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The solid and the liquid in environmental design education

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Solid and Liquid

Between Parmenides'[1] conviction that nothing in our world is changeable, and that of Heraclitos'[2] that everything is in a permanent state of change, there is Aristotle's in-between doctrine that even though the natural world is permanently changeable, there is always something solid and constant, which nevertheless differs after changes occur. Ever since, our appreciation of the natural world has sometimes been based upon the priority given to the solid components of reality and other times driven by those in the process of changing. At least in recent history, the first approach led us towards the adoption and adherence to models, standards, archetypes, modulors, ergonomics, but also, more broadly speaking, to rationalisation, internationalisation, mass production, control and prediction. The latter approach opened us up to typologies, selected historic references, memories and cultural spatial identities, as well as differentiated social meanings and symbolisms. In the last fifteen years, we have been experiencing a new reconciliation of these two different logics. Both solid and changeable components of our world are no longer ranked on the basis of their degree of stability or transformability, but they can be occasionally prioritized as always depending upon the overall dynamics emerging by the broader and unstable conditions in which the overall system exists. Aristotle' s aspirations are now glorified.

Environment

In this new mindset and contemplation the debate on environmental issues appears to be radically transformed. It started with the adamant conviction that environmental issues are questions of physics based upon the solid and classic laws of nature and as such they should be treated as technical. After the 70s this debate progressively shifted its basic hypothesis conceiving, this time, the environmental issues not as primarily technical, dependent upon natural laws, but mostly as social and political and for this reason changeable, transformable and liquid. The terms sustainability and ambience, which has dominated this debate in the last 30 years, perfectly expresses this shift from the priority of the solid and unchangeable, in the understanding of environmental problems, to the predominance of the changeable and transformable. Nowadays, we are experiencing a shift according to which, both solid and liquid factors of the environmental

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problems are described by the term 'parameter', which is rather neutral. All parameters affect the complexity of the system and their temporary hierarchies emerge from the specific dynamics of the broader system. Physics and humanities are now invited to be in a condition and in a relation of 'sympathy'. Parmenides and Heraclitos are no longer rivals; they are now allies.

Architecture

Architecture as a manifestation of our cultural values and perceptions is profoundly affected by these changes. Changes in the ways we appreciate the world transform the way our thinking is framed. Strong, new concepts emerge from the new constraints this framework imposes. This is something that both thinkers and architects support. A few years back Jean Baudrillard and Jean Nouvel had agreed that strong concepts emerge as the outcome of a creative way of encountering constraints[3]; the higher the perplexity of the constraints the stronger the concept. New constraints lead to new concepts and new concepts to new statements, practices and creations. This explains why architects are not only familiar with dealing with constraints, but they find this task challenging and intriguing.

In the second part of the last century we experienced significant changes in the fundamental concepts driving architectural creation. The persistence in the common and solid characteristics of architecture and of the humans inhabiting it led to concepts such as the 'man of the modulor', an expression of the common and timeless constitutive of the 'user', who in the name of democracy had to inhabit identical spaces accommodated in the same form, be it in France, Morocco or India. Later on, the persistence in the different and changeable, that is to say, the liquid characteristics of architecture and the human led to the concept of the human as a social being, who in the name of democracy, had to inhabit spaces reflecting his particular social, cultural and individual differences. Nowadays, due to the changes in our global understanding mentioned above, architecture is no longer considered as the act of creating an artefact that stands alone, tangible, perceived or presented to the senses. From the constraints imposed by this new mental framework, strong, new concepts emerge. Architectural creations are now defined, not as complete entities exposed objectively and factually to our experience in order to function, to serve, to represent, to note or connote, and to stimulate memories and feelings. However, they are increasingly conceived as parts of a broader assemblage of other entities and conditions, an alterity[4]. We are moving from a concept of architectural creation as a finished hierarchised total, to its conception as a part establishing multiple, not solid, unpredictable and emergent relations with the other entities of this complex and dynamic assemblage of solid and changeable elements. As part of this assemblage, the building is conceived as an interface in a dynamic system of relationships dependent upon and defined by a flux of information and data; a point in a point cloud. Between its proper substance and its alterity there is a continuum. The solid and the liquid are amalgamated in the form of information and data.

Architecture and Environment

Environmental issues have taken up a major part of contemporary architectural thinking and creating. Architecture for centuries conceived dwelling and the city either as shelters for the human beings to be protected from the natural elements, or as powerful weapons and efficient representations of their dominance over the natural forces, laws and phenomena. Even though nature, as

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generator of the alive, has always been the architects' source of inspiration, it has also always been the competitive 'other' to be conquered, mastered and dominated. This architectural production of our civilization is usually defined as the built environment, which distinctly and implicitly is opposed to the natural environment, where the former undergoes a process of naturalization and the latter a process of domestication.

The answer architecture has given to the question 'which environment for the human being?' has been structured either through the dominance of the technical perception of the environmental issues or through the above-mentioned dominance of their socio-political understanding. However, buildings continue to be major causes of harming nature. Pollution from heating and cooling buildings still exceeds that of cars. The building industry, which is the second largest industry in the world, still manufactures building materials that consume enormous energy and exhaustible resources. Buildings and their construction still account for more than half of the entire greenhouse gas emissions. Environmental sensitivity, sustainability, ecology, pollution, global warming, climatic change and the greenhouse effect, are simply terms emerging from the uncontrolled and aggressive invasion of the built into the natural environment or of human intervention in nature. Moreover, our homes, which are the highest lifetime purchase and investment, are built, to a greater or lesser extent, in the same way they were built, at least, fifty years ago. The home that will virtually define our lives for twenty, thirty or forty years in the future is designed only for today, based upon an implicit (and obsolete) conception that the future is just a repetition of the present.

The articulation of the new approaches to environmental issues with the new conceptions about architectural creation remains an open issue not only for the architectural community but also for the academic community that educates architects. What we need to redefine now is how from the new conceptions about architecture and the environment, new concepts can creatively emerge that will, in turn, drive architectural design towards interesting, efficient and innovative proposals. How the amalgamation of the solid and the liquid can open up new creative avenues to architectural design. This is an extremely important challenge to be explored and capitalised.

Information Technology

Information technology can play a very significant role in the creative amalgamation of the contemporary considerations of architecture with new views on the environment. The conception of the dwelling as an active part of a broader assemblage on the one hand, and the environment as a decisive dimension of this assemblage that permanently affects its parts and is constantly affected by their nature and action on the other, bring architecture and the environment into the same relational and associative system of information flow and data through which computer simulations investigate and manage complexity. Information technology has already provided architecture with high-end powerful computer software and hardware able to generate and fabricate intriguing architectural forms –although this achievement should not be seen as an end in itself[5]. In parallel, Computer Numerically Controlled (CNC) machines allow for testing, simulation

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and mass customization at all scales and of any volumetric or construction complexity. The contribution of digital fabrication to the environment has been underplayed, but it would be interesting to note that it can merit in less material wastage due to the ability of cutting patterns in an optimised way. Material can also be economised as with rapid prototyping the structural efficiency and performance can be tested and verified towards the marginally small sizing of components. File-to-factory techniques[6] of communication between the designers' desktop and the construction site can save shipping material to the site as it can be locally processed as well as save human power of expertise transport by operating remotely from the site while at times it can also involve robots for non-standard operations while or after the building is constructed. At the same time the same technology advances software to offer accuracy in modelling and simulation of the environmental performance of buildings and their components; advances always accompanied by the thorny subject of scaling up results and of transforming data from models to real life situations.

A body of knowledge on interactivity, adaptivity and responsiveness (actuators, transformation in real time with arduinos and intelligent environments) as well as on computation that generates new materials (encoded materiality) with specific properties that augment the environmental impact are progressively developed. Technology appears to be an affective catalyst of this expected articulation. It is promising that there are significant improvements on the interoperability between the two approaches; form generation and environmental simulations.

Environmental Design Education

How can the new conceptions about architecture and the environment be accommodated in our educational environments? Given that Building industry is responsible for more than 40% of resource consumption and environmental impact, it is in this sector that some of the largest contributions to ecological and economic sustainability may be made through better design and management. The question arising is how a school of architecture prepares its students to be part of the solution and not part of the problem?

The usual clashes on the scientific versus the humanistic bias mentioned, is not only central and fierce in many contemporary architectural curricula, but is also even tougher given the rich body of knowledge that sciences have generated in the domain of the environment. The scientific feature of this particular knowledge is what has often been the source and cause of the indifference of architects who believe that design, as a creative act, can dismiss science. By focusing on the social, political and cultural dimension of architecture (mainly in the 80s and 90s) architectural curricula kept environmental issues out of the design studio treating them in autonomous modules with a purely technical agenda.

Taking into account the experience of the previous ENHSA publication on "Teaching a New Environmental Culture; The environment as a question of Architectural Education"[7] in 2011, there is an extended urge to blend environmental education into the design studio. The pedagogy, teaching methods and techniques have been central in this discussion among educators on how to teach environmental design to architecture students. This request appears to be absolutely justified with the contemporary views and conceptions of the environment and of architecture as discussed. How

about seeing this new mental framework as yet another constraint towards a stronger concept? What if a design perseveres the environmental obligation as a social responsibility, as a way towards a stronger and more ethical concept? These two subject areas of the spectrum have to be revisited and be complementary to the pedagogic aspects of formal education. In the same amalgamation strategy, we need to reconsider the two poles of the environmental debate. The one is the role of technology in environmental thinking as a way towards global and sustainable architecture, and the other pole is the ethical dimension of the appreciation of the broader ecosystem and the systemic role of the architect, the occupant and architecture in it.

The environment can and must be appreciated as an innovation catalyst of architectural design; as a framework from which new ideas, forms and materialities can emerge offering innovative advancements in architectural contemplation and creation. This requested innovative ideal has to enhance and preserve its links with the contemporary conceptions of reality and the human as they are shaped in our contemporary world. In other words, it is high time we redefined the environmental design ideals as objectives of our educational practices, after all the significant changes and shifts that have occurred in the last twenty years.

Epilogue

Aristotle taught us that movement and change, genesis and decay -which are particular forms of change- occur in the natural world all the time. Things actually change, and this change is registered, but at the same time, things do not always change entirely. In every change there can be something solid, something maintained or preserved, while at the same time it is different from what it was. 'We do not design from scratch' Bruno Latour[8] reminds us. There is always something known, used, experienced and tested. Something solid used as a framework of constraints, to safely build on. But at the same time through the act of creation we are introducing invention, change, transformation, alteration towards the liquid, the unknown, the risky, the mistaken, the 'intentionally uncontrolled', as Jean Nouvel states. After that the new building is never entirely new, as it is part or should be a sympathetic[9] part of what already exists in its conceptual and physical context. It has to be in a sympathetic relationship with its broader system, if it is to be amalgamated with it, to blend into it.

There is an ethical basis in this particular relationship between the solid and the liquid: it is not hierarchical. It can occasionally acquire different hues by different priorities, associations, gravities and magnitudes. As a consequence, this attitude can either lead to an extremity of the absolute dominance of the liquid in the form of inventive experimentation towards radical innovation. Contemporary technologies can become enabling technologies by introducing virtuality immaterially, as opposed to artefacts with physical presence and impact that most likely harm than enable. The same attitude can lead to the other extremity of the absolute dominance of the solid leading to non-design when building is not necessary. It is an expectation of contemporary discourses on a new environmental culture to encompass ethics as one of their cornerstones.

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This sympathetic relationship between the liquid and the solid also affects the way we look back or the way we look forward; the ways in which we invent, predict, imagine and manage the future and the ways in which we think, analyse, memorise and investigate the past. Nowadays the ethical attitude emerging from the framework we have elaborated in this essay is to avoid looking only ahead (like in modernism) or looking only back (like post-modernism). The invitation is now to contemplate the future together while critically considering the past. To creatively imagine the myth of the future, but also to critically analyse the myths we created in the past: to invite and accommodate in this contemplation both Prom(y)theus and Epim(y)theus[10].

Notes

[1] On Nature, which has survived only in fragmentary form. In this poem, Parmenides describes two views of reality. In "the way of truth" (a part of the poem), he explains how reality (coined as "what-is") is one, change is impossible, and existence is timeless, uniform, necessary, and unchanging. http://en.wikipedia.org/wiki/Parmenides

[2] Heraclitus is famous for his insistence on ever-present change in the universe, as stated in the famous saying, "No man ever steps in the same river twice" (known as 'ta panta rhei'). http://en.wikipedia.org/wiki/Heraclitus

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[10] Stiegler, B, 1998 Technics and Time; The fault of Epimetheus, Stanford University