Behavioral Influences of the Architectural Environment: Their Definitions and Utility in the Design Process

An Honors Thesis (ID 499)

By

Arminda J. Hann

Thesis Directors

[Signatures]

Ball State University
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PREMISE

The availability of vacant, misused, and underused buildings in our society is readily apparent. The direct reasons behind such structures are also readily apparent. First, the original owner has increased his spatial need beyond that for which the building was originally designed. Second, the building never fit the user's needs and thus was abandoned or expensively modified. This latter reason is the more prevalent. It is this reason that is the cause behind the demolition and misuse of some great architectural structures. It is time that the architectural profession recognizes the reasons for abandonment and misuse and begins to work for a better understanding of the precarious relationship between user and space. This is not to say that architects do not understand spaces. They do, more than any other single group, but they do not wholly understand others and other's behavioral patterns in designed spaces. Those who are the most knowledgeable about behavioral patterns, psychologists, are not the ones designing spaces. Perhaps architects need to work with those who understand behavior, and become more aware of behavior promoted by environment. At the same time, the users of those spaces need to be aware of the architect's needs to reach these understandings and to eliminate the factors which cause vacant and misused buildings.

In order to understand how architecture affects people and influences their behavior, there needs to be a better understanding by the designer of the specific elements of design which affect the user. It is this effect of specific elements in design that has not been previously made clear for designers. It is obvious that a simple system of reference on specific design elements needs to be compiled and studied for effectiveness and cross-cultural capabilities. This thesis is an exploration of a way to go about creating this system in hopes that, with further experimentation, it can become a feasible part of design methodology.
INTRODUCTION

The background of this initial study is rooted in research into specific aspects of the environment and their effects on human behavior. Finding concise, well-conducted studies that could be applied directly in architectural design was not a simple task. This concept of environmental surroundings affecting specific aspects of behavior is not all that old in itself. And secondly, although many works have been done by architects concerning how their environments are supposed to affect people, little has been done with real studies as a basis, or even with a remedial attitude. Even though this thesis was undertaken in such light, it is not intended to be complete or all-encompassing. It is intended to provide a basis for thought and a new procedure for dealing with problematic architectural designs.

In the first phase of this study specific design variables were selected which were felt to be important in the architect- ural environment. Specific studies pertaining to each individual variable were located. Originally, eighteen variables were selected, but some were dropped after finding only limited information. This brought the list to ten variables of the architectural environment subject to prior study. At this point in the study the need for a use-oriented methodology was seen. In this light, a preliminary worksheet was developed. The preliminary worksheet proved to be unsatisfactory, due to its post-hoc orientation for construction and design evaluation.

In the second phase, the same variables were selected and elaborated on, but from a designer's point of view. That is, the intuitive guidelines which designers generally follow but do not consciously recognize were determined. This second study was obviously biased with respect to knowledge gained during the first phase.

In the third phase, behavioral and design variables were brought together and the method was developed which comprises this thesis. The two sets of individual variables were condensed to comprise the reference index which contains information on each variable, and specific design recommendations. The worksheet from the first study phase was re-evaluated and has evolved into what is now given as an option for the designer to use in the design process as a communication tool with the client(s) or as a method of goal determination. The procedure for utilizing all of this information in design forms the body of this thesis.
BEHAVIORAL INFLUENCES OF THE ARCHITECTURAL ENVIRONMENT: THEIR DEFINITIONS AND UTILITY IN THE DESIGN PROCESS

The environmental setting promotes certain behavior within the confines of an individual's personality and culture. There are four variables affecting this interaction: culture, individual personality, behavior, and the environmental setting. Culture is a variable with a multitude of factors affecting it, so it follows that a variety of disciplines should study it, especially sociologist and anthropologists. Individual personality is another variable which has a variety of determining factors and those seeking them include psychiatrists and psychologists. Behavior, which is the result of personality, culture, and environment is studied by all disciplines dealing with these variables. The fourth variable, the environmental setting, is just now being recognized in its full significance. Those whose key role it has been to manipulate this variable in the "real world" - architects, planners, and landscape architects have been using intuitions as their main source for design guidelines. It has been theorized by these professions that environment held a major position in the promotion of some behavior. But, empirical studies done by the professions dealing directly with behavior have not been incorporated into the design process. It is time though that this practice should come to an end. Scientists need to be aware of the value of the designer's input in the structure of experimental environments. And designers need to utilize the findings of science and comprehend fully the extent to which they have impacted behavior. It is the latter which has the more direct effect on real situations, and therefore needs to be the most immediately reviewed.

In order to thoroughly incorporate the findings of behavioral science into architecture specifically, there must be another step added to the design procedure. The added step could change the entire process and create a new methodology. This method would be based on the empirical findings of the disciplines of psychology, psychiatry, and sociology. These findings would directly change environments and structures as they are incorporated in the initial steps of the architectural design process. It is realized that this is a difficult change for the designer to undertake; there are enough concerns in the initial client-architect interviews to cause great confusion. Unfortunately, in the confusion, many ideas and desires of the client can be lost in the rush for a good design. Perhaps through a more knowledgeable position on the behavioral sciences, an analysis of the motives of the client can provide the opportunity for better communication and fewer omissions. In order to analyze the client's motives, the architect must be able to communicate to the client on individual, simple components of the design with which the client can respond to in simple, goal-oriented
In order for the architect to gain this knowledge and understand the new method of behavior-inclusive design, the architect must realize behaviorally significant factors in design. To realize these factors, the architect must be able to segregate the individual variables of design and analyze each for their behavioral effects. By introducing the user/client into discussion of these individual components, the designer can ensure identification of specific goals. By implementing a method which analyzes individual variables and their desired effects on users, the behavior that occurs within a space can be used in the judgement and design of that space rather than the architectural interpretation of a concept within a designer's mind.

In this study certain segments of the architectural environment were chosen to be used as the pilot variables in creating this type of process. They are: acoustics and sound, climatic variables, color, features, lighting, living elements, personal/social adaptation factors, spatial organization, structural impact, views, and volume. The specific analysis of each of these variables is found in the Reference-Index. These variables were used to define the action of users within each segment's limitations. From the analysis of each individual variable's effects, the process of adding variables and their effects was theorized. At this point, the implementation of the theory was desired, and a method of client communication, design definition, and design implementation was created.

Method Description
1. The client's goals for each variable are defined separately.
2. The designer has the client rank the variables, keeping (the client's) goals in mind.
3. The client selects the overriding variables which the design is to fulfill. This process is repeated for each client separately. If this is a publicly-oriented space/structure, then it is advisable that the process also be repeated with the community in a forum situation.
4. The traditional communications of the designer in the initial design stage now occur.
5. The architect defines his role in the process by establishing priorities for the separate variables.
6. With the client's list in mind, the designer selects the controlling or base variables; those whose needs must be fulfilled for the space to be fully used or appreciated.
7. The client's communications and the architect's selections are then compared and differences (if any) are noted. If there are any differences then additional meetings between client and designer.
need to be conducted in order for the respective parties to understand these differences in design goals.

8. Once differences are resolved and understood, the architect can fully implement the design process with the new method as a preliminary step to create goals, communication, and design orientation.

In the implementation of the process, the hierarchy of variables comes into place. At no point are any of the variables deleted, no matter what order they are added to the initial design. As each variable is added, its boundaries are defined within the problem and the base variables are reviewed for re-definition and conflict. The process is linear in that it arrives at a singular, tangible conclusion— that of the roughed-out design and the specific design requirements. Yet, the process is more than just two dimensions, as it shifts backwards and forwards throughout the process and, as variables are added, they can arrive at different points separately or can simultaneously affect other variables.

In order to comprehend the process, two schematic examples are offered. These examples are not meant to be universal, but are meant to be taken as typifying the process as a whole in the given situation. The examples show the client's base variables, and then the architect's process with the base variables at the start.

In order to aid the process, a common format is necessary. Through the use of a common, universal format, universal communication is encouraged between the designer and the client. In this light, a worksheet to be used in the initial stages of this method was devised. The worksheet was created with steps one through three specifically designed for the architect to use to communicate desires to the client. Direct comparisons can be created to which the client can relate in step seven. This worksheet was also developed to be used in remedial as well as "new design" situations, and thus it is relatively universal.
CONCLUSION

The action of adding observable, researched behavioral determiners to the design procedure is a definite advantage. Although it may take additional time in the initial stages of design, it helps to eliminate the possibilities of misuse and/or non-use of the space. The method becomes an organizational tool which initiates discussion and can be referred to in later stages of design (the worksheet can be used in this manner as it can provide a record of the initial processes of the design). In this thesis it is realized that the given variables are not the only ones involved, but they do provide a basis for contemplation and also orient the designer to think of other aspects of design in this more behaviorally oriented fashion. Creating the mode of thought is the goal of the process.
WORKSHEET

Space Name:
Number of Average Users:
Roles of Users:

Desired Social Behavior of Users:

Existing Social Behavior of Users:

Existing Conditions of Space (or conditions mandated by user):
  Lighting:
  Shadow Effects:
  Color and variety of:

Overall Organization(s):

Perception of Structure:

Number of Features/Objects: Fixed: Mobile: Living:
  initially perceivable oder: yes no
  If yes: Transient or Permanently perceived
  Describe:

Air Movement: static drafty comfortable/assymetrical
Temperature: warm comfortable variable cool cold
  is white noise perceivable? yes no
  is sound: pleasant controllable nonexistent
  What is the sound of?

General Geometry Perceptions:

General Volume Perceptions:

*Note: These are asking for perceptions and not quantified answers.
Rank design variables as to the order of importance desired for this particular space, and elaborate as to how they are to be applied for the desired behavioral effects.

_____ Acoustics and Sound
_____ Climatic Variables
Features and Applied objects

Lighting/Color

Livino Elements

Structured Social and Organizational Behavior

Volume, Structure, and Geometry
EXAMPLE WORKSHEET

Space Name: Crown Hall IIT Exhibition Space - Mies Van Der Rohe

Roles of Users: Architecture, planning, and landscape architecture students and faculty observers, or any person entering the structure for any purpose.

Desired Social Behavior of Users: To pause and meditate on the space and the contents therein.

Existing Social Behavior of Users: Quick movement through the space as a general rule, although those going to the space to view the space for historical reasons do not necessarily move rapidly through it.

Existing Conditions of Space:
Lighting: Much natural light, discontinuos flourescent strips.
Shadow Effects: Striking and strong.
Color and Variety of: greys and dark earthy tones, many blacks.

Overall Organization: Radial with some zoning - i.e. stairways and gallery area.

Perception of Structure: Very strong grid pattern through waffle - reemphasized by inserts. Columns are bare steel typical W form.

Number of Features/Objects: Fixed: variable Mobile: Living: 
Air Movement: static drafty comfortable asymmetrical
Temperature: warm comfortable variable cool cold

General Geometry Perceptions: Geometry is very strong.
Very cubic - all 90 degree angles.

General Volume Perceptions: The initial perception of a user may be that the space is infinite due to its monumental scale and large quantities of glass. The dark structure inhibits this creating a "cage" effect.

*Note: These are asking for perceptions and not quantified answers.

Rank Design variables as to the order of importance desired for this particular space, and elaborate as to how they are to be applied for the desired behavioral effects.

Note: in this example these are done in view of the performance of the space.

1 Acoustics and Sound - I don't know for a fact that this was this low in the design but with all hard materials it does not seem to be considered

2 Climatic Variables

3 Features and Applied Objects

4 Lighting and Color
Living Elements - Not considered except on the exterior in limited quantities.

Structured Social and Organisational Behavior

Volume, Structure, and Geometry

This space fails due to its ignorance of the base individual needs of humans which need to be fulfilled before higher perceptions can occur, i.e. the appreciation of the volume and geometry. Although these two variables are literally forced on the user, they are observed negatively as the user is given a negative attitude from his discomfort. The color and geometry of the space are only relieved by features such as displays and these are restricted, creating a sterile space.
EXAMPLE WORKSHEET

Space Name: TWA Terminal, JFK Airport - Central Space
Eero Saarinen
Roles of Users: Passengers boarding and incoming from aircraft. Service personnel.

Desired Social Behavior of Users: Public social interaction - no intimacy.

Existing Social Behavior of Users: Fits desired behavior.

Existing Conditions of Space:
Lighting: Natural and cove.
Shadow Effects: Somewhat dulled - reflections are more apparent.
Color and Variety of: Creams are dominant with tinted glass and neutrals, medium variety.
Overall Organization: Peripheral

Perception of Structure: Strong - columns and roof form dominate all perceptions, organic and natural in form.
Number of Features/Objects: Fixed: medium Mobile: Living:

Air Movement: static drafty comfortable/assymetrical

Is White Noise Perceptible? yes no
Is Sound: pleasant controllable nonexistent unpleasant

What is the Sound of?
Aircraft, people, intercom systems.

General Geometry Perceptions: Strong geometry. Very dynamic with walls outward thrusting and convex curves.

General Volume Perceptions: Initial perception of infinite horizontally with a strong ceiling effect.

*Note: These are asking for perceptions and not quantified answers.
Rank design variables as to the order of importance desired for this particular space, and elaborate as to how they are to be applied for the desired behavioral effects.
Note: These are done in view of performance of the space.

6. Acoustics and Sound
5. Climatic Variables
4. Features and Applied Objects
This is a very dynamic space to perceive, but sound is a definite problem, mainly due to materials. The space conforms nicely to most variables with the exception of climatic and sound. These are base variables and can cause user perception problems. But this problem can be somewhat elevated because the user expectation of noise is high in such a space.
EXAMPLE WORKSHEET

Space Name: Grand Ramp - Guggenheim Museum, Frank Lloyd Wright
Roles of Users: Observers of art.

Desired Social Behavior of Users: To pause frequently and meditate.
Quiet social interaction.

Existing Social Behavior: Very much as intended, except some speeding up at the lower bands of the ramp.

Existing Conditions of Space:
- Lighting: Natural or naturalistic cove lighting
- Shadow Effects: Muted
- Color and Variety of: Whites and light greys. Art pieces provide variety.
- Overall Organization: Peripheral

Perception of Structure: Medium - columns and bracing can be noted on higher levels. The strength of the structure is perceived through its material - concrete.

Number of Features/Objects: Fixed: many Mobile: Living:


General Volume Perceptions: Large, but not monumental or infinite.

*Note: These are asking for perceptions and not quantified answers.

Rank design variables as to the order of importance desired for this particular space, and elaborate as to how they are to be applied for the desired behavioral effects.

Note: These are done in view of performance of the space.

5. Acoustics and Sound
6. Climatic Variables
4. Features and Applied Objects
3. Lighting and Color
0. Living Elements
2. Structured Social and Organizational Behavior
1. Volume, Structure, and Geometry
This space is very dynamic, perhaps to the limit of over stimulation, as a main complaint is that it competes with the art. The space has had climatic problems in that it leaks. There have also been complaints that the lighting is too strong. This may be a conditioned response as compared to the lighting which is normally presented in art galleries is yellow incandescent lighting. But the complaints may show a deeper problem with the space.
EXAMPLE WORKSHEET

Space Name: Hyatt Regency Hotel - Atlanta, John Portman
Roles of Users: Guests of hotel, service personnel.

Desired Social Behavior of Users: High amount of social interaction.

Existing Social Behavior of Users: As desired.

Existing Conditions of Space:
- Lighting: Varied - natural with cove, and special accent lighting.
- Shadow Effects: Not many.
- Color and Variety of: Large variety of color. Greys, off whites, greens, oranges, etc.
- Overall Organization: Peripheral with many zones.

Perception of Structure: Medium to low. Mainly through the strong material of concrete.

Number of Features/Objects: Fixed: many Mobile: many Living: many
- Air Movement: static drafty comfortable/assymetrical
- Temperature: warm comfortable variable cool cold
- Is White Noise Perceptable? yes no
- Is Sound: pleasant controllable nonexistant
- What is the Sound of? Of people and their activities.

General Geometry Perceptions: Broken up. Large geometries are rectilinear in form with curvilinear accents such as the elevator and the floor patterns.

General Volume Perceptions: Large but broken up for human use.

*Note: These are asking for perceptions and not quantified answers.

Rank design variables as to the order of importance desired for this particular space, and elaborate as to how they are to be used for the desired behavioral effects.

1. Structured Social and Organizational Behavior
2. Living Elements
3. Lighting and Color
4. Features and Applied Objects
5. Climatic Variables
6. Acoustics and Sound
7. Volume, Structure, and Geometry
This space is well-liked by users and is conducive to the behavior desired. There are some criticisms that the space is not a purist in its concept, but it is fulfilling the needs and desires of its users, therefore it may be more pure than some may want to admit. It is through spaces such as this which attempt to fulfill the user's desires before trying to make a space pure in concept that good design is created.
INTERCOURSAL 

MODEL FOR AN ATYPICAL RESIDENCE

I. PRIMARY 
EXPECTATIONS 
OF CLIENT

PERSONAL 
ADAPTATION 
FACTORS

VOLUME

CLIMATIC 
VARIABLES

II. PRIMARY 
DESIGN 
VARIABLES

NOISE 
SUDDEN

VOLUME

CLIMATIC 
VARIABLES

COLOR

III. SECONDARY 
DESIGN 
VARIABLES

SPACIAL 
GEOMETRY

SPACIAL 
ORGAN.

LIGHTING

LIVING 
ELEMENTS

VIEWS

IV. TERTIARY 
DESIGN 
VARIABLES

STRUCT.

IMPACT

PERSONAL 
ADAPTATION 
FACTORS

FEATURES 
AND 
OBJECTS

ROUGH DESIGN 
AND 
DESIGN REQUIREMENTS

*AN EXAMPLE - NOT NECESSARILY VALID FOR ALL CASES*
INTERCORALLARY *Model for a Public Forum Space

I. Primary Expectations of Client
   - Personal Adaptation Factors
   - Color
   - Lighting
   - Volume
   - Noise
   - Sound
   - Climatic Variables
   - Spatial Organ.

II. Primary Expectations of Public
   - Personal Adaptation
   - Volume
   - Sound Noise
   - Climatic Variables
   - Spatial Organ.

III. Primary Design Variables
   - Personal Adaptation Factors
   - Volume
   - Noise
   - Climatic Variables
   - Spatial Organization

IV. Secondary Design Variables
   - Spatial Organization
   - Living Elements
   - View
   - Color, and Lighting

V. Tertiary Design Variables
   - Features and Objects
   - Impact of Space
   - Spatial Geometry

Rough Design and Space Requirements

*An example - not necessarily valid for all cases.
REFERENCE INDEX
ACOUSTICS AND SOUND

Description

Current evidence suggests that specific sounds affect the behavior of individuals. This does not eliminate some generalities that can be used as guidelines in design situations. Sound is a difficult variable to control and a difficult variable to use. The thresholds between positive and negative influence are very finite. Children have been found to be more susceptible to sound in their behavior than are adults. This appears to be true even of the extremely young. (Cohen and Weinstein, 1981)

Direct Effects

White Noise (steady)

65 dB and lower: Willingness to help others increases or perhaps goes to the norm. (Cohen and Weinstein, 1981)
Task performance increases positively for a short period of time. (Cohen and Weinstein, 1981)

75 dB (equivalent to a busy street): An increase in anxiety levels can be definitely measured, although performance may not be altered. (Standing and Stace, 1980)

85 dB: A decrease in sociability can be seen. People, who under other conditions would help a stranger, decline. (Cohen and Weinstein, 1981) Judgement of others harshens. (Cohen and Weinstein, 1981)

92 dB (steady and intermittent): Causes people to have a tendency to oversimplify and distort perception of complex social relationships. (Cohen and Weinstein, 1981) Perceptual differentiation is decreased. (Cohen and Weinstein, 1981)

General: White noise has been found to mask cues. In one experiment, it was suggested that actual physiological damage can occur when it was found that workers wearing hearing protection heard better than those in white noise conditions despite the sound level. (Cohen and Weinstein, 1981) In all cases it has been found that the addition of white noise can decrease attention spans.

Intermittant Noise:

Vigilant task performance has been found to be positively influenced in conditions of varied noise below 95 dB. (Cohen and Weinstein, 1981) Intermittant noise and indiscriminate noise should not be confused, as the indiscriminate (chaotic, unpredictable) has been found to be detrimental to human behavior. (Cohen and Weinstein, 1981) In some cases, the increasing aggression encouraged by such sounds continues to amplify
after the noise is discontinued. (Percival and Loeb, 1980)

Noise, either intermittent, indiscriminate, or steady, which is perceived to be controllable or escapable, does not produce any of the aforementioned effects. (Cohen and Weinstein, 1981) Soothing, continual (i.e. wave sounds) seem to have a fairly definite positive effect. (Cohen and Weinstein, 1981)
The perception of noise doubles for every 10 dB in sound level. (Cohen and Weinstein, 1981)

Design Recommendations

indiscriminate sounds (those that are chaotic and unpredictable) should be the first to be eliminated in a noise situation.

White noise is not a positive attribute to a space and will make it intolerable after a period of time. Physiological damage can occur after prolonged exposure to white noise.

School designers should be especially concerned with sound in spaces, as sound affects the behavior of children more than adults. This is especially true as the age group gets younger.

White noise levels of 75 dB or more are definitely detrimental to behavior - increases in aggression can be seen. 65 dB or lower is a good design goal with white noise levels.

Controllable sound, and especially soothing constant sound, such as wave and wind sounds, is positive in its effect at low volumes. Controllable is defined as user controlled.

Sound works as a correlate to a multiple of variables. The most dominate of these are: color/light, spatial shape (dead spots), and volume. When these design variables are under consideration, their effects on the user will be affected dramatically by noise.
CLIMATE VARIABLES: TEMPERATURE, MOISTURE, AIR FLOW, ODOR, CHEMICAL

Description

These variables are those which are not necessarily visible, but which do have a direct effect on the well-being and behavior of all that use a space. These variables can be easily controlled by the designer in a number of ways. The majority of these variables can be experienced through the external senses: skin, nasal membranes, etc.

Direct Effects

Temperature: Generally, behavior on hot days is described as reluctant, dreamy, docile, apathetic, lifeless and unresponsive. (Canter and Lee, 1974) On cold days, behavior is generally described as willing, cheerful, helpful, careful, settled, angelic, creative, earnest, responsive, and inquisitive. (Canter and Lee, 1974) Subjects can feel a temperature differential of .5 C. (Canter and Lee, 1974) Violence and aggression sharply increase with temperature. Aggression is minimal in ranges below 30 F. From 30 F to 55 F, it somewhat increases. (Anderson and Carlsmith, 1979) But from 10 F upward, aggression increases dramatically, with almost a vertical line on a scale. (Anderson and Carlsmith, 1979) Note: Violence breeds violence, so not just temperature is at work. (Anderson and Carlsmith, 1979)

Moisture: Generally, behavior on extremely humid days is described as: glum and destructive. (Canter and Lee, 1974) In warm temperatures (28 C+), discomfort increases with increased humidity. (Canter and Lee, 1974) For every 8% increase in humidity there is a perceived increase in temperature of 2.5 C. (Canter and Lee, 1974) At warmer levels, humidity above 50% is seen as oppressive. (Canter and Lee, 1974) At lower temperatures, humidity is not noted until actual differences in skin moisture can be observed. (Canter and Lee, 1974)

Air Flow: Generally, behavior on windy days is observed as: obstructive, wide-awake, careless, restless, diabolic, wild, vocal, quarrelsome, and energetic. (Canter and Lee, 1974) Assymetry in the heating of a space has been found to be a positive in that it allows for a variation of sensory stimuli and thus increases alertness (assymetry within reason). (Canter and Lee, 1974)

Odor: Users have shown that there is a tendency to become desensitized to the odor of a space after a period of time, therefore any odor that is to be used as a
positive reinforcement (such as advertisement for a bakery) must be assymmetrically offered. In this line, any odor that must be tolerated should remain at a constant level if possible. Odor can be easily carried from space to space by the users. Odor is extremely important in a space. Odor is most easily impressed upon the subconscious, and the hardest to erase from memory. The theory behind this is that the sense of smell was the first of the five physical senses to develop; therefore is more ingrained in subconscious memory.

Chemical Factors: These factors in the enclosed environment are just now being recognized. Studies on formaldehyde carbon dioxide, and other chemicals expressed to spaces via actual emission of materials or via air handling systems are being undertaken. The odor, the nausea, or even the illnesses resulting in death have been related to entrapped chemicals (Gapp, 1983) The psychological effects of such occurrences on an individual can negate the usability of a space. Also, such occurrences are easily media-ized to create negative public atmosphere.

Critical Design Effects

The climate of a space should be of a higher priority in design than many physical factors which are more often dealt with, such as geometry and features. These latter variables are more often given priority, perhaps because they can be described in drawings and other media available to designers. Yet, if the climatic variables are ignored, the physical design variables can be ignored by the user. The climatic variables are base variables – those which be met first in order for other aspects of the design to come into play. This is Herzberg’s Corollary, which basically states that the dissatisfied (the physiological lower order needs, such as food, water, shelter) must be met in order for the atypical individual to progress sociologically to higher levels and appreciate satisfying (intellectually perceived needs such as color, spacial geometry, spacial configuration, etc.)

Design Recommendations

The relative coolness (not coldness) of a space is more conducive to movement and thinking than relative warmth. 70°F is a critical temperature for aggressive behavior in mass groups. As temperature rises from this point, aggression rises. Temperature fluctuation is the major factor, as a temperature differential of .5°C can be discerned. Moisture levels affect perception of temperature. High temperatures (above 70°F) are seen as oppressive if the
humidity is above 50%. For more accurate analysis of specific cases use a psychometric chart similar to the one given in this thesis.

Asymmetrical air flow is conducive to activity, but it is difficult to restrain and control, as is behavior. Odor is a positive reinforcer of spaces, and should be explored extensively when dealing with public spaces that need to have a sense of place. Odor is the strongest single factor that invokes memories which are essential when creating a "place".
COLOR

Description

Color is an applied variable, that is, it is not an inherent variable within architectural confines. Color can be used as a blatant architectural control or in a subtle manner. Color can affect the user in two distinct, but not separate manners. It can affect man physiologically and psychologically. The former can has been supported by evidence, the latter is more difficult to prove and has no general application due to variations on the human condition. Effects of color have been found to remain constant only under conditions of saturation, as a general rule. Color has its greatest impact when the situation is extreme, when the space is totally enclosed without windows, open doors or intrusion of differing color schemes; and when the specific intensity (brightness measurement) is at the extreme high or low end.

High intensity situations have a tendency to create extreme physical activity as a form of escape, but not necessarily increased mental activity. Low intensity situations tend to dull physical activity, create a sense of finality, and may cause a sense of entrapment. This may also create an increase in mental activity for some individuals. Color is a correlate with light, and slightly corollary with geometry. The critical cross variable with color is sound, which tends to amplify any behavior alteration. The secondary cross variable is features, which interact with other variables also.

Direct Behavioral Effects

7.1 - 2.1% Intensity Measure
Contemplation of this color range pacifies the central nervous system and lowers blood pressure, pulse, and respiration rates. (Luscher, 1971) It has also been shown to increase general sensitivity of the nervous system.

10.5 - 20% Intensity Measure
Increases pulse, heart, respiration, and blood pressure rates. (Luscher, 1971) It has been known to increase overall activity.

72 - 54% Intensity Measure
Increases blood pressure, heart rate, and pulse rate, but is more erratic than the 10.5 - 20% range. It has been known to increase user activity for short periods of time. (Luscher, 1971)

Distance Perception Alteration
Closest: Yellow, white (72 - 54% intensity measurement).
  (Johns and Sumner, 1948)
Next closest: Red (11.5% intensity measurement). (Johns and Sumner, 1948)
Mid point: Green (30.1% intensity measurement). (Johns and Sumner, 1948)
Farthest: Blue, black (7.1 - 2.1% intensity measurement).
  (Johns and Sumner, 1948)
Variations to these ranges: Red can move significantly closer, depending on the user. The range was determined by the comparison of two separate studies. Therefore, in the general sense, green may actually be closer. (Johns and Sumner, 1948) Special note: Light incidence can vary this dramatically.

Design Recommendations

Any space that has extended usage should not have extreme color schemes - no dramatic intensity levels or monochromatic color schemes.

A space for introspection with easy access would be beneficial for areas of extended usage, and this area should have a low intensity color scheme.

Colors for a space should be chosen utilizing the following factors arranged in order of importance:
1. Sound levels and duration
   The higher the levels of sound, the less extreme the color pattern must be in order to be tolerable. The more the variation in noise, the less variation in color.
2. Light level and geometry
   The variations of light and geometry provide cross patterns and different color variations which must be taken into account for a designed space.
3. Number of features
   The more monochromatic the space, the more interruptors needed in order to make it tolerable.
FEATURES, OBJECTS

Description

Features or objects alter the readability of a space. In other words, they inhibit the perception of the whole space. They can occur in a variety of forms and can affect the user through many variations within themselves. They can cause the perception of a space to be delayed, the perception of the space's boundaries to be obscured, and in some instances, totally eliminated, through becoming the boundaries themselves.

Direct Effects

Number of features
The number of interruptors is one of the strongest factors in the effect of this variable upon human behavior. The effects of great numbers of features are directly multiplied when their sizes also are strongly perceived (as large objects). A high number of features for a given space may cause the effect of over-stimulation. A low number of features, or even the absence of them, will not necessarily cause stimulus deprivation. It is the perceived amount of features that most directly affects the obscurement of the boundaries of a space. With a high number of features, the space can initially be perceived as being infinite in volume. Also, with a high number of features, all of the effects of crowding and territorialization come into play. The number of features can also determine the length of time users will remain in a space, as features in themselves promote territorialization; therefore, the more features, the more likely people will establish territories; the more territories, the more people are likely to remain in the space. Of course this does have its limitations; if a space has too many features, they can create over-stimulation and chaos, which tends to alienate users. (Flynn and Segil, 1970)

Pattern
The pattern that features display can have a direct effect on the behavior of users. Patterns most directly affect circulation of users as they move to and about the features, instead of necessarily perceiving the circulation of a space as a whole and moving in reference to the space. The lack of pattern in the form of features, or the lack of pattern in the set-up of the features, can cause the circulation to be random and uncontrolled.

Mobility
The mobility or perceived changeability of the features
within a given space can affect the user on two levels. In cases where the movable feature is large, the perception may be that the boundaries of the space itself are movable and thus create the perception of volume of the space to be variable. If the features are small and easily movable, the space can be perceived as having the ability to be personalized through rearrangement. In all cases, the mobility factor of features increases the availability of territorialization.

**Fixed**

Fixed features, which are more generally the large ones, can be perceived as being a part of the space and not separate features at all. The fixed features become the collection areas in large spaces, especially public ones, about which users and other features congregate. This may occur due to the perception of stability projected by the very fixedness of these features.

**Texture**

Texture can be seen as one form of feature as it alters the perception of the space in many forms. It alters the movement of sound, it alters the touch, and it alters the memory of the space, etc. Texture can enhance the perception of a space or it can alter it through its disguise of barriers by the manipulation of shadow on form. The texture itself becomes a feature which may cause the user to pause in his perception of the space as a whole. The overlay and multiplicity of textural patterns may cause sensory overload. The addition of textural qualities to a space increases the stimulation derived from the space by the user. The lack of texture in a space may also create a sense of non-feature. This can be used as a positive in spaces where there are a variety of social actions or other features to decrease chances for over-stimulation. It can also be a negative, creating a perception of emptiness or blankness.

**Direct Design Implications**

Features affect a space more than generally recognized. The objects, furnishings, and features of a space create the first impression for the user. This variable is likely to be the least controlled by the designer, and more controlled by the budget director or user. Features affect a multitude of other variables directly; therefore they should have more precise input given to them from the designer.

**Design Recommendations**

Texture is an feature which the designer can control. Texture can be used to manipulate shadow on forms and thus color.
It can be used to manipulate sound through a space. Through these two, it manipulates the perception of the total space, volume and shape. Texture can create a sense of stimulation overload if used without consideration for other features.

Fixed features can be directly controlled by the designer. These are features which are obviously integral with space. These are the points about which people will consistently collect, and thus this congregation of people, especially in public spaces, must be expected and encouraged in order to encourage the use of the space. Discouragement of these places as collection points is a sure way to void a space. The lack of collection points that are secure in a space encourages vandalism and transient crimes in a behavioral sense.

The mobility and the pattern of features is necessary in a design which works well, but this factor has a built-in lack of control by the designer, resulting in control by the user. This is not necessarily a negative. Features such as these promote territorializing and thus encourage prolonged use of spaces. Although the results may not be to the designer's taste, that should not be the ultimate goal of the space. The goal of the space is to be used.
LIGHTING

Description

Lighting is a variable that can strongly affect behavior within a space. It is also a variable which interacts greatly with other variables. It is a variable that quite easily can be adapted to a variety of needs and wants. For these reasons, it must be strongly considered when designing any space.

Direct Effects

Color Perception

Errors in color perception are the least apparent at standard levels of incandescent lighting. (Fine and Kobrick, 1980) Maximum numbers of error in color perception occur at low lighting levels. (Fine and Kobrick, 1980)

Time Estimation Behavior

This varies with sex.

Females: exhibit progressively shorter time estimations as the level of illumination is increased. (Delay and Richardson, 1981)

Males: exhibit progressively shorter time estimation at higher levels of illumination. (Delay and Richardson, 1981) It has been suggested that males may be overly stimulated (aroused) at higher illumination levels. (Delay and Richardson, 1981)

Noise Perception

Noise annoyance reduces with the reduction in illumination. When the noise is at high levels (84-94 dB A), the annoyance is also decreased under strong indoor illumination. (Shigehisa and Gunn, 1978)

General Behavior

Bright Contrast: establishes a sense of direction and a focus. (Flynn and Segil, 1970)

Low Contrast: encourages casual activity and uncontrolled circulation patterns. (Flynn and Segil, 1970)

Horizontal Brightness: when this is emphasized, as compared to background lighting, there is a tendency toward gregarious behavior and active movement. (Flynn and Segil, 1970)

Background Lighting: when this is emphasized there is a tendency for detached private behavior, introspection and related movements. (Flynn and Segil, 1970)

Cool Lighting: users will generally underestimate temperature and noise and overestimate space size. (Flynn and Segil, 1970)
Warm Lighting: users will generally overestimate temperature and noise levels, and underestimate space size. (Flynn and Segil, 1970)

Limits of Visual Comfort
These are levels which are considered to be the maximum which the general public can tolerate for given periods of time. The limit varies as to the angle from the center of the visual field.

<table>
<thead>
<tr>
<th>Angle from Center of Visual Field</th>
<th>Maximum Average Brightness</th>
</tr>
</thead>
<tbody>
<tr>
<td>45 degrees above</td>
<td>750 ft-l.</td>
</tr>
<tr>
<td>35 degrees above</td>
<td>535 ft-l.</td>
</tr>
<tr>
<td>25 degrees above</td>
<td>375 ft-l.</td>
</tr>
<tr>
<td>15 degrees above</td>
<td>250 ft-l.</td>
</tr>
<tr>
<td>0 - 5 degrees above</td>
<td>170 ft-l.</td>
</tr>
</tbody>
</table>

(Flynn and Segil, 1970)

Design Recommendations

Lighting must be designed at the same time as the color scheme for a space.

The two variables are so interwoven as to be inseparable in the design sense.

Lighting must be designed at the same time as the color scheme for a space. The two variables are so interwoven as to be inseparable in the design sense.

Noise annoyance perception increases drastically with the increase in light level and is a strong factor for any design in which noise reduction is an issue.

Lighting also plays a key role in the user's sense of security and vulnerability. This is especially applicable to large volume situations. Low lighting in large volume situations erodes the security of the individual. In intense volume situations this does not occur, except when other social factors take precedence.

Low contrast lighting decreases the control of the space upon the user. High contrast lighting creates foci and gives the user a sense of direction.
LIVING ELEMENTS

Specific Design Effects

Living things within a space are perceived by the user as permanent features. They provide a sense of security and variety to a space. Under the category of living things are plants, animals and water. They are the strongest collectors that a space can have because they "go" with everything and tend to enhance the space. However, they may be designed as centroidal foci, barriers or ceilings and can have all the negative effects thereof.

Design Recommendations

Any large public space should have at least one feature composed of living elements. In most cases the design should have more than one, as a single living element could create a centroidal organization effect.

Any acute space, with users spending a great deal of time in it, should have a living element other than the user in the space.

Any space that has a high degree of annoyance, such as noise, light, color, etc. should have living elements in it.

Any space that is used for long periods should consider living elements, although they may not be desired in some situations.

Any space in which there is a high degree of tension and/or aggression inherent in its usage should have living elements.
PERSONAL/SOCIAL ADAPTATION FACTORS

Description

Personal/social adaptation factors are those that are created through the interaction of man with the architectural environment and with others. These factors are affected by the architectural setting through its ability to affect the social behavior of its users. Three sub-factors compose this variable: availability to promote territorialization, availability to allow privacy, and factors which promote crowding.

Direct Effects

Territorialization

This factor is most affected by individual upbringing and cultural variables outside the affecting environment. With more availability of space to promote territorializing, the more there is a tendency for people to inhabit that space longer. (Canter, 1974) The lesser the availability to territorialize, the more transient is its use. (Canter, 1974) In spaces without exterior views, people will tend to collect about permanent fixtures which act as partial screens, but allow the user to view outwards. (Canter, 1974) Where there are windows, they tend to be the collection areas. (Canter, 1974)

Privacy

This factor is a necessity for feelings of security. The most private place in today's society is the bathroom. Other places are theatres and libraries. In all of these places noise by other users is considered to be interuptive/violating. In all of these places eye contact between users is not promoted. Private spaces are rarely well defined in large settings, they usually occur only in settings that are attuned to that purpose only.

Crowding

This factor is greatly affected by the physical environment. Current studies suggest that this factor may also vary according to sex: females react positively in high density situations and have higher recall than do their male counterparts; males react negatively and this is enhanced if there are any external stimuli (multiple colors, objects, etc.). (Leventhal and Matturo, 1980) In low density compact situations recall tended to be the same for both. (Leventhal and Matturo, 1980) A dark-colored room tends to be perceived as being more crowded.
(Leventhal and Matturo, 1980) Variety seems to not affect this variable; in a social situation variety decreased the perception of crowding. In a non-social situation, it increased it. (Leventhal and Matturo, 1980) The perception of crowding seems to affect the perception of length and width more than it does the perception of height or temperature. (Leventhal and Matturo, 1980) Males tend to overestimate size more in crowded situations, while females do in uncrowded situations. (Leventhal and Matturo, 1980) They seem to maintain eye contact more in a crowd than males. (Ross, et. al., 1973) All of this is also dependent on a controlling factor which is culturally dependent and thus harder to define. This factor is that of territorial expectation. This factor can change instantaneously within a variety of social situations in a single culture. Territorial expectation is the mental expectation of respect by others of a certain measurable personal space for each individual. An explanatory example is that of two different social situations. At a party, people will tolerate and will, in fact, desire to be closer to one another. Whereas when shopping, as a general condition, people will desire more space, and do not necessarily want to be bumping into each other.

Design Recommendations

Public spaces must accommodate people about collection points in order to encourage the usage of the total space. Main collection points are: windows and permanent fixtures such as fountains, columns and greenery. These areas provide the most availability for territorialization.

Office spaces/living spaces must also follow personal/social adaptation guidelines first and then must take into consideration privacy and crowding (opposites of the same concept). Crowding is a major factor in work spaces whereas privacy is more of a factor in living spaces.

Privacy and crowding is initially perceived within the requirements of the given social situation (example: a party allows for less privacy than a library), the social norms of the culture (example: British versus Italians), and the territorial markings as established by the individual. The latter factor is in reference to the perceived personal space of the individual. The size may vary according to the other factors, but if the boundaries are violated, crowding will occur.

Privacy and crowding is environmentally controlled by:

Noise - the more noise, the more crowded a space seems.
Lighting and Color - the more color variations and the higher the intensity of the light, the more crowded an individual feels.

Features - the more direct sight contact, the more crowding. No sight contact is privacy.

Temperatures - the higher the temperature the less people tolerate socially. Cold is not necessarily the remedy.
SPACIAL ORGANIZATION

Description

Spatial organization is a variable that is closely tied to pattern and circulation behavior. It deals with a multitude of physical factors: features, the physical boundaries of the space itself, the geometry of the space, and any other tangible item composing or contained within the space. The actual variable of spatial organization is not necessarily a tangible item, for it can be composed of a multiple of items and cross-variable boundaries. It is really a totally perceptual item - found only in the mind of the user.

Direct Effects

Centroidal

Centroidal organization is that which focuses on a central place or object within a space. The effect of a centrally focused space can be multifold. It can be monotonous and thus decrease stimulatory effects on the users. It can be extremely controlling - allowing the users to focus all thought and attention to one idea, as in the cases of buildings of religion and/or monuments. Circulation is not usually strictly controlled by centroidal organization other than drawing all users' attention to the focus. Circulation may be organized through other interruptive measures.

Peripheral

Peripheral organization is that which forces users to move to the outside and boundaries of a space. In this type of organizational system, all stationary items of the space are concentrated in the inner region, but do not necessarily demand attention. Therefore anyone using the space for a length of time will tend to be in the inner region. This type of space is generally used for circulation purposes or for those areas that require that people move through them and not loiter. Examples of this type of space can be seen in museums and some office buildings.
Radial
Radial organization is that in which the action of the space is originated at a single point, but diffuses from that point. The circulation in this space is also relatively unordered, as the users are moving to separate areas or points within the space away from the point of origination. Radial organization occurs at the exits of stairways, at the main entry points of buildings, and at the entry in single entry large spaces.

Egocentric
Egocentric spaces are in many ways similar to centroidal spaces. They differ only in that they are not monotonous, but their focal point is stimulating, and thus they are self-serving. The fine line between some egocentric and centroidal spaces is debatable and can vary from user to user.

Zoned
Zoned spaces are those that are subdivided, so that while the perception of the whole is nearly impossible to recall, the individual zones are more easily recalled. Zoned spaces occur wherever there is a high degree of territorialization, and where the volume of the space is variable in some instances. Zoned spaces tend to create a pattern of behavior which is related to peripheral space behavior. Each of the zones is treated as a space and its boundaries are respected as circulation boundaries and collection points. Zoned spaces are in some ways a larger usage of an area with multiple features.

Design Recommendations
Centroidal (egocentric) organization is recommended for spaces which require the users to be of a unified thought or
attention focus such as: religious areas, monuments, theatres, and other singular foci areas. It must be remembered that, although the thought is strictly controlled through the central focus, the circulation is not, and needs to be enhanced by other methods. Lighting greatly affects this variable.

Peripheral organization is found to be mainly used in galleries and museums, and incidentally in many homes and offices. The circulation is strictly controlled around the exterior while primary users congregate in the center. This organization is most affected by placement of features.

Radial circulation/organization is most desired at entry points. A lack of features and a high degree of light (within tolerable limits) encourages rapid diffusion. It is also recommended that permanent features should be located about the periphery of radial areas due to the social function of these areas.

Large spaces require that at least two differing methods of organization be apparent to users. They must be planned and implemented. Spaces which do not function with multiple organizations tend to be monotonous and create similar behavior. Spaces which have multiple organizations which are only repeats of a single type or too many types together tend to become sonal and chaotic as an architectural whole.
Description

Spacial shape or geometry is the perceived three dimensional pattern of a space. It does not include volume, but works within volume in the total perception of a space. Within this variable there is a subset of the perception of level change, as this is perceived as being a part of the entire geometry of the space, but it can affect the behavior as a variable in itself.

Direct Effect

Geometry

The geometry of a space can directly affect the user through its ability to stimulate or become neutral to the user. This variable changes across cultural boundaries; therefore must be carefully watched when dealt with in the design situation. In the most common mode of the western and far eastern cultures, the geometry of the cubic or quadratic space is the most efficient, most used, and therefore becomes the most neutral through the users thorough knowledge and expectation of it. With this group of users, any change upon this basic shape increases user stimulation in a fairly strict hierarchical order. A 90 degree turn in the space is the first level for stimulation. An angular turn, or non-90 degree turn is the second order. A multiple turn is the third order, with a circular space the fourth order of stimulation. The highest level of stimulation in this particular culture is that of the serpentine space or multiple curvilinear turns, including a spherical geometry. The level of stimulation desired must be carefully set by the designer, as over-stimulation and understimulation have extremely detrimental effects on users.

Level Changes

Level changes within a space affect the stimulation effect of the geometry of a space in multiples. The most basic form can be made to be overstimulating through variations in the overhead plane or ground plane. The effects of the change in overhead level are the most subtle of the two categories. The most perceived behavioral effect is that change in the overhead plane can increase the ability of a space to be perceived as being infinite in the initial reaction. The effects of a change in ground plane have been studied in depth. From these studies a general conclusion can be drawn that relates to all changes in floor level - it causes the user to slow down or even halt movement and perceive the entire space and his
direction of movement through it.
STRUCTURE IMPACT

Description

The structure of a space infringes upon a number of other variables, but its strength as a design element and as an element crucial to any space, requires that it be considered specially.

Direct Effects

Structure as an Organizing Element
The structure or the perceived structure of a space can be seen as an organizing element creating a pattern within a space that is unchanging. This pattern can dictate the organization of elements and people within the space. The degree to which the structure dictates this organization is the degree to which it can become an ordering element. In some cases, the structure organizes the space little - only setting the outer limitations of the building. When the structure becomes the controlling factor of the space to the user, it can have the tendency to be static. In some instances, this may be desired, but this should be carefully determined because the static space creates static movements and perceptions, and eventually affects thinking patterns.

Perception of the Structure
The perceptibility of the structure affects the degree to which its pattern is affecting the user. The structure may be inherent within the boundaries of the space, in which case its perception tends to be low, almost subliminal, thus minimally affecting the pattern or organization of the users in the space. Blatant expressions of the structure have a different and opposing effect upon the users of the space. They may override the original needs of the user and impose an entirely unnatural behavior on the user. The structure which is noticeable, yet not dominating, may cause the user to have to decide what his interactions with the space will be - whether he wishes to work with the structure by either moving around or expressing it, or whether he wishes to ignore it altogether. Either way, he has an option; therefore this can be the most positive in effect on the normal user. There are some instances which may require that the user not have to make such a direct choice, and those in which the natural behavior of the individual may not be desired.

Structure as an Element of Security
The structure of a space or the perception of the
structure can be used as a device to increase the feeling of security within a space. Inversely, the perception of the structure, if it is a negative one, can increase the insecurity of the users of that space. In such a space, transient behavior would be common.

Design Recommendations

Structure of public spaces should have some degree of perceptability (not be totally obscured by a variety of finishes) in order to increase the sense of security within a space and in order to be used as fixed features.

Structure which over-regulates a space creates a static space which may become uninhabitable by the users. The structure must work for a space and not regulate the space itself.

The perception of the structure directs the degree to which the structure organizes the users' behavior. The higher the degree of perception, the higher the degree of behavior oriented along the structure's patterns. This can be positive if the structure is apparently innovative and has a great variety from the norm. However, this can create static usage.
VIEWS

Description
Views are totally intangible, but are controllable. Attitude is not dependent on views, but is greatly influenced by them. A given attitude can alter an individual's behavior drastically.

Direct Effects
Lack of views out of a given space can create entrapment and thus decrease activity and output while increasing tension. Views out of a space into monotone areas will tend to depress attitude, activity, and output, although users will not have increased tension; they will tend to avoid the space. Views out of a space into a poor site (culturally determined) can create the same behavior as a monotone area.

Design Recommendations
Views should always be examined from the common position of the user, such as standing - looking down or out, sitting - looking up or out, etc.
VOLUME - APPARENT SIZE

Description

The effects of volume on the behavior of users of a space are hard to define. They can be so interwoven with other variables as to be impossible to isolate. In order to find direct behavioral consequences, the laboratory setting would have to be so sterile as to affect the results also. This variable deals with size specifically, and in dealing with size some basic theories can be put forth.

Direct Effects

Infinite Volume

Infinite volume is most commonly perceived as being an outdoor space, unconfined by architectural barriers. This is undeniable. But, the perception of infinite volume can also occur in buildings when the architectural barriers are not easily perceived through the senses of sight, hearing, or touch, or when the architectural barriers are beyond the range of reasoning, i.e. the user cannot identify his sense of position or cannot immediately understand the scale of the space. In this instance, the perception of the infinite may be fleeting, occurring only as long as it takes the individual to acclimate. In either case, the behavior during the perception of infinite volume is basically the same. In the most basic behavioral modes, circulation tends to become extreme and undirected - this means that either extremely random wandering occurs or the user moves in straight, unidirectional lines to points of interest. The determining factor seems to be whether the user has a definite goal in mind or not.

Another effect which the feeling of infinity may have is to create the feeling of insignificance. In some individuals, this feeling may simply have a humbling effect - those are in a positive frame of mind. To those who do not currently have a good feeling of self, the effect may lead to depression. In those persons with a high awareness of self, the feeling of insignificance may lead to a sense of freedom - rationalizing that through the infinity of the space, they are no longer bound by their environment and their actions do not affect it.

Neutral

Neutral spaces are those in which the user can identify the boundaries instantaneously. In the neutral space the user can easily sense his position and can estimate the volume with some accuracy, but most significantly, can recall the size of the space. The neutral space does not seem to significantly vary the behavior of most
individuals, but can enhance the behavior of some—namely those with poor self-awareness or control.

Acute

Acute volumes are those whose boundaries are instantaneously identified as being too small. Most effects of this type of volume are negative in the initial sense, as they tend to heighten the effects of other factors such as crowding, high temperatures, lack of air flow and noise perception. In controlled situations, this volume can have positive effects on the individual—through aiding the realization of the self.

Variable

Variable volumes are those whose boundaries are instantaneously identified, but cannot be recalled; and those whose boundaries can be instantaneously identified as changeable by the user or user controlled. This type of volume can have directly detrimental effects on unstable or irrational users. Also, this volume may encourage vandalism through too high a degree of user control. The use of this type of space should be well considered before it is designed, for the awareness of the space limitations and outer boundaries of variability should be just as easily perceived as the availability of variability itself.

Design Recommendations

This variable cannot be confined by general statements. It is too dependent on the given situation.
REFERENCES

Acoustics and Sound

Climate Variables

Color

Features: Objects

Lighting


Personal/Social Adaptation Factors


