

Study of Human Behaviour Towards Various Architectural Geometrical Space

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Abstract: Throughout the history the link between geometry and architecture has been strong. The architectural space is based on the geometrical space conception. These space concepts were developed and change in course of time. In this context the current study aim is to develop the relationship between the geometrical space, historical and philosophical background of the geometrical space. Also show the connection between the geometry and the human emotions and their behavior. While the research study will show the importance of geometrical space in architectural design concept and how it effects emotionally to the users.

Keywords: architectural geometrical space, human emotions and behavior

1. Introduction

When one thinks of geometry, firstly the lines, square, rectangle, circles and other form images come to mind. Geometry largely form, shape and with a measurement and it is a part of mathematics where Visual Thoughts is dominant. Since visual thought is a dominant part of architectural design, geometry is also an important part of architecture. As a subject geometry is more belong to Mathematics where over a thousand year ago Euclidean geometry was considered to be an only geometry that can be apply in reality. During 19th it was realized that there Were other geometrical forms that can be applied in reality. Geometry was always been the important tool that allow to choose spatial shapes which are suitable. May be it would be more clear to say that good architecture has always reflected understanding of geometry.

To improve the established surroundings architects continuously make an effort to create a positive built up space. now-a-days many advance technologies in architectural design help the architects to examine the users and easily finds out which criteria affect them more. These criteria related to the environmental aspects such as temperature, light, and color (Hensen and Lamberts 2011). (Kimberly Elam) express "architecture has some of the strongest educational ties to geometric organization because of the necessity for order and efficiency in construction, and the desire to create to aesthetically pleasing structures". It mean that the architecture has a strong relationship with a geometry. Asthetic value is one of the connection between architecture and geometry. Asthetic value is one of the geometry element in which architectural works. in fact to create more asthetic value , then the

architectural work should follow the geometry principles .

Understanding how people behave in an architectural space does not explain why they behave as they do. Though it is possible that personality traits affect our perception of the environment. (Ibrahim, Abu -Obeid 2002) Many research paper shows that the different spaces evoke different emotions. Many research field try to explain the connection between space geometry and human emotions. This may help the architects to create more pleasant environment.

The paper begins with a literature review in which it discusses with the common evolution of geometry and architecture from the geodetic point of view and also the space perception and human emotions and its responses. The second part of the paper present a small experiment in which we intended to study the connection space geometry and the participant's emotional responses by using wireless device and also with an eye tracker.

A. Literature review

1) Evolution of geometry and architecture

It is the geometry which manages the architectural choices, but at sometimes it is architectural innovation which make possible to create new idea of geometries. the main three type of geometry which are used in architectural design are:

- Euclidean geometry
- projective geometry
- non – Euclidean geometry

The architectural period is connected to all type of geometry.

2) Space perception and human emotions

Many research field is very understanding from its own perspective and collaborate to understand how human perceive different spaces and how the geometry of spaces affects their feelings. Neuroscience and the cognitive physiology also tries to focus towards a connection between shapes of object and feelings. the choices of object have an impact on many factors like exposures, familiarity, symmetry, contrast, complexity and high fluency.

3) Perception and responses to space

In this section, many methods used in science literature may help to recognize the range of emotions a person experiences in a given state. Physiological parameters and measurements such as heart rate, blood pressure, can serve an indication for some

human experiences. Variation in body due to physiological effects can be experienced by different basic emotions such as: surprise, fear, anger, pleasure that can be considered by changes in blood pressure and finger temperature (Collet et al. 1997). Stress can also be examined by measuring the heart rate.

In the context of environmental design practice and research for measuring the affective response many methods involving imaging have been used in the last decade. (Chalou and Ostwald 2010) examined the potential of employing machine learning in anthropocentric biocybernetic computing for reflecting the responses of the human emotional system by using a database of facial expressions.

B. Experiment description

1) The setting

The experiment was conducted in a visualization laboratory, which contains a 3D immersive theatre consisting of a 2.4 × 7.0m screen with a 75° field of view, and three high definition projection and motion sensors, participants experienced an inner virtual space, characterized by different forms.

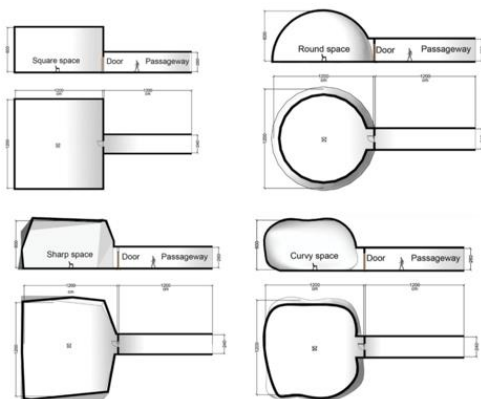
The research compared the reaction of some experts (design field) and some non-expert (from other fields) to various virtual architectural spaces. The experiment offers four basic types of spaces, which were designed to be colourless (monochromatic), soundless and free of objects (provide a single chair).

2) The set up

The setup consisted of four types of spaces: square symmetrical space, round – domed space symmetrical, sharp – edge space, tilted surface asymmetrical and curvy - shaped space with rounded smooth surfaces asymmetrical. All spaces were designed to be approximately the same size. a floor of 12×12 m and a ceiling over the height of 6–8m.

3) The process

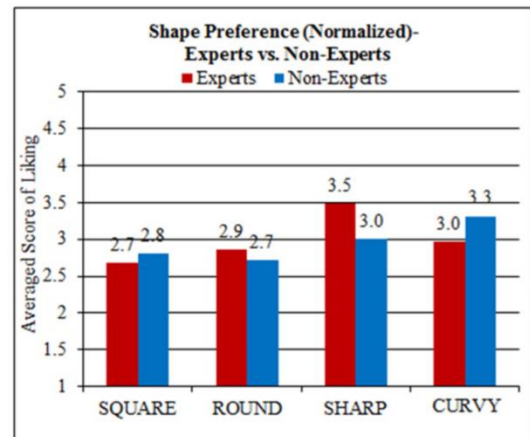
Before the experiment started, participants were replicated with 3D Goggles and with a joystick in a neutral environment so that participant’s minds were set and easily could participate. The experiment start, the examinee enters the one of the room with the help of joystick through the corridor towards a chair after entering the room, explore the space and leave the room with the same door. The order of spaces randomly.



2. Result

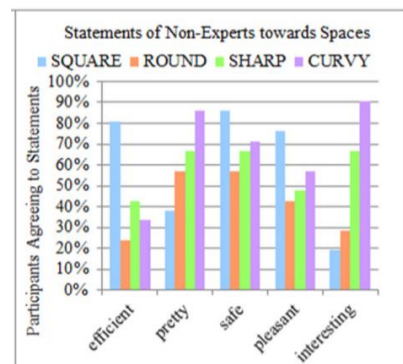
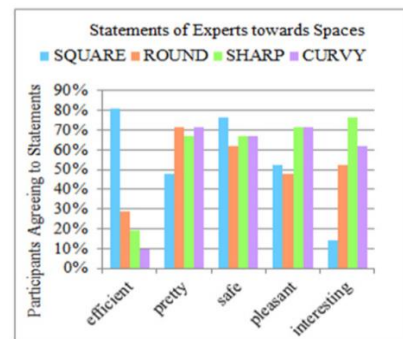
A. Preferences of spaces

By the experiment it is noted that both experts and non – expert’s groups preferred asymmetric spaces than the symmetric space. By the data it also shows that the experts have tendency to prefer more sharp spaces and the non – experts have more tendency to prefer curvy spaces.



B. Thoughts and feelings towards space

The non – experts group felt more enjoyable in space that are more familiar to space. They show a great interest towards space. They also found this space is much prettier than the other spaces. It seems that the experts group shows more interesting and pretty to the round space than to the group non – experts.



3. Conclusion

Indeed, there is a great distance between mapping the connection between emotions in relation to architectural space geometry and understanding human reaction to the spatial complexity of architecture. The latter consists of many other physical, cultural and personal aspects. Nonetheless, finding ways to improve our understanding of even the most fundamental human emotional responses towards architectural space could help designers adapt their proposals to human needs, and thus contribute to creating better environments.

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