Metodi del Territorio | Saggi

Architecture and Anthropocene

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1. From hut-building to Earth-shaping

In the beginning, there were just Adam's two hands.
He joined them above his head – like a gable roof – to protect him against the pouring rain, as portrayed in the famous first drawing in Filarete's *Treatise on Architecture* (Averlino 1464, p.2). Afterwards, primitive humans built a simple hut, according to the famous frontispiece of Abbé Laugier's *Essai sur l'Architecture* (Laugier 1755). A century later, Caribbean natives raised another hut, without knowing that it would eventually become a model for western architecture, thanks to the writings of Gottfried Semper (1851). A century later, another savage tribe entered a campsite and discussed whether they should use the dry wood found on the ground to build shelters or as fuel for a campfire, as Rayner Banham reports in his introduction to the *Architecture of the well-tempered environment* (Banham 1984, p. 19). The last involvement of a human tribe in the architectural discourse probably happened with regard to the looming superstructures of Superstudio's *Continuous Monument* (Lang and Merking 2003) where they experienced an unprecedented juxtaposition of artifice and nature. All these depictions of the primitive humankind share three fundamental components: exposed humans, an unsympathetic and blind nature opposing them and a third element that protects the former from the latter. This intermediate sheltering device is always architecture,

although its context is always different, reflecting the authors' religious, philosophical, cultural, or environmental concerns. It could involve the use of just two hands or be grown from pruned trunks and branches or be made of different parts and different materials or even emerge from a discussion about the consumption of resources. But it is always an artefact, a spatial regulatory device between humankind and an overwhelming and infinite natural environment. To properly function as a shelter, architecture subtracts a small portion of space from the environment by providing a separation from the outside world by physical means. To some extent, this primal act of enclosing is the basis of architecture, one of the earliest gestures in designing a place[1]. This very first gesture defines what stays inside and what is left outside, giving birth to a field of interaction and negotiation. Architectural devices seem effective and powerful as long they produce and maintain a meaningful tension between the interior artificial space and the exterior natural environment. This is the subject of many key images in Modern architecture, like in Mies' hand-drawings of patio houses or Le Corbusier's sketches of *fenêtres en bandeau*. They precisely state the spatial quality of the enclosure and the enclosed space, to establish a relationship between the people living within the architectural space and the sun, the fresh air and the view of the surrounding nature. The human figures calmly sunbathing or sitting on the *chaise-longue* confirm the effectiveness of the shelter conceived by the architect.

1. The growing extension of artifice

The long struggle to put together a comfortable refuge has indeed progressed very far. Today, nature is perceived as

1. There is a huge bibliography regarding this topic. Among the most relevant texts, see Norberg-Schulz (1976), and the related Heidegger's analysis of Georg Trakl's *Ein Winterabend* poem.

needing protection from the descendants of the fragile tribes looking for shelter (Raman 2007). The modifications to the natural environment have come to be spread out broadly, allowing the human population's growth. As for now, human activities influence a considerable area of the Earth, with different degrees of intensity, ranging from metropolitan areas to grazing lands (Sanderson and Woolmfer 2002, p. 895).

The impacts of human actions on the Earth and atmosphere at all scales also grew exponentially. To some extent, Superstudio's anticipation of a continuous monument spreading all over the Earth has been achieved, although in a less sublime and more mundane way. The consequences of the development mentioned above are twofold.

First, the magnitude of the human-induced change prompted environmental scientists to discuss whether humans have become a global geophysical force, a shaping agent as powerful as other natural processes acting upon the Earth System (Crutzen and Stroemer 2000, pp. 17-18). This assertion means that nature is not inconceivably infinite and independent from humans anymore (Latour 2011), and the relationship between humans and nature, mediated by artefacts, cannot be simply reduced to technological determinism. Artefacts change nature, which in turn changes the context where they operate. The former static opposition between a fragile humanity and a blind nature or the newer concern about a fragile nature overwhelmed by aggressive humans should then be reframed as an evolving relationship based on mutual agency (Grosz, Davis and Turpin 2014).

Second, the progress in the understanding of nature's deep mechanisms, and their subsequent reverse-engineering brings the discourse about nature and artifice to a whole new level. Through humanity, technology has irreversibly become a part of nature (Schimelpfenig 2017). The option to go back to a natural state is not viable anymore.

Today the difference between natural and artificial processes is blurring and fading, and with it the old opposition between humankind and its environment is replaced by an inextricable entanglement of flows of energy and materials.
While the current debate on architecture and sustainability often reports the idea of nature as something passive and separate from technology, these emerging considerations about the interaction between humans and their environment are coming to the fore.
But, if the artificial world currently rivals with nature in power and extension, some further questions arise.
Is it still possible to define an architectural space as a zone artificially separated from the natural environment, if the surrounding world is just a continuous flow of tight dynamic relations between human and natural systems?
Do nature and artifice still occupy fixed positions – one outside and the other inside an architectural shell?
These questions, embracing a wide range of disciplinary discourses, bring to the fore the problematic relationship between human actions and the natural environment, the contradictions in coupling growth and resources consumption, the impact of technology in shaping both human lives and the biosphere.

2. An increasingly central disciplinary concern

The complex topics mentioned above concern architects in multiple ways. The physical transformations of the environment are responsible for a great part of the consumption of natural resources and materials.
The construction industry annually consumes 40% of the total energy used worldwide and 16% of fresh water reserves. Until now, the construction of buildings and infrastructures in developed countries used up two-fifths of the global reserve of raw stone, gravel, and sand (Dutil, Rousse and Quesada 2011).

It is worth noticing that a great part of these resources is depleted in the construction of infrastructures that do not directly fall under the control of architects (Moe 2007, p.25).
Nonetheless, architects should consider the discussion as an opportunity to step out from the marginality. First of all, this is a fundamental issue in social innovation (Olsson *et al.* 2017), a topic which was, for a long time, at the core of architecture. Around the 70s, architecture was on its way to becoming the social art (Landau 1985). The profession and later academia – its separated-at-birth twin – voluntarily abandoned this commitment and let the market economy lead the way, producing and investigating space as a commodity instead of a social service. Therefore, architecture has since, for several decades, been losing traction against the important concerns of contemporary society (Price 1990, Koolhaas 2003).
Secondly, this problem requires a general vision, which is part of an architect's education but is rather uncommon in the increasingly technocratic world of building. Technology alone is likely to be insufficient to solve the problem, which requires instead a critical and proactive attitude towards current lifestyles and, ultimately, building. In the last decades, the building industry responded to the growing demand for sustainability through the addition of technological gadgets to rather conventional buildings, such as solar panels, new insulating materials, sensor-driven shadings¸ often missing the opportunity of working on structural measures and developing new kinds of spaces (Kaltenbrunner 2002, Auer 2011). This approach triggered a demand for more new buildings or retrofits, in some cases accelerating consumption and obsolescence but presenting only partial solutions to the original problem.
In conclusion, architecture should once again find its role in imagining the future. More specifically, it could try to understand how to achieve new forms of balance between artifice and

nature in the coming times. It would surely help in finding new opportunities for both the architect's profession and academic research. Above all, it will strengthen the discipline by reintroducing the concept of necessity within its discourse. The same kind of necessity that those *savage savants* had to face in their hostile environments that commenced architecture a long time ago.

This essay investigates the relationship between architecture and sustainability as a specific case of the unstable relationship between nature and artifice. It stems out of the need to broaden the perspective of sustainable architecture, currently based on the reduction and mitigation of impacts. In other words, architecture is currently just trying to reduce its footprint, avoiding crossing the existing boundaries between the artificial and natural. However, the increasing awareness of the consequences of human activity gives rise to completely new questions all the time, continuously relocating those boundaries and making the previous solutions obsolete and unsatisfying.
The concept of Anthropocene, therefore, seems an interesting way to address sustainability in architecture.
It describes a world where nature and artefacts mix without fixed boundaries, a field of negotiation totally distant from the abstractions of thermodynamic building models or environmental regulations. In short, it offers the opportunity to investigate and develop even more interesting ways to combine nature and artifice.
Since every theory needs experimentation, these ideas are explored in the second section of this book with short descriptions of projects that deal with these topics from different angles.

2. The Modernist paradigm

The history of humankind is punctuated and marked by the production and development of artefacts.
Among them, architecture plays a fundamental role in mediating between man and nature, through a two-way relationship.
On the one hand, architecture produces the human habitat, literally building the kind of relationship that its occupants aim to establish with nature. On the other hand, every change in this relationship induces shifts in the aims and methods of the discipline, opening up further opportunities and engendering a variety of typologies and technical solutions. However, a complete exposition of the historical co-evolution of artifice and nature is out of the scope of this text.
Indeed, the most relevant phase covered in this essay starts with the industrial revolution, when new findings in technology multiplied the power of humans to transform their environment by several orders of magnitude. Before this development, the ability to domesticate the environment was very limited by the available labour force, which was often levelled by famines, epidemics or wars. With the dawn of Modern Age, things radically changed, as humans took advantage of the new opportunities presented by technological progress. The uneasy coupling of artifice and nature has come a long way, which could be summarised through its main turning points.

1. Harnessing the unused power of nature

Unsurprisingly, Marshall Berman (1998) illustrated the spirit of the Modern Age[1] through the character of Faust, as he appears in Goethe's play (1808).

In the second part of the play, Faust strives to liberate humankind from nature's tyranny, using unprecedented land and sea transformations. He builds harbours and canals and dams for irrigation and harnesses the power of the natural elements to human advantage, with precise plans and concrete programmes. Probably, Goethe took inspiration from the impressive earthworks taking place at the time in the Netherlands to reclaim large areas of land from the sea.

Faust becomes then the prototype of the modern developer, with all the attached ethical problems. The description of Faust's ambitious project culminates in the assassination of Philemon and Baucis, and old couple. The old couple resists Faust's attempts to buy their house on a plot covered by linden trees, the missing piece of land to complete his renewal of the whole region. They stubbornly refuse his generous offers to resettle, and Mephisto and his crew eventually kill them, to Faust's horror (*ibid.* p. 68).

Remarkably, Faust's ambitions started from observing the immense and underused power of nature. He complained about the sea dissipating its energy in continuous movement while humans cannot take advantage of it. He envisioned to reverse the balance of powers, turning nature from an adversary to a precious resource. Instead of building just shelters, humans

1. The words *modernisation*, *modernity*, and *modernism* are used in this essay according to the distinction made by Hilde Heynen (1999). According to Heyne, modernisation regards transformations in industrialisation processes, which produce material effects, modernity is the subjective experience of modernisation, and modernism concerns the cultural and artistic issues that express the subjective conditions.

could fabricate infrastructures and machines, to take advantage of nature's infinite force. The extent, organisation and intensity of his plan – the idea of taming nature to serve the purpose of humankind – and even the firm response against resistance exerted by local communities clearly depict what was going on during the Industrial Revolution and anticipate the many things to come.

According to Berman (*ibid.* p. 39), Faust's vision is deeply modernist. Although Faust's imposing public works do not make use of advanced technology, as extensive workforce carries them out with picks and shovels, he shows an unprecedented eagerness to enhance human life by harnessing nature's never-ending resources. Berman's definition of modernity is that of a maelstrom of perpetual disintegration and renewal, of ambiguity and anguish. To be modern is to be part of a universe in which, as Marx said, "all that is solid melts into air'" (*ibid.* p. 15).

The Modernist exhilaration of change and renewal rests on the belief that nature will perpetually supply all the necessary power and resources for human development.

Faust's enthusiasm of exploiting nature progressed throughout the Modern Age and marked an interesting starting point to investigate how the relationship between nature and artifice evolved in the last two centuries.

The attempt to dominate the environment through staggering public works, which impose human rationality over the passive irrationality of nature and even over the residents' will, became pervasive to the point that even historical city centres – as irrational to the modern eye as nature – underwent the same process. In the middle of the nineteenth century, Haussmann treated the dense, old city of Paris as a natural landscape, cutting channels through it – his famous network of streets and boulevards built through extensive demolitions – called *percées*, to meet the request for easier circulation and faster transport of supplies advanced by the bourgeois class.

Nature's role in relation to the city became two-fold.
On the one hand, as an outer extension of the city, nature had logistic importance to provide the human settlement with the much-needed resources.
On the other hand, as a domesticated surface within the city, it provided a clean environment and fresh air, also much-needed.
Actually, the natural environment alternatively played the role of a garden and backyard, serving the human rationality and its spatial achievement – the rational city.

2. Sealed volumes and open perimeters

The Modernist fervour for transformation went hand in hand with a preoccupation for organisation.
The aim was to not only change the world but also implement change in a modern way – through rational and technology-driven processes. Taylor's *scientific management* spread outside the factories to become a pervasive model for human organisation. Le Corbusier's *Radiant City* 1935) clearly translates these instances into spatial qualities. In this attempt to rationally reorganise the congested modern city, everything contributes to a Tayloristic conception of urban space.
Its utopian zeal fatally excludes the untameable nature around, where rational, production-oriented principles fail to apply.
In these drawings, all the land not directly involved in industrial manufacturing, housing and transportation is simply left blank, as it was unnecessary or simply available for further colonisation by the ever-expanding metropolis. The river becomes a never-ending transportation route, the sky a limitless aviary for swarming aircraft, the trees an undifferentiated canopy that emphasises the clear volumes of the skyscrapers.
This blank extension provides not only leisure, panorama, light and air but also building materials, fuel, water and food, finally becoming the destination for all the resultant wastes and emissions.

Nature seems generous and positive in Le Corbusier's ideological sketches, but the old antagonism came back when he delved in detail about building climatisation. Actually, he brought the familiar struggle against nature to a whole new level, as it was not enough for him to protect humans from extreme weather. What was at stake was the standardisation of inner temperature throughout the world, to a constant value of 18° C.

To reach this target, his early conception of a climate-controlled building rested on two fundamental concepts: the use of double glazing to seal the building envelope, with warm air circulating into the cavity to compensate the temperature difference between the inside and outside, called *mur neutralisant* and a mechanical air conditioning system, denominated *respiration exacte*. Both are technological innovations of the time, radically reinterpreted. The double glazing appeared in early Le Corbusier's designs since *Villa Schwob* (1916) until his competition entry for the *Palace of the Soviets* (1931) while he learned about mechanical ventilation during his journey in the United States and through the interaction with Gustave Lyon, a French engineer. This approach was typical of Le Corbusier's ability to turn Taylorism into an aesthetic built on standardisation – the same that produced his interest in prefabrication, industrialisation and, eventually, the extension modular systems even to human bodies, with the standardising proportion of *Modulor*.

The aspiration to obtain the same temperature everywhere implies a complete separation between the inside and outside, using architecture as the ultimate artefact to isolate humans from nature. Although this modus operandi seems to confirm Berman's views on Modernism and is representative of the Modern way of dealing with the topic, it is worth remembering that on the opposite side of the Atlantic, another influential Modern architect tried to inventively combine nature and

artifice into meaningful spatial layouts and design, blending their fundamental qualities instead of drastically separating them.
Reyner Banham (1984, p.27) compared Le Corbusier's static vision of a sealed envelope with the rich set of solutions mastered by Frank Lloyd Wright in his residential projects.
Wright carefully arranged each project to take advantage of the movement of the sun, wind, and the flows of warm and cool air between the inside and outside – a subtler and less intrusive way to harness nature's powers. These microclimatic features translated into carefully drawn layouts and elaborate building envelopes, consisting of protruding roof eaves, sunshades, chimney stacks, windows and slats opening at different heights.
Philip Johnson's account of his meeting with Wright in Taliesin (Sergeant 2015) reported a dramatic sequence of alternating glimpses into the hostile desert and through comfortable, protected places, in a continuous movement across light and shade, until the sudden appearance of a garden and, eventually, the master's room.
In this case, it was not the mechanistic side of architecture that was aesthetically relevant, but its ability to activate a dynamic relationship with the environment.
However, Wright used new technologies as much as Le Corbusier. For instance, the spread-out floor plan and the tall windows opening into the garden, which mark the spatial configuration of some of his Prairie houses, such as the *Robie House* (1910), were made possible by warm water heating pipes running under several grills at the floor level, to compensate the heat loss induced by the wide glazed surface (Banham 1984, p. 105). But instead of looking at technology ideologically, as the ultimate sign of the times and a way to definitively free humanity from the caprices of nature, Wright merged it pragmatically with many features derived from his previous experience and the natural context, producing a richer spatial experience.