Design and Nature, a complex relationship

Diseño y naturaleza, una relación compleja

ABSTRACT: Over the course of its history, design has never lost sight of nature as a term of comparison, sometimes taking from it, sometimes moving away from it. To investigate the complex relationship between the two terms, design and nature, we cannot ignore the evolution of man and how it has been profoundly influenced by technological innovation, which is the most evident result of science. Tracing an evolutionary line of design thinking, a double trajectory can be registered: on the one hand the tension towards progress and the myth of the machine, on the other hand the idea of a harmonious co--evolution with nature and the need to be reconnected with it. Besides, it is progress that allows mankind to thoroughly investigate natural mechanisms and make them their own. Contemporary design, autonomous but at the same time increasingly interdisciplinary, has got blurred boundaries which intersect with the most advanced fields of biological sciences. This evolution has opened up a whole new field of investigation that multiplies the opportunities of innovation, especially from a sustainability-oriented point of view. Today the dramatic breaking of the balance between man and nature has turned into the concept of permanent emergency, which is now matter of greatest interest for design, a design that attempts to react, mend, adapt to change in an authentically resilient way.

RESUMEN: A lo largo de su historia, el diseño nunca ha perdido de vista la naturaleza como término de comparación, a veces tomándola, a veces alejándose de ella. Para investigar la compleja relación entre los dos términos, diseño y naturaleza, no podemos ignorar la evolución del hombre y cómo ha sido profundamente influenciada por la innovación tecnológica, que es el resultado más evidente de la ciencia. Trazando una línea evolutiva del pensamiento del diseño, se puede registrar una doble trayectoria: por un lado la tensión hacia el progreso y el mito de la máquina, por otro lado la idea de una co-evolución armónica con la naturaleza y la necesidad de reconectar con eso. Además, es el progreso el que permite a la humanidad investigar a fondo los mecanismos naturales y hacerlos propios. El diseño contemporáneo, autónomo pero al mismo tiempo cada vez más interdisciplinario, tiene fronteras borrosas que se cruzan con los campos más avanzados de las ciencias biológicas. Esta evolución abrió un campo de investigación completamente nuevo que multiplica las oportunidades de innovación, especialmente desde un punto de vista orientado a la sostenibilidad. Hoy, la ruptura dramática del equilibrio entre el hombre y la naturaleza se ha convertido en el concepto de emergencia permanente, que ahora es un tema de mayor interés para el diseño, un diseño que intenta reaccionar, reparar y adaptarse al cambio de una manera auténticamente resiliente.

KEYWORDS: Sustainability; Bio-inspired Design; Design for Sustainability; Design for Emergency

PALABRAS CLAVE: Sustentabilidad; Diseño Bio-inspirado; Diseño para la sustentabilidad; Diseño para emergencias
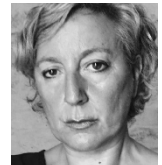
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1.Introduction

The intersection between design and nature is rooted in the relationship established for a long time with the forms and structures of everyday life. The ability of design to come into close contact with the material of the existing cannot exempt us from considering the evolution of

humankind, a reflection of the acceleration of technologies that progress through the mechanisms of mimesis and according to the path explored by biotechnology. Terms that reflect on the evolution over time of philosophical thought development, and above all on the dissolution of beliefs rooted in dogmas that slowed down its progress. The free design-thinking, autonomous and interdisciplinary, is now developing new terms of comparison and contamination from which innovative models development are outlined.

If we draw a line of progression of the different stages of advancement of free thought in Design, the influence on everyday life is reflected in a diffused way; the design and the revolutions, of which design is the bearer, concentrate the results to implement transfer processes in the forms and operating mechanisms of tools, systems of products, services and machines, to renew their use and contents.

The recurring question is: how and in what circumstances has technology determined or influenced human evolution? To understand the terms of the question, it is necessary to retrace and deepen the thought of Michel Serres (2001): his theory on the evolution of the human being dealing with science and with its most evident result -that is technological innovation- has effects on the thought and practice of Design which developed the method and explored the effects on systems.

The contribution of Design definitively introduces a process of manipulation of the existing, determining an inclusive dynamic, updating the mechanisms of production and reproduction; it accumulates both desired and unwanted effects and emergencies which, even more, push research to adaptations and plausible revolutions.

2. Man and Nature: breaking the balance

In recent decades, the effects of the violent alteration of the ecosystems operated by man have become evident: the extreme weather phenomena and the recent pandemic that has shocked both societies and economies of nations are just another sign of the breaking of the balance between man and nature. Since its appearance on the planet, about 70,000 years ago, Homo Sapiens has rapidly become the most important agent of change in the global ecosystem so as to justify the adoption of the term "Anthropocene" (Crutzen, 2002) to describe the present geological era. Through the process of domestication, man has imposed his dominance over other animal and plant species; he has constructed socio-political and technical-scientific imaginary orders with the aim of connecting single human beings and has moved further and further away from the natural basis that generated him, developing the ability to intervene, through genetic engineering, on the two fundamental evolutionary processes of living beings: selection and mutation. In this way, according to Michel Serres, man has become able to dominate life and time, becoming himself a "creator of evolution" (Serres, 2001). Each time a man invents a new tool, his body acquires the functions of that tool in order to respond to the pleas of the external environment and to shape it as he likes. Through technique, therefore, natural evolution is accelerated and externalized outside the body, in a process called "exo-Darwinism" so that - Serres affirms -"we directly reach the origin of evolution and tie a new alliance with it through a phenomenon that is called "hominescence". Without rivals, man becomes an artificer so similar to gods to take on gradually their appearance.

In the Anthropocene era, therefore, man finds himself in a two-sided position: on one hand he rises, in the words of Harari, to "Homo-Deus" able, more than ever, to impose his dominion over nature, on the other threatened by the same nature that turns against him. It is now necessary to restore a new balance between the two agents, man and nature, and to establish a relationship based on a new concept of limit.

In facing those issues a double trajectory of thought and practice is nowadays emerging: one that concerns the evolution of man in autonomy and self-awareness, the other that aspires to a co-evolution in total harmony with nature. This ambiguity can be read throughout the history of design, in the eternal tension between nature and technology, between the machine and the need for a human touch, between technological progress and the need to reconnect with the natural world.

3. Design and Nature through the history

The advent of the Industrial Revolution marked the transition from the civilization of tools to civilization of machines and brought with it a heated debate on the social and cultural consequences of modern production systems, such as the alienation of workers or the widespread production of tacky poor-quality items. Intellectuals like John Ruskin and William Morris strongly reaffirmed the centrality of individuals and the necessary coincidence between thought and action, starting the Arts and Crafts Movement and resuming some traditional manufacturing processes.

Art Nouveau sought a new modern language that could adapt to industrial objects without resorting to historicisms or excessive decoration and looked for its references in nature. The movement was mostly an aesthetic phenomenon with a low revolutionary power but it constituted a compression chamber for those energies which led to Modernism some years later.

Back to the first decades of the twentieth century, Modernism tried to identify the primary needs of man and design the way of living with a scientific method. However, design has always failed in this attempt of natural self-regulation of needs, as the needs of contemporary men are extremely more complex than merely physical needs. By freezing daily practices in abstractions and mechanisms, Modernism abandoned the dialogue that had always existed between man and the surrounding environment.

The dissatisfaction with the homologation and standardization of Modernism caused a bitter controversy among intellectuals and the search for alternatives. This situation sparked a new interest in anonymous realities, local and Mediterranean cultures, which are emblematic of a lifestyle characterized by a complete psychophysical synchronization with natural rhythms. Intellectuals started to speak about Return to Nature and a number of movements emerged, such as the Lebensreform (Reform of Life), which proposed practices and values such as nudism, vegetarianism, spiritualism, pacifism. The chronicles of the period recorded groups of intellectuals populating the coasts of the Mediterranean Sea. From Capri to the Amalfi Coast, these freethinkers carried on a silent revolution which was largely misunderstood, but was nevertheless forerunner of many new ideas.

Since the advent of machines, in fact, man has felt detached from the natural environment. This gap has widened significantly over the time, hand in hand with the difficulty in defining a sustainable development social and industrial model.

When the environmental issue emerged, the 1970s, there was clear evidence that human development was going at an unsustainable rate and exceeded Earth's biocapacity.

The indiscriminate exploitation of resources, irresponsible consumption habits, the multiplication of objects and tools -not always able to contribute to the process of self-evolution mentioned above- generated great questions and highlighted the urgent need for a change of direction, especially among intellectuals. Fussler's expression "the exponential deluge of objects" (Fussler, 1993) and Gillo Dorfles' definition of "Horror Pleni" (Dorfles, 2008) are effective in condensing the growing impatience toward consumerism and people's irresponsible habits. Design began to question its role and its responsibilities and the need for a so-called "ecology of artificial systems" (Manzini, 1990) emerged.

Design for Sustainability developed first as a discipline with a focus on processes and products, then the attention increasingly moved to the systems in which products and services are included. The observation of nature provided a good example of efficient resources use and organization of complex systems. Natural systems are autopoietic and zero waste, as the outputs of a system become the inputs of a new system. Starting from this observation, the systemic design approach analyzes the elements of a system, trying to identify new possibile flows and virtuous relationships among them. The ultimate goal is to redesign the system to make it zero-impact.

Since the birth of Design for Sustainability, many principles and guidelines have been developed and have now become consolidated practices in design projects, such as the optimization of product life, the minimization of the consumption of materials and energy, the optimization of renewability and biocompatibility of resources, the design for disassembly principles.

Compared to the past, what is now new is the opening of design to other disciplines, in a conti-

nuous exchange of principles and practice, and the invaluable contribution of technology, which offers unimaginable opportunities. The search for new forms of hybridization between nature and technology, in particular, opens up a multitude of evolutionary directions for the project. As an example, renewable sources of energy, such as wind and photovoltaic sources, are integrated in high tech living solutions that are as self-sufficient as possible; raw natural elements and materials are incorporated in hybrid objects in creative ways; in other solutions Internet of things is extended to living creatures, connecting them in complex systems.

In addition, the extensive research on new biodegradable or recyclable materials led to new frontiers and thanks to the contribution of bioengineering it is now possible to produce materials starting from living cells and tissues.

Design has always found in nature an inexhaustible source of inspiration in terms of form, processes, interaction between players in natural systems. Biological systems, in fact, can be a useful model to replicate when it comes to developing design solutions that are sustainability-oriented.

Nevertheless, bio-inspired design is not about imitating nature from a morphological point of view but rather about investigating principles underlying the behavior of living organisms and natural systems and transferring them into design solutions. Bio-inspired design can, for example, adopt a series of strategies that typically occur in nature, such as mimicry or some defense techniques but above all it can embrace the concepts of self-organization and resilience inherent in biological systems. Nature, in fact, is flexible and able to react to crisis, showing great capacity to self-repair and regenerate itself.

Progress has endowed man with new tools that allow him to observe nature closely, revealing its secret principles. Nowadays, advances made in the more innovative areas of biological sciences, such as molecular biology and genetics, allow us to understand the phenomena of nature at every scale.

It is clear that contemporary Design boundaries are much more blurred than in the past and are often intertwined with other disciplines. This evolution opened up a whole new field of investigation for design that multiplies the opportunities of innovation.

4. Design today: responding to emergency

From the half of the last century, with the emergence of environmental issues, human approach, and consequently that of Design, increasingly moved from strategies aiming at repairing damages to strategies directed to preventing and monitoring it.

This kind of approach turns out to be far more convincing in the present circumstances in which the violent breaking of the natural balance is significantly showing its effects which are no more simply occasional but are nearly conditioning our everyday lives.

In the essay Stato di Eccezione, the Author Giorgio Agamben suggests a new connotation for the term emergency, explaining that the idea of emergency has passed away from defining a state of exception linked to an occasional event to indicate a permanent one.

So emergency can be nowadays considered "the spirit of the whole age", where "the particular events are only incidental manifestations" (Giorgio Agamben, 2003) .

Climatic changes and the melting of the glaciers, the extreme meteorological events and the more and more frequent natural catastrophes, the new spectre of global pandemic, the growing lack of balance in the distribution of wealth and the escalation of migratory events: all these factors have played a part in to the destroying of the old certainties that had shown the way in the last century, plunging modern man into a permanent state of insecurity and bewilderment.

In a world where emergency seems to be a condition that is structural to contemporaneity, many are the tasks that emergency design can take on: designing products, services and communication systems to face emergency situations; planning systems able to detect in advance elements of crisis and monitor risky situations; defining strategies to manage the difficult after-emergency phase; raising awareness on risks and communicating the emergency.

In this contest design will have a key role in interpreting the events, identifying the risk or the emergency and foreseeing the possible and not always immediate solutions.

Emergency Design -a recent developing discipline that is just now facing the first attempts of being systematized- represents another side of Design aiming at re-establishing the broken relationship of man and nature. Its approach is properly resilient, because it is able to react to crisis and welcome the change, considering it not simply a source of stress but an opportunity to foreshadow and carry out different visions of the future.

5. Conclusions

The metaphor of swarm intelligence is based on the ability of living organisms, in this case biological, to live their own life and time that fall back into reality: they organize autonomously their activities, transform their living environment, make resources profitable, modify their rhythms to face the "inconnu" (Serre, 2003) in community and through sharing. In comparison, the temporal break in relation to space emerges clearly; the unavoidable detachment is its cause and consequence and is strengthened by living forms organized according to the ability of the environment to absorb change and strengthen the lost bond every day. Man is able to live a life designed on his own, moving further and further away from the natural basis that generated it: a life self-created and exclusive, like an individual and unique work of art. Without rivals, mankind embodies the role of artificer of the surrounding environment, glorifying human deeds like gods' ones and then gradually taking on their appearance.
Harari led us to the origin of this lost alliance: referable to the dominance over other species through domestication; the construction of socio-political and technical-scientific "imaginary orders" (Harari, 2011) to connect single human beings; self-glorification, through the ability to give meaning to actions which results are already somehow prefigured; the overcoming of human limits to aspire to immortality, happiness and to defeat evil, wherever it is hidden; the pursuit of an ethic subordinated to contingent value systems; the concretization of superhuman who challenges the foundations of life itself; the consciousness of the Self, endowed with supernatural abilities, a gift of technology that is also a creation of man.
The events moving in antithesis to dominance and exploitation, to the condensing forms of space and time with representative events of irreversible evolution stages, aspire to concretize new ways of life and prefigure different ways of creating meaning.

Notes

The authors shared the theoretical approach and the articulation of the contents of the paragraphs, however, the contributions are attributed as follows:
The paragraphs: Introduction; Man and nature:Breaking the balance; Conclusions; - are written by Maria Antonietta Sbordone.
The paragraphs: Design and nature through the history; Design today: responding to emergency - are written by Barbara Pizzicato.

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