Interaction between Interior Parametric Design and Learning Aesthetic Values Expressed in the European Scholars’ Work

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Received: 22.03.2015; Accepted: 29.05.2015

Abstract. In the contemporary world that every aspect of human life is affected by major developments in technology, living environment should be outcome of today’s knowledge and technology, man’s view point of himself and his surrounding and moreover in accordance to current conditions while reflecting past values and then utilizing parametric forms and creating fluidity in the interior spaces conflicting with common internal architecture provides new experience for man. This research tries to study the effect of utilizing digital technology, particularly parametric architectures, in forming residential interior, adopting such an architecture style to the ideas of European thinkers in the field of beauty, and also the effect of changes made to aesthetic values learning process. Accordingly impression of visual factors will interact with man’s active response to provide him with motivation to approach values gained from technologic changes via man’s need to experience his surrounding as a growth pattern on the one hand and a tendency to learn new values on the other hand. Technology as a part of surrounding environment relying on language and grammar of geometric design creates computer parametric forms never seen before. These forms finding an expression in the components of interior architecture make potential spaces. Since the human being has high capacity to adopt his activities to the capabilities of new constructed environment, it seems the change of environment by creating digital interior spaces will result in presenting new experience of relationships as well as learning aesthetic values hidden in new spaces and leaving for a permanent change.

Keywords: Aesthetic values, Adaptability, Interior spaces, Parametric Architecture, Learning

INTRODUCTION

Nowadays many societies face new needs concerning interior architecture due to scientific and technologic developments and in spite of enormous enthusiasm to create interior space tailored to the needs and to experience new fluid frameworks and despite space fluidity of modern era which is like a persistent spark more visible among the mist of conservative approach of the societies with bold ideas such as open plan, interior spaces are recreated with the routine patterns of symmetric and static composition. We may need to think twice and as Schopenhauer says “Think about those realities all eyes see but no one thinks about them”. A lot of increasing new demands in culture and architecture of many societies grow in line with worldwide changes and contemporary architecture should show its characteristics of form and space and aesthetic quality in a new way and intermingle with time components since according to Charles Jencks in the current world” The architecture should be the effect ,the effect of man’s view point of himself and his surroundings. Today’s architecture should be the effect of today’s conditions, the effect of science ,technology and philosophy of present time.” (1995) It offers a new experience by creating fluidity trusting parametric architecture in interior spaces and conflicting common structure of interior architecture.
This investigation tries to study the impact of benefiting parametric architecture in forming residential units’ interior spaces, adopting this style by the ideas of European thinkers in the field of beauty and the effect of changes this style made in learning aesthetic values on utilizers of such spaces. Therefore in the first section the adjustments of man and man-made environment will be noticed. However it will give overviews. In next section the European thinkers and philosophers ideas will be viewed and the beauty will be explained through expression of western thinkers within ahistorical trend from classic period to recent era .The third part is assigned to the achievements of digital architecture and its impact on shaping man’s living space. The forth section explains and analyses the achievements and finally the last part of the research summarizes the results to let us realize how environmental changes along with creation of parametric interior spaces result in a fluid environment and feeling a link. Adjustment of such an environment to the activist overtime led to learn aesthetic values and certainly it will be able to cause permanent change.

Overviews

Built environment

“Built environment is a part of man’s living space” (Von Frisch 1974). It is a collection of man and the environment adjustment which is qualified for human effort to a better response to the aim of aesthetic.

Interior architecture

Interior architecture of a built environment covers variant spectrums of visual, practical and decorative components and expresses the identity, the need, the understanding and the demand of the addressee and eventually creates a beautiful space which is practical as well.

Fluidity

Movement and space fluidity is defined as having no clear border which is not possible to be interpreted in an abstract frame. In such a fluid space despite the separations and specific spaces and its unique diversity, a total single space can be recognized. However visible fluidity in works of contemporary architects such as Zaha Hadid associates a type of dynamic non-locality.

Perception [Environmental]

It is known that human being affects his surrounding and is affected by it. Such an interaction primarily needs stimulation of sensory organs of man by external factors and converting them to electric impulses being transferred to human brain through central nerve system since perception is an active and targeted process of obtaining information from surrounding. A process which is central as it is the source of all information. Therefore it is not like sensation but the result of a purified processing by man himself through self-experienced cognition. In fact an individual as a part of environment gains a roll in defining its borders and other specifications by his behavior and moving around. It can be said that the space is a personal experience which is the sum of perception process and attributing particular meaning to the whole, the component and the connection between them. In this way perception is the point where the cognition and the reality will reach each other.

Action

An active and creative response of an activist[man] to a built environment [whether it is fluid or not], is nothing but an effort to adapt to the norms. Consequently Parsons defines “action unit “in terms of four ingredients:

1- Needs an activist of mankind.
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2- A goal should be defined then the activist act for it.
3- The activist should be in a situation consisting restrained components [instruments] and unrestrained ones [circumstances].
4- The activist utilizes norms and values to choose instruments to reach the goal.

Incentive

“Incentive is part of action “(Parsons 1937) and the behavior navigator, to modify it to fulfill human needs.

Learning

Learning will happen when one receives a new response to incentives which causes a shift in his behavior. Learning is an almost permanent change of behavior happening by experiment. We change our behavior through what we learn and modify our reactions and improve them to reach our goals.

Human needs

Abraham Maslow believes in hierarchy of needs. In specific conditions Man’s behavior is influenced by a need. In the very moment of satisfying the need, a change of incentive happens so that other level of needs matters to him which will be his behavior incentive. Then the needs will soar according to Hierarchy of needs and ebb when fulfilled then another need takes the turn.

This theory classifies human needs into five: biological, security and social needs, respect and self-actualization. Some of them have physiological base, some sociological and some a combination of these two. But the major needs are basically physiological and obviously people consider the environment qualities according to their needs. Therefore environment recognition of the public largely depends on elimination of needs.

Aesthetic

Aesthetic as a human need derived from the Greek word Aesthesis to mean sensational, established in 1750 by Baumgarten to express the style in fine arts. Although it has been noticed as the expression of reality from classic era alongside with the ontology topics, the concept of aesthetic as it is known today has got physiological aspect from 18th century and is brought up when it is about talking perception process. In this regard aesthetic ideas of the thinkers and philosophers’ are going to be overviewed.

Plato

He believed that the superior type of art is the art of the Creator, who created the universe which is the imitation of unchanging Real Universe, and then nothing is beautiful but the fact (Nikola Boalo 1677) and the image of everything is the most faithful to its reality. In Plato’s opinion this reality is a shadow of the fact over the earth and anything perceptible by our sense cannot be beautiful by itself.

Aristotle

Beauty is real but polysemy in Aristotle opinion and its meaning is inferred from the nature of the beautiful object. He believes that work of art should indicate symmetry, harmony and pragmatism and make sensational aesthetic objective.
Middle ages

The main concern in middle ages was the theoretical relationship between the creator and the creation. Beauty is interpreted by a pioneer thinker of the era as: what pleases upon being seen. (Aquinas 1942) but later Immanuel Kant differentiated beauty from pleasant. Reviewing Aquinas view point based on the claim that beauty is perceived directly while “pleasant” needs a concept and it is evaluated by the ideal.

Modern

Psychological interpretations of beauty will be discussed since concerning multiplicity of thoughts of modern era thinkers [New Movement] it is not possible studying all of them in this research. Couou believes that beauty requires psychological understanding and under the influence of William James’s psychology Santayana classifies beauty into sense, form, and symbol. Normally beauty in form and symbol attract greater attention comparing to beauty in sense since it is highly subjective but form and symbol are perceptively conclusive. On the other hand the effect of visual elements on beauty is not ignorable as Bosch believes: “Aesthetic is based on understanding and application of the visual elements.”

Technology

Technology roots in Greekword Teknologia which means a systematic treatment and it is a part of the environment that was interpreted by its nature just as a description of the arts in the early 18th century, and construed as an empirical art in the middle of 19th century. However the philosophers have extended variant meaning of technology. Hart-Davidson defines it as a combination of products, cultural beliefs, and experiences and those contexts covering production which consist consuming, spreading and designing plus the products designed to create special cultural conditions. While according to Heidegger, technology is a type of tool and human activity is an instrumental and anthropological definition of it. But in Jaspers’ opinion technique is like a medium to reach an aim hence technology rises to utilize the technique.

The fruits of digital architecture

Nowadays the architectures have a tendency towards creating fluid and complicated computerized forms which are assessable by utilizing technologic developments in digital area. The concept of this modern architecture [digital] is a computer aided production in an empirical perspective. No doubt traditional methods could not fulfill the requirements of modern architecture since digital architecture needs new distinctive tools. Therefore” Digital architecture is known as making use of computer and technology to present geometric structure of complex spaces which is the result of the relation between architecture and computer.” Actually it means decomposition of a process to a set of separated components and recomposed them into models that can be processed by computer. In this way the design is under the control of manufacturing factors from the very beginning moment and consequently any movement, turn, curve, measuring or any other obstacle to manufacturing is removed to have an output that has the ability to be manufactured.

Parametric Architecture

Parametric or geometric shapes is a new branch of computer science aiming to discover and utilize logical and mathematical relations between numbers on the one hand and shapes on the other hand. By discovering such relations, language and grammar of the link between shapes and digital world is defined and represents liquid architecture under the influence of Marcos Novak ideas. This architecture should be shaped and formed conforming to the rules of surrounding environment. Actually parameterization is a new concept in architecture that provides the facility for designers to reach fluidity in all steps and all scales from the very primary sketches to
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manufacturing phase, from individual buildings to big urban composition. In this way the form will be shaped by itself according to the given data in a computer. Environment and the shapes are in fact outcome of initial standards which are created based on one or several specific standards that changing them will result in changing the final forms to fulfill the social demands by multi-techniques of designing [parametric]. This stream was called a modern architecture style named “Parametric Architecture” by Patrik Schumacher in 2008 Venice Biennale. That is a wave which has promoted diversity in construction industry and brought a new attitude towards architecture.

**Parametric Space Detection**

As it is known “Form is a physical realization of an internal concept “and since it is closely related to the shape “Form should be selected considering its theme conform to the design type”. In the history of architecture there has been such a conformity in created forms in two types of Generalist and Specialist. In generalist system there is a main rule determining the ties between the desired final product and its components while in specialist system some components make the desired final by repeatedly regulated appearance. It seems there is significant similarity between specialist approach and Parametric Space Detection in architecture. This approach utilizes mathematical formulas to control repetition of geometric shapes used to make the final surface. This method means “A procedure based on the solutions offered for the space related problems (multidimensional) with the help of changeable variables”. The aim of geometric shape grammar is indeed producing geometric shapes with whose help it would be possible to create forms and figures by computer that never existed before. Actually the user in this method only is engaged in formula building and it is the computer which creates the forms via those formulas. Parametric shapes grammar is the more developed type of shape grammar in whose formula building there are one or more numeric parameters that changing them results in variant output derived from unique formula. In other words with the aid of parametric design, it can be expected to see computer creativity and achieve forms beenneither in mind nor on paper formerly but have the capability to be used in variant elements of the architecture. Utilizing techniques based on parametric diversity in modeling allows the designer to design a system rather than a model then applying modern instruments and techniques provides the possibility to extract the specifications and quality of complex natural systems and insert them to the architecture design and projects. It is clear in the figure 1.

![Figure 1. Zaha Hadid Istanbul master plan (Kartalpendik) source: zaha-hadid.com.](image-url)
In the process of a parametric design the role of “Algorithm[s]” is important as the main performer in creating architecture space. Algorithm is a specific collection of predefined step by step instructions in a hierarchy which is able to carry out a series of operations. Algorithms are used in the computation, data process and logical decision making and as a result these algorithms make an operation to be carried out step by step and their capability to give written instructions and consequently clarify a common rule for an operation is the reason of their importance. But indeed algorithms convert the rule to the codes and specific programming languages and run in the computer, the high computing power of computer is benefitted to calculate complicated operations rapidly and correctly. Then it is possible to convert most of designing activities into instructions and use them as input of the computer as algorithms to have the process and get the final output which is design, form and volume algorithms. Considering capability of parametric architecture that is ruled orderly, a form can be changed into a forms family collection or moreover give a different formal specification to the space by changing measurement of a parameter with the aid of algorithms. The volumes and smooth forms and liquid lines are main characteristics of this type of architecture.

Analysis

Due to the development of design and product modern technologies and applying digital products in space design increasingly, a lot of questions may be raised; do the new form and shape have the capability to strengthen the tie between man and his surrounding environment?, Is it possible for the users communicate with such reshaped spaces? And can the aesthetic implications inspire the users through these spaces?

Since change of form in interior spaces which is considered in this research greatly helps to answer the above questions, it would be studied out of other effective elements on the environment as the form [or shape] is the architecture expression and the clear and sensual aspect of an object. Norberg-Schulz takes “The form” as the objective of aesthetic. Forms created under the influence of this method may look complicated at first sight but at the same time their ability to be combined with familiar [geometric] patterns of any part of cultural geography of the world make them comprehensive [like: Islamic knots in Islam world geography] and for the same reason they are regarded to be beautiful and their train of thought belonging to a culture is transmitted to the users just by looking at them and because of the familiar patterns they are combined to. According to Bolzano anything conveys its train of thought to the spectator just by being looked is beautiful. In this way the familiar patterns being shaped over time often receive priority since as Freud believed the stream of consciousness arises from the unconscious and according to Jung, the unconscious Freud mentions has signs of past [forms] and therefore it is perceptible and since it is derived from the stream of consciousness it breaks the time and provides a medium to reach fluidity, a nowhereness . In spite of conflicting ideas about this subject it seems the real beauty is often got from learning perception processes and describing the truth usually happens when the mind agrees its subject or in other words consensus of thought and reality. Then the reality is a mind product which is lead wisely and therefore it is the fruit of scientific processes. Consequently it should be representative of science and be linked to science and its relative current technologic development. Nevertheless only relying on the technology is not possible since Robert Venturi believes: The architecture is not just the utilization of techniques and technology. For more details and re Martin Heidegger: man in the age of technology can treat technology wisely and correctly. In his opinion this will be happen if man has recourse to noble ideas which gives the environment an identity and is derived from the familiar patterns that are related to historical motifs. As Michel Foucault admitted, identities and the structure are connected to special historical circumstances and this sense of specialty can be resulted from a noble idea. Therefore the historical motifs are the ties between current age and the noble ideas.
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which get the chance to reappear following development of parametric computer technology and its frequent patterns[ like: Islamic knots]. It is good to mention that the users [actors] of the spaces designed in this way are attracted to the environment and a strong link is built between them and their surroundings. This link results in new identity based on new values. It is clear that the everyday user of this environment automatically receives its new values up to the point these values come part of his identity. This can be the correct treatment along with understanding technology in architecture sought by Martin Heidegger. However there is no single sight of it in current interior designs but rarely in some decorative elements atbest the collage while there should be much greater utilization. This approach should modify spaces and performances and relying potential liquidity, challenge themonotony of existing interior spaces, dynamically combine visual elements of space to other elements interactively and re Graham Allen have the most stimulation and the least discomfort. It is totally far from symbolic beauty that is related to recalling significances and pleasurably of the environment. Jon Langin his book “The Role of the Behavioral Sciences in Environmental Design” says: the beauty of form is a pleasure which is derived from interpretations based on sight, hearing, smell and touch received from the environment and aims to differentiate learning the structure form being pleased by it. Plato on the other hand believed that the pleasure inside all of us should be guided towards philosophical life. According to this attitude if we benefit parametric architecture quality and create spaces which are glorifications of the philosophical mode of aesthetic through combination of light and fluid forms of surrounding material world, the users of such spaces in their everyday interaction with the environment and by the minimum visual perception knowledge, will realize substantive values of new space. But” In fact the attempt to make aesthetic closer to architecture like growing closer to other ethical or social principles often reaches at an impasse. (RomaldoGiurgola 1982).

In spite of all impasses the parametric style is capable of using aesthetic values derived from western thinkers’ ideas to conform to the needs as variant parameters. However for further retaliation of the research subject and find the answer to: Is the man as a user able to conform to such intensive changes? Or are these spaces basically comfort with the aesthetic values of European thinkers’ ideas? Or do the applied changes can lead to learn hidden concept of the environment?

To find the answers and learn about the impact of the new potential environment [space], a questionnaire was prepared presenting 8 propositions comprising the effective attributes on the environment derived from aesthetic concepts. Following complete primary explanation of digital space, its impact and other relative items, the participants were asked to express their viewpoint by selecting one number out of 5 continuums based on their previous knowledge and recent realization of the subject. The result is arranged in table 1.

Table 1. The mean and standard deviation of propositions in either of them (Source: The writer.)

<table>
<thead>
<tr>
<th>Variable</th>
<th>The mean</th>
<th>Standard derivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluidity</td>
<td>4/33</td>
<td>0/71</td>
</tr>
<tr>
<td>Coordination and Amenity</td>
<td>4/50</td>
<td>0/68</td>
</tr>
<tr>
<td>Undetermined</td>
<td>4/30</td>
<td>0/74</td>
</tr>
<tr>
<td>Sense of Tranquility</td>
<td>4/03</td>
<td>0/61</td>
</tr>
<tr>
<td>Pleasurably</td>
<td>4/36</td>
<td>0/61</td>
</tr>
<tr>
<td>Visual Attractiveness</td>
<td>4/76</td>
<td>0/43</td>
</tr>
<tr>
<td>Certainty</td>
<td>4/76</td>
<td>0/81</td>
</tr>
<tr>
<td>Beauty in Form</td>
<td>4/73</td>
<td>0/44</td>
</tr>
<tr>
<td>Total Score</td>
<td>34/90</td>
<td>1/91</td>
</tr>
</tbody>
</table>

The participants could evaluate each of 8 propositions by scoring 1 to 5. Number 1 indicates less and number 5 the maximum compatibility to the proposition. Moreover the total score could be
swinging between 8 and 40. As it is shown in the table 1 the given scores to all propositions except Certainty is 4 or higher and the total score is 34/90 that is very close to the maximum. Furthermore the table 2 shows the frequency and the percentage of answering to each proposition. As it is clear the participants mostly have scored on all the aspects ranging 4 to 5. It shows the maximum conformity.

Table 2. Frequency and Percentage of answering to each proposition (Source: The writer).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Score 1</th>
<th>Score 2</th>
<th>Score 3</th>
<th>Score 4</th>
<th>Score 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluidity</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>13/3</td>
</tr>
<tr>
<td>Coordination and Amenity</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>10/0</td>
</tr>
<tr>
<td>Undetermined</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>16/7</td>
</tr>
<tr>
<td>Sense of Tranquility</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>16/7</td>
</tr>
<tr>
<td>Pleasurably</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>6/7</td>
</tr>
<tr>
<td>Visual Attractiveness</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0/2</td>
</tr>
<tr>
<td>Certainty</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3/3</td>
<td>9</td>
</tr>
<tr>
<td>Beauty in Form</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>8/6/7</td>
</tr>
<tr>
<td>Total Score</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0/41</td>
<td>28</td>
</tr>
</tbody>
</table>

High conformity means that aesthetic values which were raised from European thinkers‘ ideas will conform to the space need, the environmental usage and man’s expectations of his surroundings. Naturally adaptable man will be able to conform to new space since “[human being] lives the life just by conformity to living environment” (Fry 1961). This set of conformities between man and his surrounding over time will result learning aesthetic values hidden in the new environment.

CONCLUSION

If the living environment conforms to the general frame of aesthetic ideas of European thinkers as analyzed earlier and is structured by parametric forms, the natural result would be a liquid space comprising the familiar patterns, a display of the bond between past [tradition] and technology through non-liner forms of fluid reasoning derived from modern age developments which is completely adequate for the variant tastes of the users when it interacts with the man actively. Such a space would be in conflict with static modernism. Consequently the ideas of European thinkers on aesthetic would shape the visual elements of these spaces [interior] and following such changes accounting for human purposes including the beauty would be qualified since the changes are sourced from celebrated ideas and the facilities of current age. Naturally the man is influenced by the changes when he steps such new spaces and by learning the space he would be able to perceive aesthetic values which are based on parametric forms. Therefore change of living environment by creating digital interior spaces results both in a new experience of man and environment adjustment, and learning aesthetic values. The environment is a model for the man and he tries to learn form and what he learns may lead to change of behavior. It seems when it occurs overtime permanent change will happen.

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