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A Comparative Study between Art Nouveau and Bionic

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Abstract

This is a comparative study about nature and natural forms between two incredible architectural styles: Art Nouveau and Bionic Architecture. Nature is a detailed set of rules ؛so that the future is related to the past. Any progress and development in the new buildings engineering is made possible by applying these rules. Natural science and architecture are two points that are not opposite, but combine and complete each other; and by using experiences, biology and technology and creating a friendly bridge between human and nature by architecture help could create a trace that has nature inside it. The research method is "descriptive study" and pay attention to main factors of literature. Important result of this paper is "effect of natural science into creation of architectural approaches."

Keywords: Architecture, Art Nouveau, Bionic, Nature.

1. Introduction

An architectural style is characterized by the features that make it notable. A style may include such elements as form, method of construction, materials, and regional character. Most architecture can be classified as a chronology of styles which changes over time reflecting changing fashions, beliefs and religions or the emergence of new ideas, technology or materials which make new styles possible. Art Nouveau and Bionic architecture are architectural styles that have pay attention about nature, natural forms and natural patterns.

Nature is a combination of infinite variety (suggesting no rules) and rigidity (the result of laws). Nature is primarily made up of rigid elements and it is in their various combinations that variety is attained. This is also reflected in life in the need for absolutes. Without absolutes there is chaos. These absolutes are a direct derivative of the nature of God (Pearson, 2002). People naturally always have observed the nature that surrounded them, and found the inspiration in it. Application of the laws of nature and inspiration by the living forms in civil engineering, architecture and technology as such proved itself to be fully justified (Sumec, 2010). So finally we can confidently conclude that the future of technology will learn from the nature.

Nature is an inexhaustible source of pure ideas in an evaluated combination of form, structure and function, and the forms found in nature have the most efficiency in order to force transferring by using the minimum amount of material, and the efficient and functioning natural forms are often accountable regarding aesthetic perspective. Common words such as balance, rhythm, repetition, symmetry, etc. that are often used to describe the beauty of an artwork, have been derived from functional considerations such as efficiency in nature (Hoselehdar Saber, 2013). The most difficult stage of mastering the natural forms in architecture is a period from the middle of 19th till the beginning of the 20th century. There marked the rapid development of biology and unprecedented success compared to the previous period of building technique. Architecture always involves different issues, and obviously, designing a responsive and efficient work is considered as a major objective in this regard. In this context, many of designers explore and study the potentials of nature from the structural landscape and model a natural structure proportionate to the considered architectural work characteristics. Such an approach initially seems quite structural, but simultaneously with potential structural-oriented basis, smart selection of the pattern can result in aesthetic consequences (Hoselehdar Saber, 2013). There is a kind of inherent simplicity in the nature and if it is converted to design language, definitely a beautiful and delicate building would be created (Amirnejad Mojdehi and Bidarigh Mehr, 2011).

Throughout history, many attempts have been done to use the nature in the architecture, and the man has tried in various ways to imitate and use the nature deep knowledge in his work. Among all these efforts, simulation and replication of environment approaches are as the important methods. For living creatures, simulation and replication processes have reflected respectively based on functional as adjustment and structural adjustment in the architecture, and are seen in typology processes, artificial structures growth, and in a larger scale, at generating and growth of urban contexts. It seems that in searching for the missing link between nature and architecture, the study of simulation and replication trends in nature is essential. Nature interacts with architecture in various forms, some of which may include:

1. Nature as a base for architecture
2. Nature as an architectural element
3. Nature as guidance in architecture (Hoselehdar Saber, 2013).

The specific feature of the modern stage of learning of shapes of wild nature in architecture is that now there are learnt not only wild nature formalities but there are formed close bonds between the laws of development of wild nature and architecture. Nowadays architects don't use the outer forms of wild nature but they use the features and characteristics of a form which can be an expression of functions of this or that organism that are similar to functional and utilitarian sides of architecture (Zakharchuk, 2012). The role of nature and its application in structures and human life has a long antiquity. Now, human beings information about the limitation of matter and energy sources, Nature's role in architecture is progressed and contemporary times can be called «natural architecture» time, which means contemporary architecture endeavors that is presented as a member of nature family. So that mankind is competed with nature creative and structural power by building actual models inspired from nature. To select a natural form in architecture, selected form and structure don't make just for beauty or attractiveness of a natural model but forms make on the base of needs, conditions and their cultural limitations (Amirnejad Mojdehi and Bidarigh Mehr, 2011).

Literature Review

1.1. Importance of nature in Art Nouveau Architecture

Art Nouveau is an international philosophy and style of art, architecture and applied art - especially the decorative arts - that was most popular during 1890–1910 (Duncan, 1994). English uses the French name Art nouveau ("new art"), but the style has many different names in other countries. A reaction to academic art of the 19th century, it was inspired by natural forms and structures, not only in flowers and plants, but also in curved lines. Architects tried to harmonize with the natural environment (Wikipedia). Although Art Nouveau acquired distinctly localized tendencies as its geographic spread increased, some general characteristics are indicative of the form. A description published in Pan Magazine of Hermann Obrist's wall hanging Cyclamen (1894) described it as "sudden violent curves generated by the crack of a whip", which became well known during the early spread of Art Nouveau (Duncan, 1994). Subsequently, not only did the work itself become better known as The Whiplash but the term "whiplash" is frequently applied to the characteristic curves employed by Art Nouveau artists. Such decorative "whiplash" motifs formed by dynamic, undulating, and flowing lines in a syncopated rhythm, are found throughout the architecture, painting, sculpture, and other forms of Art Nouveau design. In architecture, hyperbolas and parabolas in windows, arches, and doors are common and decorative moldings 'grow' into plant-derived forms. Like most design styles, Art Nouveau sought to harmonize its forms. The text above the Paris Metro entrance uses the qualities of the rest of the iron work in the structure (Sterner, 1982).

Art Nouveau in architecture and interior design eschewed the eclectic revival styles of the 19th century. Though Art Nouveau designers selected and 'modernized' some of the more abstract elements of Rococo style, such as flame and shell textures, they also advocated the use of very stylized organic forms as a source of inspiration, expanding the 'natural' repertoire to use seaweed, grasses, and insects. Art Nouveau architecture made use of many technological innovations of the late 19th century, especially the use of exposed iron and large, irregularly shaped pieces of glass for architecture. By the start of World War I, however, the stylized nature of Art Nouveau design—which was expensive to produce—began to be disused in favor of more streamlined, rectilinear modernism, which was cheaper and thought to be more faithful to the plainer industrial aesthetic that became Art Deco.

More than any other artistic movement, Art Nouveau found its way into many aspects of

everyday life. It heavily influenced numerous forms of domestic design and production as well as art and architecture. Art Nouveau was considered to be a 'total style' meaning that it encompassed a hierarchy of scales in design: architecture, interior design, decorative arts including jewelry, glassware and ceramics, furniture, textiles, household silver and other utensils, lighting and the range of the visual arts. In producing what can be seen as art objects that are made for use in the home and personal environment, Art Nouveau can be seen to unite function and decoration (Steven, 2000). This meant that as an art-form, despite certain airs of elegance, luxury and decadence, that it was open to and attainable by the poor as well as the wealthy.

Nature was an extremely important influence for the Art Nouveau movement. In the vast majority of cases, most Art Nouveau designs, in any medium, are at the very least reminiscent of natural things, whether they be plants, flowers, animals or people. Plants, trees and flowers were fundamental to most Art Nouveau design, although heavily stylized. It was their rich, flowing, organic qualities that it strove to emulate, their sinuous curves and natural grace it passionately replicated. Although there is certainly a strong emphasis on nature in Art Nouveau, it was predominantly an urban style, seeming almost to have been created specifically to decorate the streets of the large, modern, industrialized cities that had grown so dramatically during the last third of the 19th century. In this way Art Nouveau can be seen as a vehicle for bringing nature into the urban environment. Important civic buildings appeared in big European cities, stylized, heavily decorated and with unmistakable Art Nouveau design, frequently laden with natural imagery (Steven, 2000).

1.2. Importance of nature in Bionic Architecture

The usage of forming principles of wild life got the new quality and received a name of architectural and bionic process and became one of the trends of architecture in the world architectural practice for the last 50 years. Bionics is an innovative architectural style that took all the best from nature: relief outlines and forms. It can be called architecture of future and its aim is synthesis of nature and modern technologies (Zakharchuk, 2012). This term was used for the first time by the American scientist, Major Jack Steel, the U.S. Army Aviation Regiment officer in 1959. He called the science of underlying systems that their foundation are living systems or having the features of living systems or similar to living systems as "Bionics". At first, Bionics used to study the machines designed and built based on living systems; and now bionics, in any aspect, is considered as the art of deployment of living systems knowledge to solve technical problems. Nowadays, anywhere speaking of technology, the same picture of critical technology achievements comes to mind that address the basic needs of now and future human being. But looking at the technology path with little care, we will more or less understand the cause of some phenomena, such as every industrial or structural phenomenon has been inspired from which living pattern of the nature (Hoselehdar Saber, 2013).

The usage of laws and forms of wild nature is rather rightful in both technique and architecture. Everything is interdependent in the world; there are no things and facts that wouldn't be connected directly or between each other. There are no pathless barriers between wild and inorganic nature, there are the laws combining the entire world in unified whole and giving rise to the objective possibility of usage in the artificially created systems of laws and principles of building of wild nature and its forms. Its basis is a biological relationship of a man and wild nature (Zakharchuk, 2012). Bionics is a frontier science that systematically acquires and applies knowledge about living organisms and their structures and functioning in the development of new technologies (Sumec, 2010).

Bionics as a word means biologic or using the nature artificial organs. The word BIONIC has created from combining two words together, Biology and Technique. The word Biology by itself is a Greek word, a shortened combination of BIOS meaning "an element of life" and logy meaning Knowing. Biology is a very broad science which is human being knowledge of him and living world of this planet. Since beginning, human have tried to get inspired by nature in designing and building structures and living quarters and use natural raw materials in constructions. Bionics, as an architectural style that aims to create a spatial environment that would stimulate the entire feel exactly the function of buildings, for which the latter is intended (Zakharchuk, 2012).

Architectural and bionic practice gave rise to the new and unusual architectural forms which are useful from functional and practical point of view and original in their aesthetic qualities. It couldn't but kindle architects' and engineers' interest to these phenomena. Architectural bionic looks like technical bionic but it's so much specific that it

creates an independent branch and solves not only technical but architectural problems mainly. Bionic architecture is a movement for the design and construction of expressive buildings whose

layout and lines borrow from natural biological

forms. The movement began to mature in the early 21st century, and thus in early designs research was stressed over practicality. One of the tasks set themselves by the movement's early pioneers was the development of aesthetic and economic justifications for their approach to architecture. Bionics, as an architectural style that aims to create a spatial environment that would stimulate the entire feel exactly the function of buildings, for which the latter is intended

Table 1. A Comparative table between Art Nouveau and Bionic

Architectural Style	Concept	Architectural Elements	Architectural Appearance	Architectural factors
Art Nouveau 1890	Nature Natural Symbols	Natural Things Curves forms Organic qualities	Interior Architecture Ornaments Natural Materials Urban Style	Context Beauty Sustainability
Bionic 1959	Nature Natural Patterns	Natural Science Bio-tech Approach Eco-tech Approach	Structure Building Management Towers Landscape	Environment Usefulness Sustainability

3.Conclusion

The role of nature as an important source of efficient ideas becomes evident. Nature offers unique solutions in response to architectural and structural issues; solutions that can prove useful in yielding optimum results. Beauty, usefulness and sustainability are considered as three integral and fundamental properties in natural components and phenomena, and since the nature essence of nature represents the accumulation of these three categories, revelation in nature and applying hidden lessons and principles in nature can be effective in founding an architectural building or inclusion of three mentioned key principles. The most important thing for Art Nouveau Architecture and bionic architecture is the building ability to induce its living nature.

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