

The Role of Behavioral Sciences in Environmental Design: An Emphasis on the Need for Collaboration between Psychologists and Architects.

Faezeh TavasoliAra¹ and Saeedeh Bashiri²

¹ Faculty member in Department of Architecture, College of Art and Architecture, Hamedan Branch, Islamic Azad University, Hamedan, Iran,

² Master of Architecture, Department of Architecture, College of Art and Architecture, Hamedan Branch, Islamic Azad University, Hamedan, Iran

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ABSTRACT

Today, the population growth, uncontrolled increase in urbanization, lack of space and human forced exposure to a minimum space, and thus creating crowded spaces along with the loss of natural space has caused stresses which is due to excessive contact between individuals. This emphasizes on the need to expand researches on the concepts of personal space, private zone, crowding, social exclusion and their relationship with the built environment. Since exciting and stimulating qualities of the environment are important determinants of human behavior, this paper examines the role of behavioral sciences in artificial environment and it also discusses the role of architects in the psychological space design and formation of appropriate and inappropriate behavioral patterns by them. The results show that architects have to rely on the instructions of environmental psychology and the relationship between object and subject in architecture and seek for a better understanding of these concepts. Consequently, they provide practical research in the built environment and have a great impact on the reduction of negative emotional reactions and thus reduce environmental stress factors. It is hoped that the relationship between architecture and psychology in the field of behavioral sciences and the strong emphasis on psychological issues that rely on mechanical strengths and physical comfort, behavioral ecology and spatial behavior would also play an important role in the mental health of people of the society in Iran.

KEYWORDS: behavior, behavioral sciences, architecture, psychology, environmental psychology.

1. INTRODUCTION

Behavioral Sciences is a generic term that includes anthropology, sociology and psychology and even sometimes politics and economics. In this paper, the study of environmental psychology and the role of behavioral sciences in this field which includes the theory of perception, cognition, social psychology, anthropology, the study of social relations, and cultural studies are discussed under headings such as environmental psychology and environment-human relationships.

Carl Jung, the contemporary Swiss psychologist states in regard to the behavioral system: "People are as much a product of the physical environment as that of the social environment" Winston Churchill, Britain's former prime minister also said: "We shape our buildings, and afterwards our buildings shape us." Nowadays, it is quite a necessity to use the behavioral sciences and environmental psychology findings in the field of architecture. Theoretical knowledge in the field of architecture has always been in need of some frameworks in order to make possible the theory development, criteria preparation and review of architecture product and process. Behavioral sciences is one of the disciplines that can provide the framework and theoretical background for architecture.

Generally, using the behavioral sciences in the process of architectural design increases the quality of the final product. The interaction between the physical environment and health has been of interest to epidemiologists. However, until recently, psychologists have tended to define the role of environment in the determination of behavior [1].

Social psychologists discuss the personal space as an invisible bubble which is in the immediate space around one's body and study its impact on individual behavior. Moreover, psychologists refer to the private zone, crowded space and its importance in different cultures and places; and how people control their private zone by regulators such as personal space, spatial territory, verbal mechanisms and aids. They also refer to the functions of having or not having a private zone and finally the psychological and physiological effects of these concepts on the behavior of an individual. Naturally, knowledge and understanding of these concepts will be of vital importance to the environmental designers.

2. LITERATURE REVIEW

Larson (1975), undertook a review of over 902 articles published in journals of psychology from 1972 to 1974 and reported that 76% of researches were conducted in the psychology laboratories, and only 8% were conducted in natural environments. In recent decades, a shift towards ecological approaches have been made to justify the behavior [2].

* **Corresponding Author:** Faezeh Tavasoli Ara, Faculty member in Department of Architecture, College of Art and Architecture, Hamedan Branch, Islamic Azad University, Hamedan, Iran, : Faezeh.Tavassoli@gmail.com

Ecological psychology or simply environmental psychology, is defined as the study of human behavior in its physical environment. This definition studies a wide range of topics, such as crowding, noise, heat, pollution and the relationship between the building design and its impact on the mental health [3].

Gifford (1980), used the ERI questionnaire (which was the first successful attempt of *George McKechnie* (1974) to make a multi-dimensional personality inventory. It was especially designed to describe methods through which individuals' characteristics effect on their relationship with their physical environment) and tried to show how people evaluate the building interior. Accordingly, he examined the interactions between the individual and his physical environment [4].

3. Environmental Psychology

Environmental psychology is the psychological study of behavior in the physical environment of everyday life (Craig 1970, Srivastava 1971). Traditional psychological studies were focused on the individual or intra-psyche environmental phenomena and analyzed the behavior with regard to the relationship between individuals or individual's internal states (Friedman and Juhasz1974). Cases in which psychological studies go beyond previous models that included the study of perception in the physical environment at the molecular and small scale of human behavior, and instead study the environment at more general scales (such as Gestalt psychology) have been used by designers with all their pros and cons [5].

Environmental psychology is the study of complex relationships between people and their environment. According to Gifford, environmental psychology is different from the main branch of psychology, because it deals with the everyday physical environment. This science provides a framework of views, researches and assumptions that can help us with a better understanding of the interrelationship between human and environment, help. Using this knowledge, assessments could be made before designing and constructing and this is considered to be the best tool for professional designers [6].

One of the definitions of environmental psychology is assessing the built space i.e. whether or not the space satisfies the designer's goals. In environmental psychology⁷, the human reaction to the environment and human reactions to the environment is studied. Psychology is the application environment to help the architect to design it in mind to be realized. The psychology of the 50s, 60s, and 70s by the architects took into consideration [7].

4. The relationship between human behavior and the environment

Mental health means the possibility of harmonious exchange between the human and the environment and his ability to play social and cultural roles that require attention to human needs and all aspects of his existence. So, the process of human activity in the environment is called "behavior". Behavior is the consequence of needs and purposeful activities for meeting those needs, capability of the environment and the individual's worldview which is resulted from his perception and how each situation makes sense for him.

The phenomenal environment refers to the real world and a part of the environment to which an individual shows sensitivity is called behavioral environment. Therefore, the behavioral environment consists of facts which are perceived selectively and are subject to reactions by humans [8].

In regard to human behaviors, individuals can be forced to show certain behavior. But surely such ways for making behavioral changes will not be useful. Instead, they will result in mental reactions such as separation from the environment or external reactions such as changes in the environment. This is due to the fact that individuals always try to use their own methods until they are justified not to and if they are forced to do an action, they will become aggressive [9].

It is obvious that the lack of response to the expectations, as individuals' view of their places which will be the basis for their behavior and assessment, will distort their behaviors and views. The reason is that an individual always has to accept much heterogeneity so that he could adapt himself to the environment and during this process of adaptation, he has to change his ideas or behaviors. The constant imposition by this adaptation will result in nothing but confusion of thoughts about places. Indeed, it can be declared that any reaction to the cognition dissonance by individuals (indifference, changes in behavior, and changes in the environment) will result in the reduction of environmental awareness and confusion of mental patterns.

On the one hand, all these factors may lead to the formation of strange and weird behavioral patterns. Because when people are constantly forced to change their behavior, then behaviors separate from their forms.

On the other hand, however, in case of cognitive dissonance, individuals make changes in the environment which leads to its transformation. Finally, these transformed places determine individuals' understanding and knowledge of the environment and the obtained result would be the reduction in environmental awareness. We often criticize individuals' wants, their tastes in house views, and etc. and we are even surprised by them. Today, these wants that we interpret as different tastes in different individuals or more honestly tastelessness are the result of confusion of conceptual patterns and environmental knowledge. If individuals' minds do not match with any external reality and normal behaviors are not expressed, not only do they change, but also people will lose their perception of space and behavior within it [10].

If individuals lose their perception of the environment and the criterion for judging it, architecture will not have any achievements. The reason is that architecture is a direct response to expectations that have altered due to the loss of space perception and declined to a low level.

Symbolic data: During the process of socialization, human learns specific behavioral patterns in addition to other acquisitions on how to use some spaces and respond to symbolic meanings of environmental stimuli. Thus, human gives

meaning to some spaces, stimuli, and events in relation with cultural values of his environment and behaves based on them [11]. Behaviors, as the process of doing any activity, have the following common features:

1. Perceptibility of behavior
2. Behavior evaluation
3. Individual or collective behavior
4. Predictability of behavior
5. Changeability of behavior
6. Dependence of behavior to the psychological space.

4.1. Private zone

According to psychologists, the private zone is interpreted as a process in which an individual or others observe a changeable boundary. In this process, sometimes the individual or group want to remain separate and at times, they tend to be in connection with others. In other words, "private zone" is a dialectical process in which there are both groups, namely, those inclined to connecting to others, and those inclined to being separated from others. But each is dominant in a specific period of time. As a result, it can be stated that being alone for numerous times and for a long time (isolation) and/or constant spending of too much time with others (crowding), are both considered as undesirable conditions.

The general principle is that attempts should be made to design flexible environments which allows easy conversion between "isolated position" and "togetherness". Thereupon, architects must offer an environment to people which can respond to their changing tendencies in regard to being connected to others or in isolation. For example, a door shape in a space is a simple example of environmental design elements which is flexible and makes possible the regulation of reciprocal social interactions. Its openness signifies the desire for social communication and its closeness is the indicator of individual's specified territory or zone in the space.

4.2. Privacy:

Concepts of privacy, personal space and territory are closely related to each other. There is a common feature among definitions of privacy. The main point of this definition is the ability to control individuals or groups on the visual, auditory and olfactory interactions with others. Rapoport (1977) defined privacy as the ability to control of social interactions, choice right, and the possibility of individual's desired social interaction. Privacy should not lead to separation from the gathering and the tendency for isolation. Westin states: Privacy provides autonomy; releases emotions; helps self-evaluation; and limits communications and protect it. Thus, privacy is important in terms of the relationship between the individual, group, and the rest of society [12].

4.3. Crowding:

Crowding causes stress due to restricting the autonomy and self-expression and hinders the desired communication. Crowding is accompanied with feelings of lack of control over the environment and is influenced by the individual's perception of the degree of control that people have over their inconvenience. Crowding leads to negative behaviors due to its direct relationship with the social pressure. Behavioral places should not be too crowded and the number of people must be in accordance with the current pattern of behavior. People must have their enough personal space and desired territory control [5].

4.4. Personal space:

The concept of personal space is closely related to Edward Hall's study on the interaction distance. In most cases, entering an individual's personal space would be an unpleasant and stressful experience. People will notice their behavior change when they do not want to invade the personal space of others. So, they behave in way that will not damage the personal space of others [13].

The place a person selects to stand or sit in public places like elevators, libraries, parks and restaurants is often affected by an effort to maximize the distance between himself and the people who are using these environments [14].

5. Psychological space and mind processing of environment

There is not a direct relationship between human and the environment. Human uses a filter called psychological space between himself and the outer space. Therefore, any experience which begins with perception is dependent to the psychological space. Knowledge and social beliefs and systems, past experiences etc. are the context for the present and future experiences. Therefore, our experiences have always been influenced by our subjective findings. Since human is not a mechanical being, when dealing with environmental information, not only selects the information, but also processes them. Data processing operations are performed in mind, so mind and senses are complementary. Sensory receptors only receive the environmental information and transmit them to human, i.e. they are as his link to the outside facts. However, they are not able to analyze. Along with them (senses), the mind is known as a faculty which prepares the individual for acquisition. Mind, orders the received data according to the rules mainly in order to make possible the perception among the vast amount of information. However, all the information received from the past to the present such as individual and group experiences and memories, etc. assist the mind. Thus, human relates the form and function not only to the same identity, but rather to a world of meanings and experiences. Linking of an identity to the contents of human mind gives a particular meaning to that identity and the individual acquires a special feeling toward it. Establishing this emotional connection, identity finds its place in the human mind and turns to something rather than just a collection of selected information from the environment [15].

Carl Gustav Jung, the Swiss psychologist, presented a classification of two categories, "extrovert" and "introvert" which has become a part of human everyday conversations. The "extrovert" person lives based on external needs and the "introverted" person relies on his inner and mental values.

Two dimensions must be considered in order to determine if an individual is "introvert" or "extrovert":

- (A) The effect of environment on the individual

(B) Individual's impact on the environment.

According to Jung's theories, a small portion of the population are in both dimensions (introvert or extrovert).

Theories in the field of psychology can be adjusted over a reciprocal range in terms of behavioral stimuli. On the one side, there are the theories of radical thinkers who believe that the needs and stimuli of human behavior stem from his inside. They usually emphasize on the force of human nature on instincts and do not consider as important the effect of environment as group factors. At the other side, human is considered as an object. These theories discuss a completely passive human is discussed who is the result of environmental conditions (environmental determinism). In psychology, the environment is discussed in the impact of environmental conditions in the development, strengthening and weakening of some needs and the emphasis is on the role of environmental data in satisfying the needs of others [16].

6. Stressful environments

Stress is a psychological and physiological reaction. It occurs when a person feels that he is in a threatening situation and condition. Stress is often experienced as a feeling of anxiety. When a person feels endangered and threatened, his sympathetic nervous system prepared him to deal with it or to escape from danger. At the same time, some particular physiological reactions such as palpitations, sweating, anxiety, and increased secretion of adrenaline and other chemicals occur within him.

Implicitly, environment can be defined as everything around us, whether made or natural. Architects define environment as buildings, open spaces, and landscape.

Environmental stress factor is a physical environment element which creates a negative emotional response due to its being threatening. Environment stress factors are the factors that lead to the loss of an individual's abilities in the long-term through creating stress in him [17].

Environmental stress factors have more specific and analyzed aspects than do stressful environments. Factors that make the environment seem stressful to human are listed in two categories:

1. Factors that are almost similar among all individuals.
2. The factors that vary among individuals: these are the result of differences in human character.

Feeling stress in an environment depends a lot on individual's perception of the environment. In summary, perception can be viewed as a process through which an individual receives the information from the environment by his senses. Then, he analyzes and evaluates them by the brain. Three effective factors on the perception play an important role: (A) human's state of mind at the time and the conditions of the environment at the time of perception. (B) Personal mood which has been shaped and made of individual's all the past experiences and events. (C) Hereditary factors and social-psychological context i.e. factors that have not arisen neither from learning nor from the experience. These differences among individuals cause that they have different experiences of the perception of a space. Environmental perception may be different from each other [3].

Experiments have shown that if human lives in a state of absolute ignorance of the environment; or the information received by the individual from the environment is so little that he would not be able to expand his knowledge of the environment; or on the other hand, if the received information are too much that he cannot analyze them, then he will suffer from unfavorable mental states. Any visual stimulus tends to be seen in a way that its structure seems simple to the mind.

7. Psychological needs in architecture

The term "psychological needs" is not so much used in architecture. But Louis Kahn, in the book "conversations with students," uses largely the space feature, as the two types of space, "space in general" and "architectural space". He suggests that anyone can design a space or a combination of spaces. But only an architect can design an architectural space. He means that anyone can design a building, only if he considers its need. The architectural space, in addition to meeting the physical requirements, fulfills its psychological requirements. A building which is designed only based on the psychological needs as the unique design criterion [18]. As Robert Sommer, the contemporary American psychologist states, the personal space bubble is a basic unit in architectural design and this may be an interesting and useful concept for architectures so that they can have an image of reciprocal interactions in the space in their mind. But it is not a means that they could follow.

8. The psychological effects of colors and shapes on humans

Colours have great effects on our mind and soul which cause various reactions in human and emergence of different behaviors in the built environment. These effects are sometimes rooted in our relationship with the colors found in the nature and are sometimes rooted in our past and culture [19].

Some effects of primary and secondary colors which are almost the same among all people of every culture and previous background, are as follows:

Yellow: A symbol of knowledge, human perception, spiritual brightness and divine light.

Red: The ultimate glow and internal energy, a symbol of life, passion and power.

Blue: A symbol of peace and tolerance, introversion, great depth and respect.

Green: Promising eternal renewal of nature, representing knowledge, spiritual faith, and eternal life, sign of resurrection and spiritual ascent to heaven.

Orange: Color of maturity and youthfulness, happiness, excitement and liveliness.

Purple: A mysterious and confusing color, passionate and thought provoking.

But more important than knowing the effects of each color separately, is knowing the impact they have on humans when they are placed next to each other. For example, orange heat reaches its peak beside blue. It should also be considered that how the effects of each color change in case of getting darker and lighter (in combination with black and white). For example, when purple gets darker, it becomes fearful, illusive and dreadful [20].

Like colors, forms and shapes can have enormous effects on the human mind and soul. For example:

Square: Of weight and strength, illustrating clarity and assertiveness (matching with the red color).

Triangle: Symbol of light and reflection and transformability (matching with the yellow color).

Circle: Of an infinite and eternal motion, cause of peace and symbol of soul and spiritual aspects which represents thought depth and stability (matching with the blue color).

9. Mental metaphors in architecture

There is a metaphorical relationship between the architecture of a building and the human mind or soul. This is the same relationship which exists between brain activity in the human brain and his physical construction. It mean that there is a significant and metaphorical relationship between the construction of buildings and our mental and physical construction. These relationships strengthen through our brain's emotional-sensational device [21]. Thus, our outdoor living space is closely associated with the inner space of the mind. There is no doubt that human outdoor living space is made of architectural spaces of city, neighborhood, home, and other available places more than anything else. Therefore, architecture has a deep and meaningful relationship with our mind construction. and they are in interaction with each other.

10. Conclusion

Considering that the fundamental purpose of behavioral sciences is to develop positive theories, it is clear that these sciences have an important role in the development of theoretical foundations of design in various ways. If the position of behavioral sciences in architecture be considered as a model for professional architects, it will lead to the success of the design. Each of environmental factors such as height, light, color, noise, etc. have a strong and predictable effects on human behavior and emotions. Thus, mood states and emotions that people experience is largely the product of this environment. Mood states and consequently the human behavior are influenced by the physiological arousal and emotional readiness.

If architects use the help of environmental psychologists and direct their design towards creating environments that meet human needs, then the built environment can satisfy aspects of human needs such as survival, safety, belonging, esteem, learning and beauty. Designer's cognitive impairment about human behavior toward the environment causes problems. For example, there are chairs in an environment that no one sit on them; or paths are designed that no one passes them.

Closer relationship between architects and environmental psychologists causes a significant decrease in the present tensions and the built environments are not only a better place for individuals living, but also they will last for a longer time.

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