Review Article

Analysing the Role of User Control over Environmental Conditions in Stress Reduction

Saeed Haghnia, Nadieh Imani

Interior Architecture Department, Tehran University of Art, Tehran, Iran

Email address: saeed_haghnia@yahoo.com (S. Haghnia)

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Abstract: Research Necessity: Satisfaction of users’ psychological needs should be one of the objectives of architectural design, and designers should consider users’ needs during the design process. Arising stress and over-stimulation is one of the negative and harmful consequences of presence of the user in the related place. Having control over environmental conditions when users are unable to eliminate undesirable factor can be effective on user's adjustment for creating a desirable conditions, according to Irwin Altman's privacy regulation model.

Methodology: By using library resources after a brief review of relevant concepts this paper describes how the control factor can effect on adjusting with environmental alongside with reviewing a case study.

Results: Eclectic model of theoretical perspectives presented by Paul Bell has been developed based on human’s receptors and Kahrizak supportive complex of Karaj (Iran) is studied by using outcomes of developed model.

Conclusion: Finally, some solutions to the problem of user control over the environment in architectural design are proposed and it is argued that an understanding of these methods is essential to producing effective designs, which will provide comfortable environmental conditions and leads to approach a successful architectural project.

Keywords: Privacy, Control, Environmental Conditions, Environmental Psychology

1. Introduction

It is hard to not consider environmental factors as a major influence on behaviour. If a designer ignores these effects during the design process the result will not be considered a success. In other words, during the architectural design process, it is essential to pay attention to psychological factors which may influence how the space is used. It follows from this, that cognitive factors which influence behaviour in a given space should be considered.

Man changes his environment on the basis of his needs, aims and is himself affected directly by the environment in which he lives. In designing architectural spaces, few are the cases, in which adequate attention is given to the psychological aspects related to the user of the space. Therefore, it seems a necessity to focus on the cognition and consideration of space.

The purpose of this article is to present an account of the relationship between users’ stress levels and having the means to control environmental conditions. Stress is conceptualized as a relationship between a person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering well-being in particular [1]; and control makes people feel more comfortable in a constructed environment. This article focuses on ‘personal space’ as an environmental variable. The concept of personal space is not unique to psychology; it also has roots in biology, anthropology and architecture [2].

2. Presentation of the Issue: the Definition of Environment

‘Environment’ is a complex, multi-dimensional concept. Spatial, social, cultural, physical, architectural, symbolic, geographical, historical and biological factors are among the significant environmental dimensions; research by ecological specialists and specialists in environmental psychology show noteworthy considerations of physical and also symbolic and biological dimensions [3]. This article has focused on architectural aspects of environments; and the term ‘environment’ in this specific article has been used to refer to
designed and constructed environments.

**Definition of personal space.**

There are several definitions of personal space, but according to Bell (2001), personal space is defined as a portable, invisible boundary surrounding us, into which others may not trespass. The concept of ‘territory’ is closely related to that of ‘personal space’ but is defined by Bell as “a relatively stationary area, often with visible boundaries, that regulates who will interact”.

If someone invades our personal space we experience arousal. Figures 1 and 2 show that this relationship is not limited to humans. Any observant person will have noticed that a wild animal will only allow a man or other potential enemy to approach to a given distance – termed ‘flight distance’ by Hediger - before it flees. According to Hall (1990) the size of personal space varies between individuals and is determined by several factors including 1) cultural and ethnic determinants 2) gender differences 3) age differences and 4) personality determinants. It needs to be added that personal distance is not same between different people with different cultures, but everyone needs the protective boundary.

![Source: Hall 1990.](image1)

**Figure 1.** People waiting for a bus.

![Source: Hall 1990.](image2)

**Figure 2.** Birds sunning themselves on a log.

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3. **Definition of Perception**

User perceives the environment mainly through the sensory apparatus, which can be roughly divided into two categories: 1) distance receptors, which are used to examine distant objects i.e. the eyes, the ears and the nose and 2) immediate receptors, which are used to examine the proximate world, the world of touch, the sensations we receive from the skin, membranes, and muscles [4].

Because our perceptions of the environment are derived from our sensory apparatus, they can also be divided into four types. 1) Auditory perception, which is based on information carried by the cochlear nerve. 2) Olfactory perception, which is based on chemical sensing of odours. Olfactory perception not only differentiates individuals but makes it possible to identify the emotional state of other organisms. An interesting experiment is described by Hall in ‘The Hidden Dimension’:

Bathing the other person in one's breath is a common practice in Arab countries. The American is taught not to breathe on people. He experiences difficulty when he is within olfactory range of another person with whom he is not on close terms, particularly in public settings. He finds the intensity and sensuality overwhelming and has trouble paying attention to what is being said and at the same time coping with his feelings. [4]

3) Thermal perception: it seems hard to imagine the skin as a major sense organ because information from other receptors, such as eyes and ears, plays such an important part in daily life, but it is. According to Hall (1990), humankind is well equipped to send and to receive messages about emotional state by means of changes in the skin temperature of various parts of the body. 4) Tactile perception: touch and visual spatial experiences are so interwoven that the two cannot be separated. The artist Braque distinguished between visual and tactile space thus, ‘tactile’ space separates the viewer from objects while ‘visual’ space separates objects from each other.

4. **Definition of Cognition**

‘Cognition’ should be defined carefully; although it is closely related to perception it is a slightly different concept. In psychology the term ‘cognition’ refers to the mental process of actively selecting and organising information, including sensory information. Cognitive processes thus give meaning to sensory data. In other words, cognition is the process during which experiences acquire meaning and man is thus enabled to understand the meaning of, and relations between various phenomena [5].

5. **Need for Privacy: Different Distances**

Personal space is a primary requirement for all living organisms – particularly humans – and without sufficient personal space individuals experience arousal [2]. Altman’s (1975) privacy regulation model posited that inadequate personal space would lead to attempts to shore up boundary control mechanisms in order to provide privacy. Invasion of
personal space is an example of a threatening environmental event and this possibility should be a critical consideration during the design process [6]. Table 1 describes several categories of interpersonal distance. Stress and arousal will occur if any of these is violated.

Table 1. Types of interpersonal relationship and the sensory qualities which characterise Hall’s spatial zones.

| Appropriate Relationships and Activities | Sensory Qualities |
|----------------------------------------|------------------|
| Intimate distance (0 to 1.5 feet)       | Intense awareness of sensory inputs (e.g. smell, radiant heat) from other person; touch overtones vocalisation as primary mode of communication. |
| Personal distance (1.5 to 4 feet)       | Less awareness of sensory inputs than at intimate distance; vision is normal and provides detailed feedback; verbal channels account for more communication than touch. |
| Social distance (4 to 12 feet)          | Sensory inputs are minimal; information provided by visual channels less detailed than at personal distance; normal voice level (audible at 20 feet) maintained; touch not possible. |
| Public distance (more than 12 feet)     | No sensory inputs; no detailed visual input; exaggerated non-verbal behaviours employed to supplement verbal communication, since subtle shades of meaning are lost at this distance. |

Source: Adapted from Bell 2001.

Personal space and individual differences: an example.

Edward Hall mentioned an experience in his book, which makes the effect of individual differences on the personal space clear. He was visited by a very distinguished and learned man, who had been for many years a top-ranking diplomat representing a foreign country. Hall said: as Dr. X talked, I became dimly aware that he was standing a little too close and that I was beginning to back up. By experimenting I was able to observe that as I moved away slightly, there was an associated shift in the pattern of interaction. He had more trouble expressing himself. If I shifted to where I felt comfortable (about twenty-one inches), he looked somewhat puzzled and hurt, almost as though he were saying: “Why is he acting that way? Here I am doing everything I can to talk to him in a friendly manner and he suddenly withdraws. Have I done anything wrong? Said something I should not?” Having ascertained that distance had a direct effect on his conversation, I stood my ground, letting him set the distance. [7]

6. Dialectical Concept of Privacy

According to Altman (1975), being able to have privacy is always good, but being in an isolated environment leads to depression. It is easy to imagine, for example, the situation in which an individual wants to be alone and undisturbed for a while. He or she may go to another room to read or play a computer game. Whilst being isolated from others is not a desirable situation, having no right to be alone is also sufficient to cause anxiety. In practice, as Figure 3 shows, the appropriate level of privacy varies over time, and involves periods of social contact and periods of solitude.

7. Eclectic Model of Theoretical Perspectives: How Does It Work

The eclectic model of theoretical perspectives (Figure 4) proposed by Paul A. Bell in his book ‘Environmental psychology’ provides an effective description of reactions to inappropriate processes, from the perceptual stage to the adaption/adjustment stage and possible after-effects.

Perception of the objective physical conditions depends on individual factors and attitudinal, perceptual, and cognitive processes. If the subjective perception is that the environment is within an optimal range of stimulation or is congruent with intended behaviour, the result is homeostasis, maintenance of the existing state. If however the environment is not perceived to be within the optimal range of stimulation, then one or more of the following psychological states results: arousal, stress or information overload, and coping strategies are engaged; Coping refers to a person's cognitive and behavioral efforts to manage (reduce, minimize, master, or tolerate) the internal and external demands of person-environment transactions that are appraised as taxing or exceeding that person's resources [1] If the coping strategies are successful, adaptation or adjustment occurs [2].

As Figure 3 indicates, if an attempt to cope with environmental stress is unsuccessful the arousal and stress will continue, possibly heightened by the individual’s awareness that his or strategies are failing. This cycle will recur many times during daily life.

The probability that an event will become stressful is determined by a number of factors, including the
characteristics of the event and the way it is appraised. The stress process will only begin if a stimulus is classed as threatening following cognitive appraisal.

**Figure 4. Eclectic model of theoretical perspectives.**

**Role of the designer.**

What is the designer’s role in management of stress? Figure 5 shows the role of the designer in the eclectic model of theoretical perspectives, which is based on sensory perception of the environment. If an individual’s primary perception of the environment is within the optimal range of stimulation, then the result is homeostasis; if not, stress, arousal and over-stimulation are possible outcomes. At this point the individual selects a coping strategy to deal with the threatening environmental event. If this attempt to deal with the event is unsuccessful, the arousal and stress will continue; however if the individual is able to control the environment – as we discuss below - the outcome will be adaptation or adjustment.

**Figure 5. Role of the designer according to the eclectic model of theoretical perspectives - Authors.**

Designing the environment is the designer’s first duty, what user perceives by sensory apparatus, but it is not the final perception. Final perceptions of an environment are influenced by individual, social, cultural and situational factors, so it is unrealistic to expect a designed environment to satisfy all the various people who will use it. It is therefore the designer’s responsibility to make sure that the user has control over aspects of the environment and is able to remedy the negative effects of environmental stressors (e.g. by turning off an annoying light). Namely, a sense of control is related to opportunities to modify or alter aspects of the environment [8].

There are three types of control:

1. Behavioural control, in which we have an available behavioural response that can change the threatening environmental event; 2. Cognitive control, in which we process information about the threat in such a way that we appraise it as less threatening or we understand it better (e.g. deciding that a contaminant in our water is not toxic); and 3. Decisional control, in which we have a choice among several options (e.g. choosing to live in a quiet rather than a noisy neighbourhood). [2]

During the design process the designer should focus on behavioural and decisional control mechanisms which can lead to adjustment. Cognitive control is an internal, individual-level process. The designer should enable users to control environmental conditions as this will make the project more successful.

Using nature during the design process can be mentioned as an effective way to supply the cognitive control for users, which leads to distract their attention in a positive way.
Simulated nature has been found to have stress-reducing effects similar to those of being in nature [9]. Positive distractions help people attend to stimuli other than their own discomfort and anxiety. Positive distractions include static stimuli such as reading material, photographs, and representational posters or paintings of nature. Active stimuli such as music, companion animals, and people laughing also have the potential to provide positive distraction [10].

8. Case Study: Control Over the Privacy: Kahrizak Supportive Complex of Karaj

“Kahrizak” is a supportive complex, which is located in the Karaj city of Iran, contains several supportive functions for elderly people. The “Flowers” (figure 6) is one of the well-equipped elderly’s residential buildings of Kahrizak complex and known as the V. I. P sector. Each two floors “Flowers” building contains ten similar units, five in each floor, and each unit has six dependent rooms for six users. This building also has a Café, hall and offices at the entrance of the first floor; and a hexagonal central patio, which is used for elderly’s gatherings.

Because of users’ individual differences and the dialectic concept of privacy, appropriate range of privacy is needed to be considered for the environment. This building successfully provides three level of privacy for users: 1) 1st level: elderlies have their own private rooms so they are able to choose this level of privacy when they feel they want to be alone. 2) 2nd level: separated shared spaces are designed for each unit’s users. Their function is supplying privacy, which is between the 1st and 3rd level; and helps users of each unit have their own small community. 3) 3rd level: the central patio, hall and café are designed to give elderlies an opportunity to choose communicating with other users in a larger scale; based on these three categories, users have the ability to choose their ideal level of privacy, what makes them feel comfort in the space and reduces their stress level.

9. Conclusion

The available research suggests that designers can influence users’ perceptions of a constructed environment. This means they should be aware of and try to satisfy all the fundamental human needs. In other word, a designer has the ability to make people in a constructed environment feel comfortable or experience stress and arousal. Designers should also know how to improve the quality of an environment. As a first step, designers should attempt to satisfy most of the users’ needs,
but they should also give users the ability to control their environmental conditions as this will reduce their stress levels. Since satisfying users’ needs can be mentioned as one of the most important keys for a successful project, designers should keep this fact in their mind during the design process.

Figure 8 shows a summary of considering the need for privacy during the design process, from the perception of environment to design solution, which is making users able to choose their ideal level of privacy in the designed space.

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