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Abstract

This paper describes a study of concepts of environmental psychology and their presence and representation in architectural designs. Architectural journals were used in the analysis of design iconography (drawings and photographs). Different architectural typologies were investigated to exemplify specific elements in relation to concepts of environmental psychology. The purpose of the study was to gain a better understanding of these concepts and their appropriate physical settings. Examples that represent the concept of personal space were emphasized. The understanding of psychological concepts in their architectural context is seen as essential in a quality design process. A number of design solutions were identified in the design iconography investigated. Specific examples were studied for application to Brazilian situations. The results showed that typical examples found in architectural publications do not easily exemplify psychological concepts and in Brazilian journals examples were few and less representative. Since journals influence both the professional and student design processes special efforts should be made to amplify architectural criticism with demonstrations of spaces “that work”.


Introduction

This paper presents a study on concepts of environmental psychology and its representation in architectural designs. Environmental psychology has increasingly been a subject of discussion in architectural studies. However, the concepts of territoriality, privacy, personal space and security, among the most influential environmental psychological factors in design, are often only discussed on a theoretical basis and their translation in to architectural configurations are not always correctly incorporated. The typical design process does not follow rules that guarantee the introduction of the rich knowledge coming from environmental psychology research. Therefore, studies relating behavioral and psychological concepts to design decisions are still very much in need. Such investigations should primarily point out spatial configurations that provide the proper behavioral settings, or create what may be termed “spaces that work”.

To avoid excessive subjectivity in design activities research has looked at the creative process in architecture. Design methods have been devised to add structure to the decision-making process and their goal has been to produce design solutions with a higher response to user desires and necessities. Studies show that in architecture the creative process does not follow rigid rules and problems in design are considered “wicked” (DÜLGEROGLU, 1999; JUTLA, 1996). Due to the inherent complexity of the process, most designers give preference to individual and informal approaches, based on trial and error (KOWALTOWSKI & LABAKI,
Data is not always readily available for decisions to be made with justifications. Due to their informal ways of procedure and lack of protocol, design methods cannot be considered scientific. They cannot be shared or repeated and intuition is considered an important part of the process (LANG, 1987).

Admitting the presence of uncertainty in the design decision-making process, many architects have advocated a participative process. When a lack of information is apparent the inclusion of a variety of opinions can stimulate the creation of new ideas (SANOFF, 1991). Research data coming from Building Performance Assessments (BPA) or Post-Occupation Evaluations (POE) should be made available and social, cultural and psychological concepts have entered the discussions of design projects in a more systematic way. Checklists have been devised as important tools to avoid erroneous design solutions. In some cases checklists are transformed into codes and regulations. As well, a detailed architectural program is today seen as an essential design document to share concepts and include measurable indicators that may be used in design evaluations.

On the other hand, architectural journals, used as a major source of design inspiration in the creative process and especially architectural students, are devoid of building performance assessment data. Although design knowledge has been accumulated over the years, the diverse, complex and multidisciplinary aspects of design factors are still mostly absent in typical design criticism found in such journals. Architectural critiques are not always in line with user opinions, perceptions and reactions. This makes the study of appropriate settings difficult as a stimulus for the creative process in the professional or educational setting.

Conscious of the problems introduced above, a study was conducted to identify architectural solutions that incorporate environmental psychology concepts. Architectural journals were used in the analysis of design iconography (drawings and photographs). Different architectural typologies were investigated to exemplify specific architectural elements in relation to the concepts of security, privacy, personal space and territoriality. Brazilian journals were specifically searched to enable examples to be appropriate for the local design situations. On the whole, the purpose of the study was to gain a better understanding of these concepts and their appropriate physical settings.

The concepts of territoriality, privacy, personal space and security

The concepts of environmental psychology are primarily related to aspects of territoriality, privacy, personal space and security. In architectural design these aspects and their representation is however often overlapped. Thus privacy and personal space as well as the feelings of security can be solved through the introduction of similar architectural elements, such as space definers, walls, fences etc... Also, specific design solutions can contribute towards different aspects of environmental psychology.

Seen as separate concepts, territoriality can be identified as a pattern of behavior related to control of physical space (GIFFORD, 1997). The control of space can be achieved through habitual occupation, some form of defense, personalization and mere marking. Psychological well-being, feelings of security and safety act on people’s attitudes and the indicators of environmental psychology depend on the user’s perception of space as territory (NEWMAN, 1972; GIFFORD, 1997). In countries with high urban crime rates, the feelings of security are often expressed through territoriality attitudes. The control of space is considered vital for physical safety and prevention of crime. Fences, walls, and security bars are all signs of defense attitudes. In Brazil, private property is highly valued, since social rights exist formally but are not as yet psychologically trusted, and attention is given primarily towards built space rather than open space. Private property in the form of construction is a symbol of social status and control. The theoretical concepts of territoriality encompass the infringement of
physical space through invasion and attitudes of defense. Signs are used especially as preventive measures. User reactions are mainly behavioral and temporal, thus the physically striking out and letting a dog loose are typical attitudes (CROWE, 1991; GIFFORD, 1997).

Privacy is another aspect related to control and autonomy behavior. It is a process in which interaction between people is regulated. The built environment plays a key role in facilitating privacy. Users often will employ similar design expressions as found in territorial and security behavior, but for privacy visual and acoustic barriers are important. Privacy in public spaces is mainly expressed through avoiding unwanted interaction, thus keeping distance and turning ones back to other people (GIFFORD, 1997). Walls in general help to create intimacy spaces and allow for solitude. In Brazil the colonial or traditional house was based on an architectural program that included internal sleeping-nooks. These unventilated and dark spaces existed for reasons of privacy and security in colonial times. Today, bedrooms replace such dark and often stuffy spaces, which guarantee proper ventilation and lighting, but may reduce user’s privacy (LABAKI & KOWALTOWSKI, 1998).

Personal space as defined in environmental psychology is the distance and orientation component of interpersonal relations. Cultural differences exist. Also when physical settings are less spacious, interpersonal distances increase. Crowding therefore affects this concept. With increasing urban densities more attention must be given to the provision of personal spaces. High densities are part of Brazilian urban models, however economic pressures act on the provision of appropriate personal spaces. Crowding occurs and these conditions can be linked to social problems. Behavioral consequences, such as aggression and crime rates may be linked to unfavorable spatial conditions.

**Research methodology**

To investigate the examples of spaces that incorporate the concepts of environmental design a study was undertaken on two fronts. First, architectural elements that exemplify the concepts of security, privacy, personal space and territoriality were identified. Secondly, representational examples of these elements were searched in architectural literature. The concept of personal space was emphasized, since it is the psychological aspect that is most difficult to identify and design for. The research method applied to this study follows Alexander’s conceptual model introduced in his “A Pattern Language” (1977). An “if-then” method was applied. Figure 1 exemplifies this methodology for two specific problems. The pattern “sequence of sitting spaces” (see fig. 1 A) addresses the different needs for comfort and enclosure of seating areas according to their position in the intimacy gradient, and the pattern “ceiling height variety” (see fig. 1 B) demonstrates the need for relating volume to user densities. Each pattern describes a recurrent problem in the built environment (“if”), and “then” the core of the solution to that problem is presented.

A: Pattern “sequence of sitting spaces”  
B: Pattern “ceiling height variety”

Figure 1: Examples of Alexander’s patterns (1977).
A study of architectural elements that incorporate concepts of environmental psychology

Seven main elements were identified: spaciousness, nooks or alcoves, furniture and equipment, visual and acoustic barriers, interpersonal distances, lighting, floor and ceiling level changes. These elements are specifically related to the environmental psychology aspect of personal space. Also, exterior views and differentiation in finishing materials are considered characteristics that contribute to the efficacy of those main elements. Figure 2 illustrates those elements.

Spaciousness

Spaciousness of the physical environment allows for adjustments in interpersonal distances. The affiliative-conflict theory (GIFFORD, 1997) maintains that we have conflicting social motives – a desire to draw closer to others and, at the same time, a desire to move away from others. A spacious environment that accommodates both formal and informal behaviors is therefore comfortable, because it allows for adjustments according to the circumstances and its appropriation by the users. Abundant and diffuse lighting, light colors of finish materials, high ceilings or even no ceilings or lateral enclosures contribute towards a sensation of spaciousness. At the same time, the environment should allow for intimacy, through the formation of nooks that do not however interfere with the overall spaciousness. Hall (1966) asserts that what can be done in a space determines the way we experience it: the sensation of spaciousness depends for instance on the user being able to walk freely from one side to the other, move around etc. In comparing two environments of similar dimensions, the sensation of spaciousness will come from the one where a minimum number of steps are necessary to access the corners of the space. Thus users comprehend spatial dimensions without interferences. Volume may also help with the concept of spaciousness. Alexander et al. (1977) specifies different ceiling heights according to uses, capacity and intimacy gradient of spaces. High ceilings are considered adequate for large gatherings (fig. 1 B).

Nooks

Nooks or alcoves can be configured through furniture, walls and different finishing materials. They create personal space. Alexander et al. (1977) recognizes the power of nooks in several patterns. Alcoves provide greater protection, intimacy and also confine social interactions when based on collective conformations and sociopetal layouts. They can also be temporary or fixed, being the latter subtracted or added to the building’s volume. Children recognize this psychological necessity, often creating their personal spaces under tables and making tents.

Furniture and equipment

Flexible and adaptable furniture through the use of wheels and wireless technology equipment allow for diverse layouts according to the users needs and corresponding activities. Environmental adaptability is valued. Though often present in recent office spaces, the designer should keep in mind the necessity of guaranteeing personal space in the midst of so many layout options. Flexibility should not mean non-defined space. Spaces devoid of activity definition may become “no man’s land”. On the other hand, the flexible furniture, on wheels, allows users to create their personal nooks.

Visual and acoustic barriers

According to Gifford (1997), fear or security is an important psychological factor on personal space. It can be materialized through visual or acoustic barriers. In public environments, a
security sensation is necessary in order to characterize personal space. An individual will need the maximum possible field of vision in order to feel comfortable in urban situations, which can be attained by a strategic and protected location. Barriers can isolate an individual or a group from others. Sociopetal to sociofugal spaces may be formed through the distinctive application of materials, changed in ceiling heights and shapes and dimensions of rooms. When movable, barriers can integrate and contribute to the adaptability of a setting. Barriers can also represent status when allowing an individual or a group to stand out from others.

Interpersonal distances

The complexity of human behavior demands appropriate interpersonal distances to gain feelings of well-being. Inadequate distances, when too close, may lead to a feeling of invasion and subsequent flight, and when too far, may lead to a feeling of indifference, loneliness. Gifford (1997) describes several theories that try to explain an individual’s acquisition of the rules concerning interpersonal distance. Research points out that we prefer more space between us when the overall supply of physical space is low. Thus crowding changes our behavior in favor of protecting our personal space. Also, the status of an individual or group has impact on the interpersonal distance: the greater the status, the greater the distance from others (SOMMER, 1969). Hall (1966) asserts that the development of the human body extensions throughout history reached a degree that people tend to forget about their animal nature. Today’s wireless equipment can be considered the new human body extensions, usually requiring a greater interpersonal distance in order to keep acoustic and visual privacy. However, these new technological developments also isolate humans in their wireless world. This may cause behavioral consequences in interpersonal situations. New social and behavioral patterns are seen as necessary to avoid conflict. Architecture in this case has not yet found solutions to this isolation of an individual in a crowd.

Lighting

Human perception of space relies largely on vision (Hall (1966). Sommer (1969) maintains that personal space is a phenomenon that only happens under light. Within our visual cone, light and shadow differentiate space. Natural or artificial light can delimitate a specific area when point sources are used. Thus, personal space is defined through light level differentiation. Color can be an additional element to characterize the spatial definition.

Floor and ceiling level changes

Floor and ceiling level changes play a significant role on the differentiation of spaces. Alexander (1977) asserts that the relative intimacy of different spaces should be felt between rooms, especially between those that connect. More public rooms need higher ceilings. Level changes might also emphasize the status of an individual or a group. People placed in a higher spot may acquire a feeling of higher status (SOMMER, 1969; HALL, 1966; GIFFORD, 1997). The superior position affords supervision and increases privacy. The “half-way height” pattern of Alexander exemplifies this necessity well. Thus ground floor apartments should be raised above street level to let people oversee street life, but without invasion of privacy from the street itself. In office design top floors are reserved for the directors and in societies with large social differences apartment buildings are favored by the upper classes to assert their “superiority”. This can be seen in urban situations in Brazil.
A search was undertaken in architectural journals and design publications of the last ten years to find spaces or design solutions that have incorporated the elements discussed above. Brazilian journals were included. Nine design projects were identified as good examples for the creation of personal spaces. Figure 3 shows these examples.

The New York City restaurant is a renovation of an old warehouse building. A high ceiling, abundant daylight and white walls characterize the design. Frosted-glass panels partition the various areas, providing a variety of configurations that allow for a degree of intimacy as part of a larger space. Different personal space situations are created. Thus small and large groups are accommodated and individuals can isolate themselves or start interpersonal relation through choice of seating. The long communal table (marked 3 on the plan in fig. 3 A) is particularly interesting in providing proper personal space configuration for people dining alone. They have a protective barrier in the back and observe the space and the entrance, thus affording users visibility and control. Red banners further mark this space. Access to the restaurant is confined behind a curved-frosted-glass wall to create a transition space between the public sphere of the street and the (semi) privacy of the dining area.

In contrast the restaurant in figure 3 B is located underground and no daylight is provided. It has several interesting spaces. First, the sociofugal shape of the bar (marked 4 on the plan) inhibits eye contact of users, thus interpersonal relations are reduced and the time spent there is controlled by this architectural element. Nooks are well defined for group dining, and are always set against walls for additional protection. A private dining room (marked 6 on the plan) is set at a higher level with windows overlooking the general dining area and conferring acoustic privacy. This space affords privacy and status of special groups.

The third restaurant space is defined through rubber “bubbles” or shells that are clad in aluminum. Their internal surfaces have distinctive and separate color, increasing identification of personal spaces. The “bubbles” are of varying size, thus in some cases
several groups may dine together in one colored space. Larger shells have flexible walls to allow specific group configurations. Not all tables are housed in the shells but a large open space is provided for small tables preferred by individuals dining alone. See fig. 3 C.

Figure 3 D presents a school design addition. Here the roof of two new classrooms provides a special space for student groups to observe and be observed. Railings divide this area to allow for several groups to congregate. In the school environment the level change may imply in special group domination of this area. The new rooms have different ceiling heights and thus, the space is divided into different group spaces. The lowest ceiling provides a special nook or children’s retreat.

The office space in figure 3 E consists of a renovation of the upper two floors of an old industrial building with high ceilings and daylight coming from the upper level’s clerestory windows. Two kinds of social areas were created. Some of these areas are large with comfortable chairs and coffee tables that allow for casual interaction. The many smaller ones permit co-workers to collaborate on projects. Teamwork is encouraged through movable desks along “zippers” or spines of workstations that roll on in-line-skate wheels, with storage space called “suitcases” sliding along the upper portion. Checkerboard “gullwings” act as movable acoustic barriers for privacy. Window openings between the “wood zipper” workstations allow for contact when desired. Different finishing materials create a sense of variety. A few private offices are also included in the office plan shown in the figure as marked by the number “7”.

The house in Athens represented in figure 3 F provides personal space in the kitchen and in the office space through pools of light. In the house in Oakville the study nook is determined by focal daylight and floor and ceiling level changes (fig. 3 G).

The house in Berkeley provides a bed nook that is characterized by enclosing walls and furniture (fig. 3 H), and at the Tugendhat house, the dinning space is created by a sociopetal wall (fig. 3 I).


Figure 3: Design projects that support personal space.
Conclusions

The results of this study revealed that the identified elements -- spaciousness, nooks, furniture and equipment, visual and acoustic barriers, interpersonal distances, lighting, and floor and ceiling level changes occur in an associated way. When consciously considered in the conception of a design, those architectural elements may emphasize interpersonal relations in the built environment, leading to users’ positive reactions and therefore contributing to their comfort.

The environments that provide closeness emphasize the protection of its users and are configured by nooks, visual and acoustic barriers, furniture as well as floor and ceiling level changes. Lighting and finishing materials are shown to play an important role also. When present in the built environment in a collective form, they allow for adequate interpersonal distances of social interactions. The “Lever House” and “Georges” restaurants, as well as the residential designs clearly represent proper enclosure settings. On the other hand, spacious environments emphasize communication among people. They are characterized by abundant and diffuse lighting, high ceilings, exterior views, few elements of enclosure, flexible furniture, adaptable equipment and flexible physical barriers. Diverse layouts for a variety of individual or group users are offered. These take into account different interpersonal distances and intimacy gradients. The “66 N.Y. City” restaurant, the Brunswick school addition and the Oxygen Media offices take advantage of those elements.

Architectural perception to the issues that influence people-environment relations is important in a productive and sensitive creative process. Investigation of the kind presented here should be encouraged, especially in architectural education. The design iconography from architectural journals and publications offers access to a diverse repertoire in varied contexts. But this material must be used with discretion since design analysis is often hampered by a lack of human figures in the images, and often these may be distorted to emphasize formal aesthetic issues. To the untrained eye these factors of architectural representation may not be apparent and must be discussed in the design teaching studios. Alexander (2002) maintains that from the second half of the 20th century on, buildings have been judged more by the way they look in magazines than by the satisfaction people feel when using them.

As a continuation of this study a more focused and specific research is recommended in order to accumulate quantitative and qualitative data for design application. Measurable distances appropriate to spaces “that really work” are important to insure design quality. Distances vary depending on the different uses and on the public or private character of the spaces. Designers must be made aware of these differences. Other aspects, such as climatic and cultural differences, which include differing sensorial responses to the environment, must be considered as well. Although the concept of personal space was emphasized in this study, it is clear from the discussion above that other aspects of environmental psychology overlap when architectural elements are defined. Thus barriers, nooks, level changes and lighting definitions can contribute as well towards the concepts of territoriality, privacy and security.

The study presented here and has initiated a catalogue of architectural design elements that influence the environment-behavior relation. The understanding of these issues by architects and their conscious consideration in the early phases of design should allow for a built-environment that responds to a wider range of user needs. It is hoped that more investigations of this kind will lead towards a greater incorporation of spaces “that work” in architectural and urban design.

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