Towards which expressive horizons?

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ABSTRACT
Today's explosive developments in digital technology have also affected architecture and urban landscape. The new possibilities opened up by digital simulation have led to an increasingly strategic approach to planning, an approach based on generating scenarios, which thus represents a radical departure from traditional planning. But, up to now, what is the prevalent trend in architecture? Can we talk yet in term of language? Or have the extreme freedom in design destroyed the style? In this paper we present an analysis of the contemporary architecture, strongly influenced by digital technologies, through an objective analysis of several case-studies and we show the first result of this in progress research.

KEYWORDS: Design Process; New Trends; Architectural Criticism; Digital Design.

Starting from the first Sutherland's attempt of automation in drawing, passing through the develops of the commercial software programs and their diffusion into the architectural and engineering studios in the early 90's, coming to nowadays, architectural design is always strongly influenced by digital technology and most recent buildings certainly shows marked signs of this digital soul. We can see two parallel approaches to the architectural design: some architects start from the geometrical digital manipulation of the shape, thinking forms that can only be imaged with the computer aid, as in the *Performative Architecture* or in the *Parametric Design*, some others take advantage of these instruments to express their idea. In the second case the computer helps the designer, who probably couldn't try to experiment and realize some projects with complex shapes without the provision given by information technology, but they continue to use the computer only as a way to represent and give form to an abstract idea, taking possession of the digital augmented capabilities *"on the research of expressive solutions not yet explored with the traditional representation methods"* (Riccobono, 2012, p. 132).

The use of the software controlling architectural shape may have indirectly *"reinforced the feeling of some architects to be the protagonists of a cultural environment, in which the geometry, science and philosophy are the fundament of new expressive avant-garde"* (Pellitteri, 2010, p. 28). Several projects suffers from excessive solipsism and they are often self-referenced. Then, it is natural to ask if the relationship between digital modeling tools and some trends in contemporary architecture is become only a formal fact. Today, we take a big risk: the primacy of the shape can take precedence over others fundamental aspects of Architecture and the architecture can become only a *"form for form's sake"* (Tschumi and Cheng, 2003, p. 49) .

It isn't any doubt that we are inside a revolution of methods, processes, thinking. At first we saw different approaches to this tricky question: some were enthusiastic, others were skeptical and critical. Nowadays we can talk of Post-Digital Age, because the first effects of this revolution are strongly evident on global scale. *"The architecture is very much a synthesis between the virtual, the actual, the biological, the cyborgian, the augmented and the mixed"* (Spiller, 2009, p. 95). Today we have to reflect about the changes that architecture has undergone and is undergoing, to

understand the real results and meanings of more than ten years of digital experimentation in the construction industry. As Antoine Picon says, *"we are now past these initial reactions of enthusiasm or concern. The question is no longer whether the digital technology is a good or bad thing for design; it is rather about the direction architecture is taking under its influence"* (Picon, 2010, p. 8).

The case-studies: selection and classification

For this reason, the main aim of the research is the comprehension of the current scenario and the hypothesizing the future, trying to put together the different approaches to the question, as much the aspects related to the design strategies placed at the base of project, as much the geometrical matters. Understanding the new directions in the architectural contemporary design it is certainly a complex issue and a historical-morphological approach can be useful to analyze the real impact of these building on our discipline. We think it is necessary to relate project ideas and formal configuration because, although in every historical age the architectural morphology has always reflected the moment culture through the design thinking, this is even more evident looking at the contemporary scene dominated by new digital media.

Therefore we have analyzed the current scenario through the selection and the classification of fifty case-studies, that we will explain in greater detail. The choose to make an as much possible objective analysis on the current buildings is a necessary task to really understand the modifications inside our cities and obviously in architectural language, if we can already talk in term of language and style. The case-studies were selected according with this parameters:

High-quality buildings, testified by the publication on journals with international relevance. It is chosen to not include the project never realized, because we can't see their relationship with the environment or understand the real congruence between project and realizations. Furthermore, many projects remained on paper seem often like a funny ideas or games, rather than something that can be actually realized.

Architectures where is strongly evident the influence of digital tools and culture.

Last fifteen years projects, because in this way we could insert also the first pioneering attempts of digital experimentation in Architecture, such as the pavilion *HTwoO* by NOX / Lars Spuybroek or the *Möbius House* by UNStudio, until the last realizations.

Global scale: we choose to not limit our investigation into a specific geographical area, because the effects of digitization on the evolution of architectural shape are evident on global scale.

Classification based on Design Strategies

At first we have defined a vocabulary of the current architectural trends derived by the use of digital technologies. Each category was described, deepened and explained in all specific aspects. Then each architecture was then classified according these several categories, that now we will discuss in more detail. Some buildings may have more than one classification. The aim was to understand which are the most common trends, if several ways of designing are recurrent in the architectural practice, if they interact each other and with which results. The categories identified are:

BLOB: the term Blob (Binary Large OBject) assumes different connotations depending on the specific context in which it is used, but in general, it represents a *mass without form and consistency*. Greg Lynn was the first to associate the word with architecture in 1995, coining the term *Blobitecture* or *Blob Architecture*, referring to those buildings digitally designed that have an organic, a bulged shape, as an amoeba. The shapes are defined through special algorithms implemented within CAAD programs, in order that the shape evolves depending on the pressure applied from outside on the surfaces and modifying the algorithms consequently.

Fig. 1, the blob Son-O-House by NOX in Son en Breugel, Netherlands.

GRID: traditionally it is a Cartesian structure that generates static and rational shapes. Grids are transversal elements, always present in the history of architecture. In our time the term is inextricably linked to the concepts of net, connections, network and sharing. The introduction of the IT made it possible working on the grids in a different way: they are no longer a rational and rigid design tool, but become an instrument for designing forms and spaces unpredictable and changeable. *"Laying down a grid"* - variously modified and deformed - *"should be a mapping of the possible, not a restraining order. [...] At any instant it can be pulled apart and shifted dramatically, [...] fixed one moment, vanish and refigured in the other"* (Balmond, 2002, p. 372).

FLUIDITY: The term was defined for the first time in scientific field as that physical magnitude, inverse of the viscosity. With the advent of the digital age, the concept of fluidity extends to computing, becoming a key-word.

The computer single particle is not a physical quantity, but rather an electrical pulse capable of providing and transferring data. In the contemporary landscape scientific discoveries and technological innovations are changing the same idea of nature and the Architecture reflects, with its proposals, the formalisms of science and technology. Curved figures, as spirals, waves, liquid crystals, become a precise figurative reference for the contemporary architecture.

FLOWS: Looking at the constitution of contemporary society, it is immediately apparent that itself, compared to a few decades ago, is dominated by a constant flow of people, information, mobility systems. *"Not a flow - such as motorway or the phone - but the juxtaposition of a variety of flows, is the first finding that the reality where we live is made up of meshes that add interconnections"* (Solà Morales, 1996, p. 15). Contemporary architecture has taken the flows as a starting point of the design. The movement of the users inside the space has generated a widespread trend of designers in creating free spaces, not rigidly structured: it is the user who creates the architecture, choosing to freely move inside it. There is no more a rigid concept of exterior and interior; the architecture is the result of the movement and is destined to be container of human activities.

DIAGRAM: in architecture it is usually thought of as *"graphic tool"* (Bijlsma, et al., 1998), that is the translation of a series of possible relationships between the parties in a drawing, but it can't be attributed either to the type, nor even to a sketch. The term derives from Greek *dià* (through) and *grámma* (something written). Although it is usually made up of points, lines and surfaces organized in two-dimensional patterns or three-dimensional models, it may include data, legends, text, and then relate different aspects at the same time, crossing data, connecting functions and needs. Digital diagrams become an operational concept tools, design tools as well as a means of reading.

PATTERN: in architecture and design generally it indicates the repetition of a geometric graphic motif on a plane. The buildings can communicate through their materiality, the articulation of joints, the different types of surface, the different materials. Even though the current fascination with the aspect of facades has turned image into fetish, the reconsideration of physical and material qualities of architecture has nonetheless gained a new prominence in the contemporary tectonic tradition. Software programs with shape grammars allow the design of patterns, starting from a set of elements previously defined and repeating them with imposed or random schemes.

ARTISTIC FACT: one of the major trends, due to the introduction of information technology in architecture, is the growing interest as much in the formal outcome rather than in the process that gives life to the project. For artistic fact we mean those buildings designed as if they are works of art, which increase infinitely the category of sculpture. The borderline between architecture and sculpture becomes increasingly ephemeral and undefined because certain works of art, such as those by Anish Kapoor, become part of the architecture of the city. On the other hand, more and more artists are implicated in the creation of the architecture, while some architects carry out art installations.

DECONSTRUCTION: The term enters into the history of Western philosophy with the writings of Jacques Derrida, from which arises the movement of *Deconstructivism*. Derrida didn't intend to create an *-ism*, indeed it was contrary to place the deconstruction within a philosophical movement, as was then happened, involving Art and Architecture. From a superficial reading of Derrida's thinking in key purely formalist, in recent years new forms were born, trying to dematerialize architecture, through disconnections, cuts, rotations, offsets.

FOLDED SURFACES: The concept of folding is introduced in architecture with the publication of the text of the French philosopher Gilles Deleuze, *The Fold. Leibniz and the Baroque*. The main contribution concerns an alternative view of the concept of space. For centuries the architectural space has been designed according to the Cartesian model, in which each point is identified by fixed coordinates that allow to represent the objects through elementary geometric shapes and to frame precisely their position in relation to the context. This rational and linear vision of space has certainly practical advantages because it simplifies, distinguishes, orders. Some architects, like Eisenman, identify this new model with the topological surfaces, geometrical entities that, as the surface of the ground, they are continually modeled, deformed, folded.

MATHEMATICAL DERIVATION: architectural space is intimately linked to numbers and proportions, from antiquity to the present day. Before the advent of digital technology, the mathematics used in architecture was simple arithmetic, made by proportional relationships and Euclidean geometries. Digital technologies allow us to manage and design forms, whose mathematical relationships couldn't be controlled only with Euclidean geometry. Within this category you can find those projects where the formal configuration comes from the work of mathematicians, for example, the Moebius strip; the topological surfaces, where the intrinsic properties of figures remain even when the surface is subjected to deformation; from everything that arises by fractals, where a geometric object is repeated throughout its structure in the same way on different scales. In addition, we have inserted also all those projects conceived through scripting operations, or by defining an algorithm that generates the form (genetic algorithms).

NATURAL DERIVATION: intimately connected with the mathematical derivation, there are those projects derived from the nature, both the buildings having clear figurative references in natural forms, both the projects derived from the evolutionary processes in nature. The study of natural systems requires access to an information system so complex as to be inaccessible to human cognition and can be decrypted only with the aid of computer. On the other hand, information technologies allow to generate the form through computation, setting the logic of natural systems - for example the genetic code or biological systems - generating a series of possible scenarios. The project is obtained by combining the best basic conditions.

PERFORMANCE: the performative approach to the project wasn't born with the advent of digital technology *stricto sensu*, since the goal is to optimize one or more parameters. With the advent of the information technology new lines of research were born: in fact the new software for architecture allows the creation of autonomous forms, arising from the optimization of different parameters. You can choose to focus on the structural, the climate - environmental, but also the social and procedural aspects, and many others. In parallel, the final shape can be achieved also due to the modification of a primitive initial, for example a sphere, a cube, a parallelepiped, modifying it, deforming it by successive approximations, until it reaches the best possible configuration.

Classification based on Geometry

This taxonomic classification was articulated in four different sub-categories. At first we defined the category "Geometrical Configuration", distinguishing the *Rectilinear* and the *Curvilinear*, without considering, at this moment, what kind of geometry it is. The second step was classifying every case-study according with the category "Morphology": then each project may falls within the parameters *Anthropomorphic, Biomorphic, Zoomorphic, Geometrical*, which, in turn, it is sub-divided in *Euclidean Geometry* and *New Geometries*.

The successive action was the identification of the "Shape Primitives" placed at the base of the form (for example, *Sphere, Cube, Parallelepiped, NURBS, Pyramid, Revolution Solid, Rotation Solid, Extrusion Solid*, etc.). At the end, we classified all "Compositional Operations" made up during the definition of the architectural form (e.g. *Boolean operations* - addition, subtraction, intersection - *Repetition, Deformation, Folding, Rotation, Overturning, Tilt, Cutting, Break, Interruption, Translation, Sliding*).

Results

Up to now, because the research is in progress, we have we analyzed the 50% of fifty case-studies chosen and we have found that, among the "Design Strategies", are prevalent the Blob, Fluidity and Folded Surfaces, with 14%, followed by Natural derivation (10%), Artistic fact (9%), Flows (8%). As regards instead the taxonomic classification, we can see that the curvilinear geometric configurations are prevalent, with the high percentage of 78%. Furthermore, regarding to the category "Morphology", we have a very high percentage of the Geometrical ones (88%, obtained by the sum of 36% for the Euclidean Geometries and 52% for the New Geometries). As regards the "Shape Primitives", has not been found a clear prevalence of any sub-parameter, instead regarding the "Compositional Operations", were prevailing categories *Deformation* and *Folding* (together for a total of 48%), followed by the ever important Boolean Operations (25%).

In general, we might say that contemporary architecture seems to tend towards complex surfaces and deformed shapes, as an expression of a fluid society that is increasingly complex, mobile, interconnected and

Fig. 2, the Metropol Parasol in Seville by J. Mayer H. with its clear reference in the natural forms.

Fig. 3, the optimization of environmental parameters was the guiding principle to design the London City Hall, by Foster & Partners.

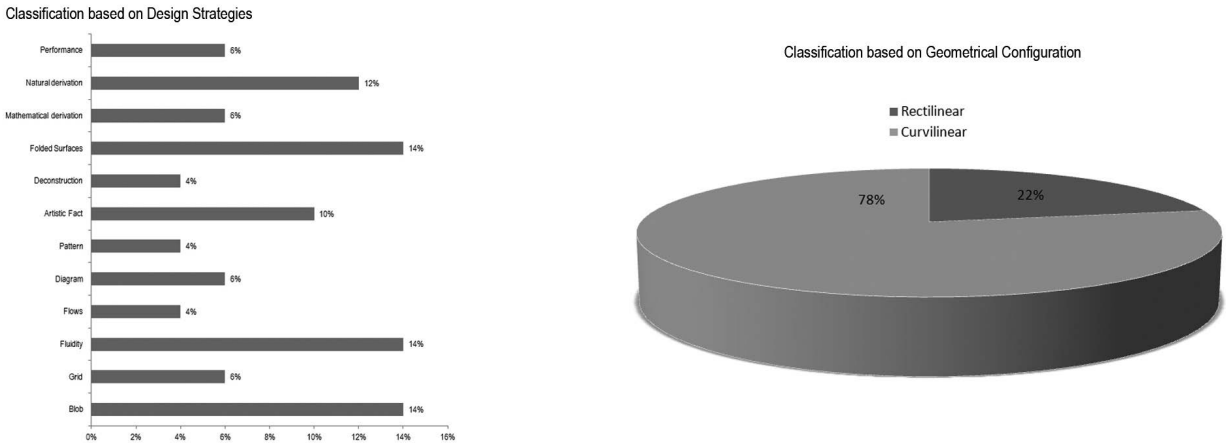

Fig. 4-5, The graphs shows the results of the classifications based on "Design Strategies" and "Geometrical Configuration".

unpredictable. Therefore the contemporary world reflects itself in open and non-rational spaces, free-form geometries, liquid and permeable architectures, in which there aren't clear divisions between inside and outside or between the various functional areas. Everything is flexible, free and subject to change.

It is evident that we are going maybe towards a New Expressionism or a New Baroque, but without the great cultural importance that has accompanied these two great historical and artistic movements. If we compare this new revolution to the discovery of Perspective in the fifteenth century, we can see that whereas the Renaissance was been a big cultural movement, involving all aspects of the society and art, this new revolution doesn't seem have that great value. It is more related to instrumental facts or artistic facts, with often partial approaches of the design. *"The image seems now the true aim of many architects, with all its consequences, such as fashions and styles"* (Pellitteri, 2010, p. 28). Certainly the image, when it is perceived, has the value of the sign. But a sign without a real meaning. But, up to now, the Digital Age gave us only these products. Expressive languages emergent from instrumental, procedural and artistic facts with considerations primarily limited to the shape, with purporting to justify the formal choices through the use sometimes of society, sometimes of philosophy or art. The form, expression of an incomplete spatial research, very often remains or becomes only the image, in the continuing search for a visibility at all costs.

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