlight the need for a broad and open discussion, appropriate to the vastness and complexity of the problems faced.

The well-known sentence by Leon Battista Alberti, “The house is like a small city and the city is like a large house”, is a brief indication of the subjects of the volume. The widespread phenomenon of urbanization of large parts of the world, the problems of so-called shrinking cities and the severity of the effects of climate change and energy issues, are all major themes in today’s world. Architectural and urban contents are also main themes in EU policy where the crucial role of architecture has been stressed in many documents concerning the development of European cities.

These arguments are developed in a thematic intertwining that goes from architecture and city’s analytical and design techniques to those connected with organization, construction, planning, conservation and practice of a profession whose role has taken on ever greater responsibility within the human destiny.
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Archetypes in-formation. Strategies of Transition in Architecture and Urban Design

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Introduction

In the course of late-modernism, the transition across space units of different scales making up the city was possible due to the utilization of archetypical systems. Architecture and urbanism’s common practice was to describe a variety of desired qualities in relation to semantic references, such as machine and network. By comparing machine’s and network’s adaptations to space, the paper’s scope is to scrutinize the significance of archetypical systems along the design process. Archetypes act as schematic visualizations showing the relations among the units involved, as much as they are notably disassociated from the restraints of matter and physical form. They may be interpreted variously as they may also be modified even be combined with other archetypes too, and so they are inherently ingrained with the potential for adaptation according to the specificities of each case study. A complete reevaluation of the design process would reflect the idea that architecture holds information being codified and retrievable at the same time, so as to envision an architecture that is responsive to any kind of data, according to each time’s set priorities.

Machine and Network as Assets of Metaphors Expressing Different Spatial Order

Machine and network are referents of technological origin representing two opposite logics. Their differences are reflected onto their nominative features.

Machine was a prominent symbol of modernism. Its structural qualities responded to the ideals of that era. Machine’s adaptations in design include examples of architectural and urban scale. Concept designs about the “machine-house”, the “machine-building” and the “functional city” were developed during Mid-war. The related proposals demonstrate machine’s supportive role practically in every human activity. The idea behind was that a space unit could be translated to a “functional apparatus”, being expressive of the technological sublime. Implementations further focused on the transference of machine’s properties to design principles. Such a tendency was very much influenced by the priorities imposed due to the economic crisis of the 30s. Efficient housing units was the main theme of 2nd CIAM held in Frankfurt in 1929, whereat machine’s attributes were related to the fulfillment of basic living needs, low-cost production, standardization and maximized efficiency (Heynen, 1999). Ernst Neufert’s seminal study Architects Data first published in 1936 was a comprehensive guide offering solutions in terms of functionality, thorough analysis and construction, also responding to a variety of programs, sustainability, even aesthetics. In the same period, Otto Neurath came up with ISOTYPE, a graphic language system of symbolic icons whose aim was to...
PART FOUR. INFRA STRUCTURES, LAND AND LANDSCAPE

ensure interdisciplinary communication and the adaptation of scientific methods of data manipulation in urbanism and architecture (Neurath, 2008). In machine-based design, space would perform as rigid and secure, also following chain reactions and the production process would be described as a sum of algorithmic operations. Efficient design further involved the allocation of discrete functions in separate space units, as if these were specialized machine parts. Prediction resulted from regularity and was achieved by following rational methodologies and repeated procedures. Overall, machine’s adaptations to space would be about the transference of values such as optimization, effectiveness, performance and prescribed processes, towards a predefined outcome.

After World War II, the network represented a set of intellectual and ideological challenges, being reflective of the radical social changes. Large-scale architecture and urbanism focused on the quest of new organizational schemas incorporating network’s characteristics also being in response to the emerging social structures, replacing the mechanical ideal. The urban themes of the Utopians of the 50s and 60s introduced priorities such as ceaseless change, mutation and expansion of the city in all directions. The adopted positions expressed a general spirit of contestation against modernism, being considered as the outdated status quo that was no longer capable of supporting the plurality, the contradictions, the mobility, the tensions and the overall character of contemporary life. Visionary thinkers such as Yona Friedman with his proposals of Ville Spatiale applied in Paris in 1958-1959, 1964 and 1970, Tunis in 1959, New York in 1964 and Venice 1969 among others, Constant Nieuwenhuis’ New Babylon of 1956-1974 and Takis Zenetos’ Electronic Urbanism of 1962-1974, worked systematically on the development of a gigantic network hyperstructure that could expand above the city, often at the residual areas of the land left unbuilt, the remaining natural landscape and the coastline.

In spite of the boldness of these proposals, to some architects and city planners of the post-war era it was clear that the establishment of new models of social structure in replacement of past ones could only happen with design projects that were grounded to reason. In this general framework belongs the work of architects of Team 10. They presented themselves as “Utopian, but Utopian about the present”, whose aim was “not to theorize but to build, for only through construction can a Utopia of the present be realized” (Smithson, 1968). Team 10’s organizing schemas carry many of the characteristics of the network model, being abstract, open, flexible and variously applicable. Their common belief was that the architect designs the system, without controlling all of the elements making up the total, not even the exact form of the building (Allen, 2001). Around the same time, Constantine Doxiadis employed network structures to describe the dynamic relations among spaces of all sizes, ranging from the generic room-cell to the building, the block, the neighborhood, the city, the aggregate of cities and nations, to the globe. For Doxiadis, network structures may be traced in every aspect of existence setting the world ecosystem (Doxiadis, 1963). Networks signify the new establishment of relations among architecture, sciences and social activities (Pyla, 2002). In retrospect, it may be claimed that the pioneering architects of the
50s and 60s have set the basis, upon which contemporary research in architecture is often geared, above all with the introduction of technological innovations related to the computer (Tzonis and Lefaivre, 1999). Concepts such as virtuality, event-space and ubiquitous information flow echo the influences of electronics and digital technologies in the comprehension of space, as these were mentioned for the first time by Doxiadis and the wider circle of scientists with whom he collaborated for long (Wigley, 2001). Organizing structures referring to network introduce qualities related to adaptability, also the ability to support collaborations and heterogeneity among the parts, towards an unspecified outcome.

Next, it will be shown that an updated evaluation of late-modern works, rather than projecting on them the replacement of machine structures with ones related to network, it points at a machine / network compound model introducing qualities of both parts; specifically, that the network arrangements globally support mechanical relations locally, forming polycentric structures. This model reflects the total spectrum of characteristics of urban space, being related in dynamic manners towards forming an organic whole. More importantly, the aim of machine / network synergy would be to explore the modes of association among different spatial entities, functions and scales in the city: by this means, to set the conditions of attributes about space according to pairs of characterizations generally seen as contradictory such as effectiveness and transformability, also in response to time.

Late-modernism Revisited. Organic Modes of Association Projected on Archetypical Systems

The interest in organic modes of development has led to an extensive research on archetypical systems. Schematic configurations such as the stem, the web, the mat and the matrix that will be shown later were main themes of study throughout late modernism. What is more, these schemas were manipulated very differently, depending on the idiosyncrasies of each case. For example, dwelling units ranging from the single house to settlements at varying sizes were viewed as dynamic parts of a higher order that was also able to adapt, to change and to expand. These objectives direct the work of Team 10 architects Candilis-Josic-Woods. The group appointed flexible structures of minimal organization offering a variety of adaptations, as the proposals could be developed partially also permitting modifications over time.

Candilis-Josic-Woods worked extensively with the stem. In its simple form, the stem is described as a line such as the street, upon which urban activities of all types are attached as “plug-ins”; these include market, culture, leisure and religion, also parks, gardens, administration, public services and housing. The stem may be extended to its both ends, as it may bifurcate, too. In the street version, it is most often separated from mechanical traffic, so that pedestrian movement stays secure and uninterrupted.

Candilis-Josic-Woods applied the stem to various projects, for example the University of Bochum in 1960 (Fig.1), Caen-Herouville in 1960-1 and Toulouse - Le Mirail in 1961-3. The stem functions cohesively for the space units it supports,
including all forms of human association. It is supposed that some functions tend to generate more intense activity than other ones. Activities at varying levels of concentration may be connected and related together through a malleable axis whose shape is capable of change. In effect, a series of opposite qualities about space with the intermediate phases between them unfolds, concerning the private and the public, the specified and the unspecified, the definite and the diffused, the closed and the open, echoing the attributes of the compound machine / network model.

As the stem evolves, it transforms to a web of main and secondary streets. The web is a system of higher order that retains the attributes of the stem. For Candilis-Josic-Woods, the web – and the grid, too, in its simplest form – is a more advanced arrangement, carrying multi-level activities, services and space types as well. Its form is not a preconception but a result, in fact an unknown. The web is generally non-centric and through these peaks of intensity it becomes poly-centric. Like the stem, it is open-ended and it can grow and change (Candilis et al., 1961). The web was first applied at the proposal for the reconstruction of the Historical Center of Frankfurt-Romerberg (Fig. 2) in 1963 and for Frei Universität (Fig. 3) in Berlin in the same year. The proposal for the Frankfurt Center was about the development of a general grid system extending equivalently to all directions. The grid reconnects the areas and the buildings that remained intact after the destructions of 2nd World War. A perplexed mesh of successive levels unfolds as it connects the remaining monuments of the city, making a thick structure of varying densities. The structure is adaptable to the pedestrian scale and the immediate environment of the area. In Frei Universität, the grid was also combined with the stem, producing a complex web structure with hierarchies in its interior. It is made of a parallel repetition of four main pedestrian streets. This brunch defines the primary orientation for the project. The four streets are connected with secondary paths, introducing a higher density.

In a series of related experimentations, Doxiadis proposed a multi-layered “horizontal” and “vertical” system based on the grid, which may be described as nesting (Fig. 4). Moving inwards, the system stays more static; moving outwards, it becomes more open. Doxiadis first expressed this dynamic system in a schematic urban arrangement called Dynapolis; then he applied it at the City of Islamabad, the new capital of Pakistan, in 1960 and the City of Detroit in 1965-1950. In these schemes, the city center also follows a dynamic expansion towards an axis, so that it can grow in a predesigned manner, avoiding uncontrolled congestion (Doxiadis, 1966). The formed poly-centricities offer a gradation of different qualities, as they may belong to a dynamic hyper-system. Overall, the stem and the web express the potential for development over time being flexible and expandable as well, while supporting the effective resolution of local areas according to specified needs.

At the time, archetypical systems was a theme of interest for architects with great magnitude such as Le Corbusier. It is known that Le Corbusier directed the working team of Venice Hospital according to the drawings of Frankfurt Center, introduced to him by Shadrach Woods (Tzonis, 2001). Le Corbusier with
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4. Constantine Doxiadis, Grid nesting (credits: Y. Zavoleas)


7. Machine / network model. Descriptive diagram, showing the relations among different space units, also the dynamic appointment of characterizations about a unit, according to its relative placement (credits: Y. Zavoleas)
Venice Hospital completes his lifelong research on systems, which began as early as in 1914 with Domino. The design of Venice Hospital started in 1964 and was finished by Julian de la Fuente in 1966, one year after Le Corbusier had perished. It is a manifestation of the mat structure, a composite variation of the grid (Fig. 5). The general scheme does not hold any excessive points, remaining neutral. Locally, however, one may find the plurality of space qualities about the interior and a variety of intensities according to the hosted activities. The total is an open structure forming a playful “lace” gently placed at the coastline of Venice, in so doing suggesting a poetic relationship with the irregularity of the urban tissue (Allard, 2001). Le Corbusier, during the latest period of his work, developed a thorough research on alternative systems being open, also combining the structural qualities of machine and network. As a result, he came up with a version of matrix deriving from the grid for Olivetti Electronic Center in Rho-Milan, in 1962-1964 (Fig. 6). In that case, space is arranged in the cells of a total, divided evenly, also offering a variety of densities in different buildings, being connected by an elevated system that traverses the whole. This unifying system starts from the national highway and it follows every possible direction forming an organic network of circulation in amoebas shape. The circulation mutates according to the spaces it encounters, being also combined with areas set for common activities such as the restaurant, the library and the administration, as it finally enters with its “tentacles” the inner space units reserved for production.

Upon comparative examination, it was shown that archetypical systems of late modernism were adapted in various projects. Their structural characteristics may be explained with the aid of semantic pairs of opposites, for example clearness / ambiguity, fixity / openness, rigidity / flexibility, hierarchy / equality and rule-making / rule-trespassing. The formed set of dualities including the instances between them relates to the proposed machine / network model (Fig. 7). The dynamic associations of these opposites is possible due to the fact that each space unit belongs to a larger entity being open enough to support a collective of varying parts; at the same time, the unit behaves as a larger entity, framing a total of units of lower class, defined in a more specialized manner. The space units may thus be classified according to size in successive layers dynamically related to each other, providing with the desired range of qualities.

It may also be argued that the more architecture is concerned with large-scale issues, the more it is understood as a problem of strategic development, for which archetypical systems support the relations among different space units. Archetypical systems are an aid in the transition from abstract descriptions to technical drawings; they are used to classify data and to allocate it in regards to space; they set the general logic and; they permit a variety of configurations. Overall, archetypical systems are methodological means giving shape to architectural thinking along the design process, meanwhile referring to organization, rather than to formal choices.
Conclusion. Form as the Result of Codified Information

The transition across different scales making up the city manifests a palette of notably diverse characteristics. Machine / network model is used as a semantic pair, providing with a full set of terminology needed to describe space in its totality and to dynamically relate its parts. A common practice for the usage of such models is the manipulation of information deriving from analysis. Data of all kinds about a design problem of any scale may be compared and related to each other in an abstract level. The produced relationships may then be transferred to space, as they are projected on archetypical systems. Structural development generally applies to large-scale problems, but the processes described above are suitable virtually in any other case, too. These abstract schemas set the structural basis upon which architectural form emerges and is gradually materialized.

Nowadays, the interest on archetypical systems is further combined with the digital production means in regards to parametric computation and dynamic manipulation. Form may be viewed as a resultant of the structural relations among the parametric data it supports, as it may be reduced to this data, also be adjusted to change happening along the design process and during the prolonged phases of construction. Advanced computer-aided methods ally with the objectives put forth throughout late modernism, upon the premise of an architecture that is prone to mutation – in theory, at least.

Bibliography


