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Effects of Interior Environment on the Dining Experience and Design of a Prototype Seafood Restaurant

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Abstract

This study dealt with identifying factors related to the interior environment of a restaurant, which enhance the dining experience. The objective was to identify the effects of various attributes of an interior and their effects on the human psyche and behavior. The major aspects that were studied in the course of the review of background literature were color and light and their effects on human emotions as well as perception of the interior environment. Several studies reported factors that influence preferences in interior environments and reinforced the need for studies in the field in order to create more meaningful environments that are comfortable and relaxing. Other factors also emerged and literature with suggestions on design and development of environments conducive to positive attitudes, behavior and emotions was documented.

Knowledge of these attributes formed the basis for the design of a prototype for a seafood restaurant in Tallahassee – Coral Reef. Both the functional and ambient requirements were laid out to guide the design and the site was chosen on the outskirts of Tallahassee. The basic concept behind the design evolved from the client’s need for a highly sophisticated atmosphere and also from the client’s background as a naval officer. References to marine life were kept subtle and the major element of the restaurant was designed as a channel of water that meanders through the entire spaces and ties it all together. The design was based on the idea of transforming the space into an experience that would give the visitor relief and comfort away from the routine busy life.
Human beings continually scan their environments for information and stimuli, which help them to make conscious and subconscious judgments about the surroundings, and to determine what actions and attitudes are most appropriate (Robson, 1999). People’s attitudes, behavior and well-being are influenced by the aesthetic quality of the environment (Scott, 1993).

Changing customer demands and their increased expectations, are driving design in the restaurant industry (Belman, 1996). With an increase in the number of people eating out, the demand for more sophisticated and ambience-rich settings is also increasing (Ursin, 1996). Restaurant visitors are looking for entertaining environments with aesthetic qualities, which can reinforce and enrich the overall dining experience (Hamaker, 2000). Ambient, social and design factors are elements that can contribute to the creation of a restaurant environment that provides a positive dining experience to visitors (Robson, 1999).

**Purpose Of The Project**

The purpose of this project was to identify factors of the interior environment of a restaurant that affect guests’ emotional state, behavior and dining experience. The aim was to find preferred characteristics in the ambience of a fine-dining restaurant and incorporate these ideas into the design of a fine-dining seafood restaurant in Tallahassee, Florida.

**Justification Of the Study**

Ursin (1996) referenced figures from *Contract Interior* to explain the growing trend of eating out. Ursin related statistics regarding the increase in the US food dollar spent away from home from 25 percent in 1955 to 44 percent in 1993 and also mentioned that there is every indication that it will soon be up to 50 percent.

Inferring from the growth in the number of people eating out, the demand for more comfortable and inviting restaurant settings is justified. Ursin (1996) mentioned another survey
conducted by the National Restaurants Association in 1995, in which 44 percent of the respondents reported that they like restaurant environments that are more stimulating and active, clearly indicating an increased awareness among people about the aesthetic quality of restaurant interiors.

With the increase in the number of people eating out and the demand for sophistication and comfort in restaurant settings it becomes increasingly essential to ensure that designs can be justified against a set of criterion, which are based on preferences of restaurant visitors. Scott (1993) underlined the importance of understanding visual attributes that govern people’s environmental preferences and the application of this knowledge to interior design and architecture in order to create “aesthetically pleasing spaces conducive to positive attitudes, behaviors, and well-being.” Scott outlined a set of visual attributes that define preferences in interior environments and found them in coherence with previous studies related to landscape and urban design. Scott stated the need for continued investigations on the validity of the identified framework for specific interior environments.

**Brief Description of the Design Problem**

The project was driven by the client, Retired Gen. Triviani, an ex-naval officer. His goal was to build a seafood restaurant on the outskirts of Tallahassee, which will cater to a clientele looking for a highly sophisticated environment. The aim was to create an environment that would demand a certain code of conduct but still provide relaxation and respite from the routine busy life. The restaurant was meant to cater to approximately 150 visitors with a bar and lounge to accommodate approximately 35 guests. An outdoor seating area was proposed in order to provide a natural setting, which was found to be highly preferred in several studies reported in the review of literature. A review of literature about the growing trends in restaurant design revealed the incorporation of a grocery store and kitchen garden, which are becoming increasingly common in restaurants. These were also incorporated in the design requirements.

**Goals of the Project**

The aim of the project was to design a prototype for the restaurant based on the functional and aesthetic requirements specified by the client. The project was aimed at identifying attributes
The design of the restaurant will be based on subtle references to the nautical theme. The overall form of the restaurant, shapes in doorknobs and accessories as well as wood inlays will refer to the curvilinear nature of the sea and also the shapes reminiscent of ships. A color scheme comprising of the variety of bright colors characteristic of coral reefs, such as red, orange, yellow and green will be representative of coral reefs after which the restaurant has been named. The bar will be a niche carved out of glass chips in bright colors and will be lit from the back, acting as a three-dimensional representation of the concept of coral reefs. Stained-glass elements will be used to enhance the color scheme. The form of the building as a whole and the spaces would basically be a juxtaposition of curvilinear and rectilinear forms serving as a reference to the curvilinear free form of sea waves, sailing ships and corals. The rectilinear forms will be a reference to the disciplined and regimental nature of the owner’s naval career.

Color scheme

The color scheme will be based on the idea of creating a retreat for the visitors. The idea is to create an atmosphere representative of an evening at the beach. The dining area will be a wooden floor (earth colors like sand), the ceiling will be dark blue (evening sky), the walls are proposed to be shades of orange and red (setting sun) and all light fixtures hanging from the ceiling are proposed to be satin nickel finish with white opal or transparent glass with fluorescent lighting (representative of stars in a dark night sky). Furniture will be neutral wooden colors with bright upholstery and table covers. As stated before, stained glass and fiberglass chips will provide further color accents. The colors chosen for the walls are also conducive with studies on interior colors and their effect on odor of food as discussed later in the ‘Review of Literature’.
Lighting

Lighting in the restaurant is proposed to compliment the color scheme. Color and light accents are proposed mainly for the wall and ceiling planes, in the dining area that fall largely within the cone of vision. Most of the lighting will be fluorescent, to assist the creation of a starry sky effect and to satisfy the considerations of green design. Soft floor lights will be provided at steps and corners as well as around the proposed water channel.

Water as an element of design

The sight and sound of water and other natural materials is being considered as holding a great appeal to the senses. In order to incorporate water as one of the elements of design, it has been proposed that one of the background walls will have a sheet of water rippling down constantly into a channel that meanders through the entire restaurant. This channel of water is proposed to be the element that ties the entire restaurant.

Wine display

A fine-dining restaurant is recognized by its wine and liquor collection. This is thus proposed to be a major feature of the design and the locus of the restaurant. The large wine glass with display will serve to tie the two floors together.

Outdoor seating

The site overlooks a small natural lake on the adjacent plot and the proposed outdoor seating will overlook the lake and will also have a visual barrier from the main road.

Artwork

References to the owner’s background and philosophy will be evident in the selection of artwork but it is proposed to avoid any direct references to marine life in order to avoid any reactions like, “this thing I am eating was once alive and kicking.” All artwork will refrain from stereotypical references to aquatic life, or the “ship in the storm” themes but will contribute to a feeling of coolness.

Definition Of Terms

Ambience: The feeling or mood associated with a certain setting or environment. Ambient factors are those that affect the atmosphere of the environment, such as color, sound, lighting, and scent (Robson, 1999).
Arousal: A measure of how an environment stimulates our perceptions or excites us (Mehrabian and Russell, 1974). Arousing environments are those that are complex and provide high volumes of information to all senses at the same time (Robson, 1999).

Brightness: Brightness of a hue depends on the relative amount of the specific spectral hue that a surface reflects in relation to the amount of that spectral hue that is absorbed by a toning agent (Miller, 1997).

Chroma: The purity or saturation of a color is referred to as chroma. A strong-chroma color is bright and pure while a weak-chroma color is dull and grayish (Doyle, 1993).

Color scheme: The color palette used in the interior space including the color of structural as well as furniture elements in the space constitutes the color scheme.

Complexity: Complexity in an interior environment is related to the variety and diversity of interior elements like materials, textures, patterns, colors, etc. or the scene’s ability to offer a sufficient number of representations to simulate interest (Scott, 1993). It is directly related to the intricacy of design and the amount of effort that the human psyche takes to comprehend the space in totality. Less variance in the materials, textures and pattern in the design leads to lower complexity whereas an increase in the variance of above factors leads to higher complexity.

Dining experience: Experience can be defined as the apprehension of an object, thought, or emotion through the senses or mind. Dining experience, in this study, is related to the response (largely sub-conscious) of the senses to the interior environment during the course of a meal. With reference to restaurant settings it can be interpreted as the factors influencing the length of stay, the response to the quality of food, the desire to return, etc.

Dominance: The degree of control a person has over the environment or setting, which helps us create and defend our personal space (Robson, 1999).

Fine-dining restaurants: Restaurants with table service that cater to the elite socio-economic group of society. These restaurants are generally identified as requiring a formal dress code, being relatively expensive (subject to geographical locations), and higher on the level of sophistication.

Hue: Hue is the name of the color and this term may be used interchangeably with color (Doyle, 1993).

Lighting: The placement, intensity and color of lighting and light fixtures in an interior space correspond to the lighting character. Lighting may include artificial as well as natural light.
Intensity of light may vary from dim to bright. Color of light can be consistent in the entire space or a number of light colors may be used. Perceived colors of objects in the interior also depend on the color and intensity of light falling on them (Peretti, 1997).


*Reference to nature:* Reference to nature in the design of an interior environment is generally related to the incorporation of natural elements in the design. Water features, plants, natural materials, windows that afford a view of the outdoor environment, skylights, as well as features like natural sounds and fragrances all contribute to the naturalness of the setting (Miller & Schlitt, 1985).

*Spaciousness:* Spaciousness is related not only to the directly perceived size of the interior space but also to the psychologically perceived openness in the space. Factors that contribute to the perception of openness are higher ceilings, large openings with a view to the outdoors, unobstructed spaces, etc. (Scott, 1993). According to Aking and Küller (1972) this factor relates to the appearance of space and light.

*Spatial configuration:* The design and configuration of various elements of the interior space constitutes its spatial configuration. This includes placement of structural, furniture and decorative elements and their design in terms of form and scale. Level changes, ceiling heights, division of spaces, etc. which define spaces within a single large space are major factors that contribute to the definition of spatial characteristics of an interior (Scott, 1993).

*Style:* Style corresponds largely to architectural and furniture styles used in the design of the interior space.

*Value:* The lightness or darkness of color is a dimension called value. The value of a color is determined by comparing the color to a varying scale of grays with white at the top and black at the bottom. This scale is known as the value scale (Doyle, 1993)

**Conclusion**

This project is directed towards applying the information gathered from a review of literature on built environment, its components and their affect on human behavior and psychology, especially pertaining to dining spaces and behavior. A review of literature of
preferences of human beings in interior spaces and their reaction to various aspects of an interior will form the basis of the design of a seafood restaurant in Tallahasee, Florida as per the requirements set by the client Ret. Gen. Triviani. The next chapter discusses literature on preferences in interior environments and there is a detailed discussion of color and lighting in interiors. In addition there is a discussion on some of the upcoming trends and major concerns in restaurant design. Finally I present my design for the proposed restaurant based on this literature and the specified requirements.
Chapter 2
Review Of Background Literature

The literature related specifically to interiors of restaurants and its effect on human behavior is limited. However, there is a lot of information on the relationship between emotions and characteristics of the interior environment such as color, light, and odor. This project includes a review of literature related to attributes and aspects of interior environments on which occupants base their preference judgments.

A manual search of volumes of the Journal of Interior Design Education and Research starting 1979 yielded articles related to design and interior spaces. Reference lists from these articles also provided several important primary and secondary sources. The databases that were most useful in finding literature on the topic were the WebLUIS system of the FSU library and PsycINFO. Keywords that were successfully used individually and in combination were color, lighting, interior, environment, restaurants, psychology, emotion and preferences. Other literature was found through internet search engines like google and yahoo. On-line publications like Restaurants USA and Color Bulletin yielded some important information.

The following sections present the attributes of interior environments. Effects of color and lighting on emotions, perceptions, and other aspects of human behavior that define preference are discussed, followed by a detailed discussion of growing trends and concerns in restaurant design. Finally, a detailed documentation of the proposed design for the restaurant in presented.

Preferences in Interior Environments

There are 3 modes of perception in human beings and these include the operational mode, in which we concentrate on only those elements of the environment that are important to accomplishing a task; the responsive mode, which includes our everyday noticing of things around us; and the inferential mode, in which we focus our attention on those elements that support our knowledge of an environment (Robson, 1999). Robson stated that an environment, which provides information on all three levels, is a successful environment especially when it
also relates to things that are familiar and understood from previous experiences. Also discussed was the theory about too many stimuli competing with each other that leads to a sensory overload. Referring to the Pleasure Arousal and Dominance model formulated by Mehrabian and Russell (1974), Robson stated that various combinations of the three basic factors presented in the model lead to preference or non-preference of an environment. Arousal levels are stated as being extremely important in determining the length of stay of guests and are associated with the amount of stimulation that the environment provides. Arousing environments have been described as complex environments that provide high volumes of information to all the senses at once. The degree of pleasure is known to increase as arousal increases, up to a point, beyond which increasing arousal leads to over stimulation and eventually a drop in the feeling of pleasure.

Other factors that contribute towards enhancing mood and pleasure are lighting, scent, sound, social factors, exterior design features, restaurant layout and furniture and finishes (Robson, 1999). Robson’s study discussed these factors in detail and stated their contributions to the restaurant environment and the visitors’ behavior. Bright lights contribute to arousal and draw people to them. Lights that move or are highly colored can be used to increase levels of stimulation. Pleasant smells enhance mood and in turn promote clear thinking. Robson discussed the possibility that scent can provide additional stimulation. According to Smith and Curnow’s (1966) study supermarket shoppers spent significantly less time in a store when loud music was played and Milliman’s (1982) study concluded that slow rather than fast-paced music kept patrons in stores longer and increased their purchases. It was thus inferred that fast music results in both faster service and shorter lengths of stay. Robson however stated with reference to these studies that care should be taken to ensure that the volume in a restaurant is sufficient to provide a moderately high level of arousal but not so much that it prevents comfortable table conversation. The age group of patrons should be a major consideration in determining sound levels. Sound levels of 75-79 decibels should be the maximum if the target market is patrons under the age of 30, while older patrons will be happier when the background music is set at a low volume.

Robson (1999) discussed the human tendency to steer away from overcrowded environments which reduce the ability to define personal territories and also the apprehension towards being alone in a public space. Robson suggested that a restaurant setting should be
designed such that it looks busy yet provides the opportunity for people to form their own territories. Seats that are anchored by some physical feature like columns, windows or lamps, were stated as a means to limit the amount of information and stimulation reaching the occupant. Unanchored seats on the other hand, make a person feel more exposed and less in control. Division of dining areas into smaller more personal spaces satisfy the human need to find company and it also provides the flexibility to open or close certain sections depending on how busy the restaurant is and make is look more crowded, which sends the message that the restaurant is popular. Busy environments increase arousal levels, but a hectic setting can be over stimulating and encourage patrons to complete their meals quickly.

Robson (1999) stated the need for providing an exterior environment, which will provide the guests with ample information about the cuisine; ambience and service to expect inside the restaurant help them interpret the environment more quickly. Some suggestions in this regard are: well-defined entrances, convenient drop-offs and an ample waiting area. The lack of windows has been suggested as a means of increasing the element of surprise by restricting the view from outdoors.

Restaurant layouts need to cater to the need for division of the space into smaller areas, through level changes, low barriers, or floor finishes, etc. in order to make the place feel busy. Robson (1999) stated that open kitchens and tableside activity add to the complexity of the environment and lead to higher arousal levels. The environment should be easy to understand and assimilate, and should provide a good view of the main areas from the entryway. Effective use of retail areas as buffers between the host area and the main dining area can be used to achieve this result. Booths, which provide no control over the seating arrangement and are less comfortable in terms of the posture and personal distance between guests, have been stated as increasing table turns as it avoids lingering. Hard finishes on furnishings and floor contribute to higher arousal levels through increased sound as music and noise bounce off these surfaces and reverberate through the space. Practically speaking, these surfaces are easier in terms of maintenance. Use of many different textures and materials contributes to the complexity of the environment, which is highly arousing.

A study by Scott (1993) using a selection of 80 slides presented to a group of students showed that preferences in interior environments are based on previously held theories of preferences in natural and urban landscapes. Scott came up with a set of eight factors identifying
preferred environmental attributes and detailed the associations of these factors in various interior environments. The factors evaluated by Scott have been tabulated in order of mean preference in Table 2.1.

Table 2.1
Factors in Order of Decreasing Mean Preference Score (Scott, 1993).

<table>
<thead>
<tr>
<th>Factor</th>
<th>Label</th>
<th>Mean</th>
<th>(n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor 3</td>
<td>Spacious settings with plants and natural light</td>
<td>3.77</td>
<td>(9)</td>
</tr>
<tr>
<td>Factor 2</td>
<td>Intimate social zones with spatial and visual complexity</td>
<td>3.49</td>
<td>(13)</td>
</tr>
<tr>
<td>Factor 8</td>
<td>Multilevel spaces with strong angular elements</td>
<td>3.43</td>
<td>(5)</td>
</tr>
<tr>
<td>Factor 5</td>
<td>Spaces with interior windows and patterns of repeated elements</td>
<td>3.03</td>
<td>(8)</td>
</tr>
<tr>
<td>Factor 4</td>
<td>Spaces with curvilinear walls and darkness</td>
<td>2.81</td>
<td>(9)</td>
</tr>
<tr>
<td>Factor 6</td>
<td>Institutional settings</td>
<td>2.48</td>
<td>(9)</td>
</tr>
<tr>
<td>Factor 1</td>
<td>Open, unstructured spaces with repetitious furnishings</td>
<td>2.31</td>
<td>(11)</td>
</tr>
<tr>
<td>Factor 7</td>
<td>Deep and enclosed spaces</td>
<td>2.17</td>
<td>(8)</td>
</tr>
</tbody>
</table>

Mean preference score for each factor equals mean of mean preference scores of the individual scenes loading on the factor.

Preference statistics for entire environmental sample: $M = 2.90$ (N=80) $Min = 1.42$ $Max. = 4.49$ $SD = 0.698$ $Var. = 0.448$

Scott (1993) mentioned that in the study “spatially and visually complex intimate social zones” were dominated by social settings and gathering places such as restaurants and bars. These spaces were sub-divided into smaller, clearly defined zones. Scott also includes partially enclosed areas furnished for group interactions for these settings. Scott stated, “Varied types of placements of walls and furnishings yielded complex spatial configurations. Materials of diverse pattern and texture, non-uniform lighting schemes, and inclusion of artwork, plants and other accessories contributed visual richness.”
Scott (1993) tabulated various attributes that influenced preferences in interior environments and provided descriptors that identify these attributes in interior environments. Table 2.2 was formulated by Scott to present these attributes in order of decreasing preference ratings as concluded from the study.

Table 2.2
Attributes Related to Preference in Interior Environments (Scott, 1993).

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Typical Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plants</td>
<td>Plants, trees</td>
</tr>
<tr>
<td>Spacious</td>
<td>Spacious, high ceilings, open</td>
</tr>
<tr>
<td>Complex</td>
<td>Varied materials, textures, unique furniture arrangements</td>
</tr>
<tr>
<td>Spatial configuration</td>
<td>Varied space, divided into smaller areas, level changes</td>
</tr>
<tr>
<td>Windows</td>
<td>Windows, views</td>
</tr>
<tr>
<td>Relaxing/social purpose</td>
<td>Warm, relaxing, carpeted, comfortable seating</td>
</tr>
<tr>
<td>Style</td>
<td>Modern, unusual or strong design, high-tech look</td>
</tr>
<tr>
<td>Light</td>
<td>Light, bright, high-contrast or varied lighting</td>
</tr>
<tr>
<td>Coherent</td>
<td>Simple, non-confusing</td>
</tr>
<tr>
<td>Other</td>
<td>(Unique or meaning unclear)</td>
</tr>
</tbody>
</table>

Note. Attributes are tabulated in order of decreasing preference rating.

In the same study, Scott (1993) also identified attributes of interior environments that subjects identified as causes of non-preference in these environments. These were tabulated in order of decreasing non-preference. Table 2.3 presents these attributes wherein a sterile and low in complexity environment is the most non-preferred environment.
Table 2.3
Attributes Related to Non-Preference in Interior Environments (Scott, 1993).

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Typical Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sterile/Low Complexity</td>
<td>Sterile, no variety of materials, boring furniture arrangement, no accessories, plants or artwork</td>
</tr>
<tr>
<td>Tight/Enclosed</td>
<td>Cramped, closed-in, low ceilings, congested</td>
</tr>
<tr>
<td>Institutional look</td>
<td>Institutional, ordinary, repetitious furniture, uniform lighting, presence of books, exit signs</td>
</tr>
<tr>
<td>Dark</td>
<td>Dark, dim, dreary or gloomy, no windows or natural light</td>
</tr>
<tr>
<td>Hard Materials</td>
<td>Hard materials, brick, tile, metal</td>
</tr>
<tr>
<td>Vast/Empty</td>
<td>Too large, long, empty, barren</td>
</tr>
<tr>
<td>Boxy Shape</td>
<td>Straight lines, “boxy”, boring</td>
</tr>
<tr>
<td>Bright</td>
<td>Too bright, harsh, glary</td>
</tr>
<tr>
<td>Unique Shape</td>
<td>Unusual shape, “bizarre” architecture</td>
</tr>
<tr>
<td>Other</td>
<td>(Unique or meaning unclear)</td>
</tr>
</tbody>
</table>

Note. Attributes are tabulated in decreasing order of non-preference.

Miller and Schlitt (1985) discussed the contribution of naturalistic settings or settings which are high in terms of references to nature. They stated that these settings contribute highly to increase in preferences of interior environments. Several factors, techniques and design elements were identified and suggested as means of increasing naturalness in interior environments in order to make them more appealing to occupants. Table 2.4 is a partial list of techniques that may be used by designers for creating interiors high in naturalness as presented by Miller and Schlitt.
Table 2.4
Techniques for Creating Interiors High in Naturalness

<table>
<thead>
<tr>
<th>Technique</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Light</td>
<td>Natural light or simulations and substitutions for the same, for example, lamps that are strong in the yellow-red range.</td>
</tr>
<tr>
<td>Sky Effect</td>
<td>Skylights or simulation of the effect</td>
</tr>
<tr>
<td>Natural Materials</td>
<td>Wood walls and furnishings</td>
</tr>
<tr>
<td>Natural Colors</td>
<td>Colors from natural sources like, flowers, plants, and natural materials.</td>
</tr>
<tr>
<td>Water and Vegetation</td>
<td>Gardens, plant areas, fountains, greenhouse, etc.</td>
</tr>
<tr>
<td>Non-visual Experiences</td>
<td>Sounds of nature, natural fragrances of flowers and plants, and the characteristic texture of particular plant materials.</td>
</tr>
<tr>
<td>Seasonal Change</td>
<td>Color, lighting, texture, and furnishings to simulate seasonal change.</td>
</tr>
</tbody>
</table>

Note. This table has been reproduced based on the findings presented by Miller and Schlitt (1985)

McLain and Rogers (1981) discussed the reactions to openings in a room. They stated that as the activity and simulation is restricted in a room, (as in an office environment) the complaints against the windowless room increase as opposed to very active and stimulating environments like theaters. The study inferred that windows provide a psychological relief for users in non-stimulating environments.

Burns and Caughey (1992) conducted an experiment with restaurant interiors and their perceptions by people. The study involved the formulation of a total of 2731 units of analysis (words or phrases that conveyed a single impression of the restaurant) and established categories that lead to first impressions of restaurant interiors. The largest contribution was identified as a result of “holistic impressions” detailed by Burns and Caughey as including architectural style, function, atmosphere and space planning. “Room components” including ceiling, windows, lighting, floor, walls and other structural elements were the second largest contributors to the formation of first impressions. “Color and pattern”, “furniture and accessories” including plants
and artwork, “type and cost of food”, “geographic context” and “clientele” were other factors identified by Burns and Caughey.

Burns and Caughey (1992) elaborated the factor of cost of food and stated that the reason for the type and cost of food not being an important category in the first impressions of restaurant interiors suggests that other aspects of the restaurant image such as its name, signage, logo, and menu may be the instruments towards identification of the type and cost of food served.

Color Theory and Color Psychology

Color has had an effect upon virtually every aspect of human life and culture since the beginning of time (Birren, n.d.). Considering all subtleties and variations perceived by the eye, there is a definite effect of color on human psyche. Color presents opportunities that can be exploited in design of interior spaces but which remain unrealized because designs and color palettes are being dictated by market trends and prescribed hues (Portillo and Dohr, 1993). Colors have a significant impact on daily life and play an important role in self-presentation as well as forming of impressions (Hemphill 1996). Colors have certain behavioral connotations and influence states of mind as well as the perception of some physical qualities of the immediate environment and, if used resourcefully in design of these environments, can influence the user’s emotional and mental balance (Wells, Need & Crowell 1979-1980). Color can be used as an important tool in design problem solving based on the various aspects that it influences. It offers many contributions to the built environment if used to its full advantage (Portillo and Dohr 1993).

Various aspects of color

Spillman (1985) proposed multifunctional color frameworks in architecture that formed the basis of the functional aspect of color selection, and outlined the influences of color. This framework comprises of psychological aspects that influence human behavior; contextual aspects that emphasize designs and the environmental settings in which these designs are placed and structural aspects that describe the compositional development of color.

Boeschenstein (1986) elaborated on the categorization of color provided by Spillman (1985) and added three aspects to the original list including a) functional aspects that involve
color unity, figure ground relationships, color illusions and color-coding systems; b) relational aspects, which include color in terms of architecture and the natural environment; and c) emotional aspects which involve subjective preferences and market trends.

**Symbolism of color**

According to Birren (1961), over the years, man has associated color with objects that he encounters on a regular basis, events from history, or traditions and cultural beliefs. This gives rise to emotions generated by the color owing to a subconscious recollection of the association. The colors in general, begin to symbolize the object, event or belief from where the relationship first began. Symbolism of color thus embraces all the civilizations, religions, art, science and customs that man has been through since the beginning of time.

Mahnke and Mahnke (1987) established similar associations of color with mental impressions and recollections, thus supporting these findings. Over the years recent events as well as additions to the environment through invention and discovery have led to the additions to the list of direct and indirect associations. Mental associations of color have unconsciously developed as a part of the evolutionary process and, although the degree and strength of emotion varies from person to person the general association remains the same. They presented a tabulation of the various associations that have been established with color and also the impressions that they generate. (See Appendix A)

**Color selection in architecture**

Portillo and Dohr (1993) conducted an experiment with interior designers as subjects to conclude that there are certain set criteria that largely affect color selection for interior spaces. These include compositional criteria that involve creating unity or emphasis and manipulating form or space; symbolic criteria which spring from design concepts; behavioral criteria based largely on functional requirements; preferential criteria, which reflect individual color preferences and color trends; and pragmatic criteria based on economic constraints, maintenance factors and physical preconditions.

The study provided a basis for evaluation of design solutions in terms of design elements being more explicit and purposeful. Compositional, symbolic and behavioral criteria were found to be predominant in the selection of color palettes by designers.
Effects of color on the perception of interior environments

The placement of certain colors in an interior environment is an important factor, which affects the psychological impact of the space on the occupant and also the subsequent reactions. Whitfield and Slatter (1978) studied the judged appropriateness of colors for walls in a domestic interior setting as a function of its style of furnishing. They established a relationship between appropriateness and prototypicality and that the extent to which a particular color is found appropriate in an interior setting is a major determinant of positive or negative aesthetic response to the color. Interchanging colors of ceiling, walls and floor can alter the complete spatial character of a room and consequently reaction and behavior of the occupants (Mahnke and Mahnke, 1987). (See Appendix B)

The effect of a hue on interior surfaces depends on the space, the material and texture carrying the hue, the duration of stay and the intensity of the hue (Mahnke and Mahnke, 1987). They also stated that there is a definite psychological association between color and its placement in an interior space and the spatial experience. Emotions that are evoked as a result of the color of surfaces in a space result in the variation in behavioral patterns of the occupants.

Acking and Küller (1972) conducted an experiment to study the effect of color on eight major factors in the perception of an interior space. These factors were found on the basis of responses from subjects. The relationships between color and the various factors deduced from the experiments are listed below:

Factor of pleasantness. This factor deals with a feeling of comfort and sense of security and well-being and is described by terms such as pleasant and inviting, or opposing terms such as boring, repulsive or nerve-racking. There was a lack of general results regarding the relationship between the pleasantness evaluation factor and color variables, but Acking and Küller (1972) stated that differences within hues are as a rule much greater than between different hues.

Social evaluation factor. This factor implies an estimation of the social status and may be described with words such as expensive and fine, or opposing terms such as pretentious, poor and simple. Acking and Küller (1972) found that perception of social status varies with lightness and to a lesser extent with chromatic strength. Results stated that an interior is valued more highly when blackness increases (towards a darker value) and less highly when chromatic strength increases.
Spatial enclosedness factor/ Perceived openness. This factor is related to the description of the appearance of space and light. Words used to describe this factor are open, light and spacious, or opposing descriptions like closed, dark or encumbered. Acking and Küller (1972) found that the perception of openness increases with lightness of either interior details or walls and also with a corresponding increase in the chromatic strength of interior details. There was no dependence between chromatic strength on the walls and perception of openness.

Factor of complexity. This factor refers to the intensity or complexity in the interior environments and includes descriptive terms such as motley, composite, complex or discrete. Variations in materials, textures, and pattern throughout the space contribute towards increased complexity of the environment. (Scott, 1993) Results of Acking and Küller’s (1972) study showed a positive correlation between chromatic strength and judged complexity. Complexity increased as chromatic strength increased. No such dependence was found on lightness but small positive correlation was reported with redness and greenness.

Factor of unity. This factor takes into consideration the unity of the environment. Examples of associated descriptors include unitary, whole and of pure style, or opposing descriptors such as badly thought-out or split. Results were inconclusive however, moderate dependence on chromatic strength was found. Unity decreased as chromatic strength increased. A small correlation was also reported between unity and blackness (darker value).

Hogg, Goodman, Porter, Mikellides, and Preddy (1979) conducted a study to identify the major determinants that govern judgments of color samples and simulated interior spaces. The study found five factors that account for a major part of the total variance in perception of interior spaces as a factor of color. These factors and their correlation with color are:

Dynamism. This factor is related to the ability of an environment to reflect continuous change and activity. It is highly dependent upon the variety in the design throughout the space. The terms largely associated with the presence or absence of this factor are exciting-calming, dynamic-static, hard-soft, vibrant-still, austere-lush, modern-traditional, fresh-stale, weak-strong, blatant-muted, obvious-subtle, active-passive, introverted-extroverted and dull-sharp. The dynamism factor was found to be the most significant factor in all analysis. It was found that as chroma increased the space was judged as more dynamic. Neither hue nor value made a linear contribution to this factor.
**Spatial quality.** The design and configuration of various elements of the interior space constitutes its spatial configuration. This was the second largest factor in the analysis and the terms associated with the presence or absence of this factor have been listed as open-closed, complex-simple, weak-strong, cramped-spacious, uncontrolled-controlled, free-constricted, private-public, and loose-tight. It was found that as color became lighter, the space was considered more spacious. For green, blue and purple increasing chroma was found to generally lead to an increase in spaciousness whereas for red and yellow the relationship was found to be curvilinear.

**Emotional tone.** This factor is largely associated with the emotions that the space evokes. The variables related to this factor are cold-hot, hard-soft, and austere-lush. Moving around the “hue circle” from red to purple, relationships indicate that emotional tones become cooler, harder, and more austere. Decreasing chroma was found to enhance this effect. Green was found to denote maximum neutrality with respect to emotional tone.

**Complexity.** Complexity refers to the variety and diversity of elements of the interior environment like materials, textures and patterns, which offer a large amount of stimulation. Hogg et al. (1979) identified terms that are largely associated with this factor such as unusual-unusual, complex-simple, private-public, and modern-traditional. Hue did not correlate significantly with complexity but complexity was found to decrease as colors became of lower value and it was found to increase from red to purple around the “hue circle”.

**Evaluation.** This factor can be associated with the overall impression and the occupant’s response to the space. The main descriptors associated with the evaluation factor are: pleasant-unpleasant, and receptive-repellent. There were no significant correlations between hue, value and chroma and the evaluation factor.

Hogg, et al. (1979) also studied the differences in judgment of interior spaces as a factor of the color by architects and non-architects in this study. The results of the study state that there is a high degree of consistency in the patterns of response and judgment of color by architects and non-architects. This similarity in response was found to be stronger for dynamism and spatial quality than for emotional tone. The study concluded that there is a possibly biological correlation between color and its connotations as expressed in language and the effect of field of study and work has minimal effect on judgment of interior spaces based on their color.
Color of food and the sense of taste

There have been a number of experiments conducted in order to determine the effect of color on the sense of taste. There are colors that humans associate with food and this is largely an outcome of habit. People are not used to meat being grey or peas being red and they may evoke a feeling of revulsion even though one might know that the food is edible.

Mahnke and Mahnke (1987) referred to previous studies on the effects of color on taste of food and stated that:

Psychological studies on appetite appeal and color reveal a certain trend. Warm reds (vermillion, flamingo, coral), oranges (peach, pumpkin), warm yellows, light yellows, and clear greens are true appetite colors. Purple-violet, purplish-red, orange-yellow, yellow-green, mustard, grayed tones, and gray have little appeal. To be more specific, a peak of appetite and agreeable sensations exists in the red-orange and orange regions. Pleasure decreases at yellow-orange, increases again at yellow, reaches a lot at yellow-green, and is restored at clear green. Blue-greens (aqua, turquoise), although seldom associated with food itself, are well recognized and can be used to advantage as backgrounds for food display…

… Green salad may look greener and fresher on cool pink serving dishes; the richness of butter is enhanced by green-blue or bluish-white; bread appears best on blue-green or green-blue plates. (p. 102)

In an experiment DuBose (1980) made people taste drinks and identify them. He reported that when people could see the color of the drink they identified them correctly whereas they got confused when they could not see the color, or the color was absent or altered. Subjects also thought that a drink with greater color intensity was stronger in flavor. The acceptability of a drink increased with the intensity up to a certain extent but too much color was unacceptable. Johnson and Clydesdale (1982) reported that subjects reported that sucrose solutions, which were redder, tasted sweeter than those, which were colorless, or with lower color intensity. In a study conducted by Philipsen (1995), he found that intensity of color affects flavor quality of a drink as well as its overall acceptability. Changes in color led to a difference in perceived flavor of the drink. This experiment supported Roth’s (1988) findings that intensity of the color is directly proportional to the apparent sweetness of the drink.
Color of food and odor

Aroma has always been associated with food and its ability to simulate appetite. It is one of the sensations that is debated as being highly psychological and also varying from person to person. The effect of color on the perceived aroma of food has been studied over the years. Christensen (1983) conducted an experiment with human subjects who were given normal as well as uncolored samples of some food items. The results of the experiment indicated a definite relationship between color and odor. All the foods were judged to have a stronger odor when they had color compared to when they had no color. The aroma quality of the colored food was also judged to be better than that of uncolored food. Christensen (1985) extended the study to measure the difference between the odor perceptions in relation to color in subjects of two age groups and found that there was no difference between the young and the elderly in their discriminate odor of food and the judgments based on variations in color were also consistent.

Mahnke and Mahnke (1987) associated smells with the colors that support or compensate for them. They reported that,

Sweet smells are supported by red and pink and compensated for by green and blue. Narcotic and heavy smells are supported by brown-red and violet and compensated for by yellow-green and orange-yellow. Bitter smells are supported by brown/violet and compensated for by orange/pink. Sour smells are supported by yellow/yellow-green and compensated for by red/purple (maximum level). Musky smells are supported by greenish-brown and compensated for by light blue. (p.110)

Mahnke and Mahnke (1987) examined relationships between color, odor and taste. They found that pink, lavender, pale yellow, and green hold pleasant associations with smell while tints of coral, peach, soft yellow, light green, turquoise, flamingo, and pumpkin have pleasant associations with taste.

The food industry relies heavily on the aromatic appeal of food because anticipation of taste depends on perceived aroma. Studies indicating the association of color with human perception of aroma indicate another aspect on which the selection of color scheme for restaurant interiors needs to be based.
Effect of color on appetite

Color is a visual element with which almost all human emotions and feelings have been associated (Birren, n.d.). As discussed earlier, the color of food has been found to have definite affect on the taste mainly because of the psychological association of certain food with certain colors. Some research has also been conducted on the color of the surrounding environment and its effect on appetite. This is an important issue when dealing with the food service industry, which thrives on inducing consumers’ appetite. Birren suggested several ideas for selection of color palettes for specific interiors. He suggested that bright and warm colors like, red, orange and, yellow tend to simulate the autonomic nervous system of man, including digestion, while soft and cool colors tend to retard it. Birren elaborated colors associated with specific food like golden yellow or claret red for wines, and most of these are based on the colors that have been associated with the particular food over the ages. He suggested warm and bright appetizing colors for backgrounds of food service counters and more sophisticated earth tones for walls in table service restaurants. Lighting and illumination play a major role in color selection and their influence on the final appearance of color on a surface will be discussed later. Figure 2.1 represents the curve presented by Birren to associate color with appetite.

Figure 2.1
The Appeal of Color to Appetite.

Note. Peaks that occur in red, orange, yellow and green and the low points that occur in yellow-green and purple. The curve has been recreated from the book Color in Interiors: Historical and Modern by Birren (n.d.) (p. 187)
Color and pleasure, arousal and dominance – Effects on emotions

The Pleasure Arousal and Dominance model first formulated by Mehrabian and Russell (1974) has been described and incorporated by Valdez and Mehrabian (1994) in their study of effects of hue, saturation and brightness on emotional reactions. Pleasure has been associated with the feeling of security and well-being (Robson 1999). Arousal is seen as the amount of stimulus offered by the environment. Dominance has been described as the amount of control one has over the environment. Stating the importance of the Pleasure Arousal and Dominance model for studies of emotional associations Valdez and Mehrabian stated that a general description of emotions can be obtained through a study of the dimensions of pleasure-displeasure (the emotional counterpart of Evaluation), arousal-non-arousal (the emotional correlate of Activity), and dominance-submissiveness (the converse of stimulus Potency).

Valdez and Mehrabian (1994), in their study of the effects of color on emotions, elaborated the model formulated by Mehrabian and Russell (1974) and presented emotional categories represented by groups of dichotomized relationships between pleasure (+P), displeasure (-P), arousal (+A), non-arousal (-A), dominance (+D) and submissiveness (-D):

- **+P+A+D**: admired, bold, creative, powerful, vigorous
- **+P+A-D**: amazed, awed, fascinated, impressed, infatuated
- **+P-A+D**: comfortable, leisurely, relaxed, satisfied, unperturbed
- **+P-A-D**: consoled, docile, protected, sleepy, tranquilized
- **-P+A+D**: antagonistic, belligerent, cruel, hateful, hostile
- **-P+A-D**: bewildered, distressed, humiliated, in pain, upset
- **-P-A+D**: disdainful, indifferent, selfish-uninterested, uncaring, unconcerned
- **-P-A-D**: bored, depressed, dull, lonely, sad

Based on this model Valdez and Mehrabian (1994) conducted 3 studies with undergraduate students and deduced relationships between hue, saturation and brightness of color and emotional reactions. The responses of subjects were analyzed on the basis of the categories and dichotomous relationships presented above. Following relationships were concluded from the study:
Brightness and saturation with pleasure. Brighter and more saturated colors have been reported as more pleasant. Results indicated that brightness had a considerably stronger effect than saturation, on pleasure-displeasure reactions.

Brightness and saturation with arousal. Less bright and more saturated colors were found to be more arousing. The contribution of saturation to arousal reactions was found to be almost twice the magnitude of the effect of brightness on arousal.

Brightness and saturation with dominance. Less bright and more saturated colors were found to induce greater feelings of dominance over the space. Darker (less bright) colors elicited feelings of strength or boldness, as did more saturated colors, which were more vivid, purer or stronger. It was also found that the effect of brightness was considerably stronger than that of saturation in determining this response.

Color wavelength (hue) with pleasure. Pleasure levels for blue, blue-green, green, red-purple, and purple were found to be greater than those for green-yellow, yellow, and yellow-red. Pleasure levels for purple-blue and red were reported as significantly higher than those for green-yellow and yellow. Also, pleasure levels for yellow-red were significantly greater than that for yellow. Pleasure-displeasure reactions to non-complimentary colors were approximately a U-shaped function of wavelength, with yellows at the bottom portion of the U. In general, short-wavelength hues were found to be most pleasant, with intermediate-wavelength hues showing low levels of pleasantness. Complimentary colors elicited higher pleasure ratings.

Color wavelength with arousal. Mean arousal level for green-yellow was found to be significantly greater than the mean arousal levels for purple-blue, yellow-red and red-purple. Blue-green showed a significantly higher mean arousal level than purple-blue. It was generalized that green hues elicited highest arousal reactions.

Color wavelength with dominance. The only significant pattern found in this regard was that green-yellow and yellow were found more dominant than red-purple.

Valdez and Mehrabian (1994) conducted studies using achromatic color palettes as part of the study of emotional associations of color and deduced the relationships between brightness and pleasure, arousal and dominance. The following relationships were presented:

Brightness with pleasure. Black was found to be least pleasant and pleasure increased through intermediate greys with white as the most pleasant.
Brightness with arousal. Arousal levels of achromatic levels were reported as a U-shaped function of brightness. Responses were greatest to black, diminished for three successive greys of increasing brightness, but increased to an intermediate value for white.

Brightness with dominance. Although dominance decreased steadily with increasing brightness, the slope was less steep for brighter colors. Black elicited the highest level of dominance, greys reported intermediate levels of dominance, and white reported the lowest dominance levels.

Hemphill (1996) tabulated the results of a study on emotional reactions of adult males and females to different colored rectangles. Bright colors include white, pink, red, yellow, blue, purple, and green. Dark colors comprise of brown, black, and gray. Positive responses correspond to happy, excited, relaxed, and positive. Negative responses relate to anxious, boring, sad and negative. The results of Hemphill’s study were summarized and have been presented in Table 2.5.

Table 2.5
Color-Emotion Associations for Bright and Dark Colors (Hemphill, 1996).

<table>
<thead>
<tr>
<th></th>
<th>Bright colors</th>
<th>Dark colors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
<td>Negative</td>
</tr>
<tr>
<td>Respondent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>102</td>
<td>42</td>
</tr>
<tr>
<td>%</td>
<td>67</td>
<td>27</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>59</td>
<td>25</td>
</tr>
<tr>
<td>%</td>
<td>53</td>
<td>22</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>161</td>
<td>67</td>
</tr>
<tr>
<td>%</td>
<td>61</td>
<td>25</td>
</tr>
</tbody>
</table>
Hemphill (1996) stated that the reasons for most of the positive and negative responses are the established associations of colors in everyday life. Hemphill stated that the association of blue with the sky and ocean, which are seen to be limitless, calm and serene, could be the reasons for its preference. Preference of the color green was based on its association with forests, trees and nature. Yellow was stated as positive because of its association with the bright sun and grey was seen to be negative because of its association with rainy days eliciting sad and bored emotional responses.

**Gender difference in response to color**

There have been several studies to investigate the response of humans to color. Some of the experiments were conducted to examine if men and women responded differently to color. Guilford (1934) studied the harmony of color combinations and found that more pleasant responses were found when human beings were exposed to either very large or very small differences in hue and his study further indicated that these responses were more prominent in women than in men. Complimentary hues placed opposite each other on the hue circle elicit more pleasant responses than hues placed adjacent to each other on the circle. Guilford and Smith (1959) found that men are generally more tolerant towards achromatic colors than women and they inferred that women are probably more color conscious than men and their color tastes are more flexible and diverse.

Further studies by McInnis and Shearer (1964) concluded that there are differences in color preferences of men and women. They found that 56% of men and 76% women preferred cool colors and 51% men and 45% women chose bright colors. Blue-green was more favored among women than men, and women preferred tints to shades.

Recent studies on interior spaces and color preferences by Bellizzi and Crowley (1983) have indicated that subjects perceived warm-colored environments as less attractive and less pleasant than cool-colored environments. Results of all these experiments have been challenged owing to the restrictions in the selection of subjects and geographical restrictions in conducting the studies. Studies by Khouw (2002) indicated that warm colored environments with medium and high chroma were found to be generally unpleasant and overpowering but reactions of confusion and distraction caused by extreme color contrasts are more frequent in men than in women. Khouw suggested parallel interdisciplinary studies that analyze various aspects of human psychology and culture as well as exploratory studies on gender color responses in order
to provide the design community with a broader perspective and more information about the relationship of color and its meaning in design spaces for the two genders.

Valdez and Mehrabian (1994) found that men and women reacted in highly similar emotional ways to brightness and saturation levels of color but women showed a slightly stronger pattern of response. It was also inferred in the study that both sexes have similar emotional reactions to various hues. Hemphill (1996) also concluded that women responded more positively to bright colors, and also more negatively to dark colors, comparison to men.

*Color-coding and cognition*

Evans, Fellows, Zorn, & Doty (1980) studied the effect of color-coding building interiors on human orientation. The study involved measures of recall and recognition to study way-finding behavior in a building and concluded that if the interior of a large monochromatic building was color coded, then individuals would comprehend the interior spaces better and it would enhance knowledge of spatial information in the building. Evans, et al. referred to previous studies, which concluded that signage systems that are distinctive, legible and placed at appropriate locations enhance way-finding behavior. The authors also refer to the distinctiveness of form as being another major factor in recalling information about a building’s interior.

*Color and perceived length of time*

Smith and Curnow (1966) found that people exposed to red environments perceived their length of stay as being shorter than those exposed to blue environment although the actual length of exposure was the same. Mahnke and Mahnke (1987) reported that a general belief is that time is overestimated in environments with warm colors, whereas with cool colors, on the other hand, time is underestimated.

Mahnke and Mahnke (1987) also referred to some studies that produced exactly opposite results. In a study conducted by Porter and Mikellides (1976) subjects were presented two identical lectures in two lecture theatres one painted blue and the other red. The audience in the blue theater felt that the lecture had lasted longer than it actually did while those in the red lecture theater felt the opposite. Mahnke and Mahnke stated that the effect of color of surroundings on estimation of time is still and unresolved issue.

*Color and apparent volume, weight and size*

Mahnke and Mahnke (1987) discussed apparent volume, weight and size based on color perceptions and stated that appearance of space is a major factor that influences aesthetic appeal.
Spaces that appear large and open induce a feeling of comfort and relaxation. Light colors recede and the apparent size of space is larger whereas darker colors advance and the space feels smaller and overpowering. The quality of artificial light and penetrating natural light plays an important role in this factor because of the effect of light on the appearance of color. This factor will be discussed in detail later in this chapter. The apparent height of ceilings, and the size of a room are two interior elements that are dependent on the effect of their color on human perception.

Mahnke and Mahnke (1987) reported that apparent weight of objects also depends on color. Darker objects appear heavier, whereas lighter ones appear less dense. Perceived stability of objects depends on this factor. A darker colored object supported by light colored legs appears unstable because the apparent weight of the object is more and that of the legs is lesser.

**Lighting in Interiors**

There are several factors corresponding to lighting in interiors. The factors that have been largely studied with reference to perception of interiors and behavioral connotations include illumination level, color of light, and type of illumination. Peretti (1977) conducted a study on the effects of illumination levels on verbal response latency, which involved students who were presented with three boards at three different illumination levels. One board had names of color written in black, the second had question marks in different colors and the third had names of colors written with a color different from the name. He concluded from the amount of error in reading at different illumination levels that too much illumination or too little leads to decreased visual performance and efficiency. Both high and low illumination levels affect hue and saturation qualities of color and these factors affect task performance as well. Köhler (1959) stated that color presents itself differently to the eye depending on the brightness of the background it is displayed on and this also affects the perceived size of the object.

Lighting has largely been studied as a part of color studies and researchers have dealt with the effect of light on color perceptions. Results of an experiment by Wells, Need and Crowley (1979-1980) indicated that the use of fluorescent light versus incandescent light has very little effect on the behavioral connotations of color.

Lawson (1973) suggested different ways in which lighting in a restaurant interior can influence perceived interior spaces. These inferences include:
- Increase or reduce the impression of space,
- Correct the proportions of the room,
- Induce mood, tempo, and atmosphere
- Reveal texture and heighten shape and form,
- Emphasize features and display works of art,
- Provide color, animation and contrasts,
- Indicate directions and project information, and
- Draw attention to dangers.

The following discussion about lighting, its effect on interiors and human response to it will provide the reader with its application for the above-mentioned purposes.

*Lighting design for interior spaces*

Lawson (1973) referred to three major techniques of creating color in a restaurant and these are based on direct or reflected light. The first method is the use of colored lights that illuminate a white or neutral background. Use of colored lampshades over tables and other specific areas is another way of introducing color as the light passing through these shades acquires color. This method produces more localized color pools. Lawson also discussed the light reflected from colored surfaces in the restaurant interior like colors from decoration and furniture and states that this method involves reflection of chroma common to both the colored light and the color of the surface. If these two colors are in contrast the surface will simply appear black or grey.

Köhler (1959) discussed the importance of studying light, color and illumination from an integral point of view because the manifestation of these three factors leads to the physiological and psychological relationships that would in turn define requirements and design of the style of lighting. Köhler identified color temperature and the relationship between color, temperature and intensity of illumination. This relationship has been presented in Table 2.6.
Table 2.6
Light Color and Intensity Of Illumination

<table>
<thead>
<tr>
<th>Coloration</th>
<th>Intensity of Illumination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reddish, “warm” light</td>
<td>Relatively low</td>
</tr>
<tr>
<td>White, “sunny” light</td>
<td>Medium</td>
</tr>
<tr>
<td>Bluish, “cold” light</td>
<td>high</td>
</tr>
</tbody>
</table>

Note. The table is from Spieser, Handbuch für Beleuchtung, Zurich, 1950 as presented by Köhler in Lighting in architecture (1959) (p. 127)

Köhler (1959) also presented general requirements for lighting referring to lighting as an artistic instrument that influences people psychologically. The recommendations provided by Köhler include:

*Sufficient amount of light.* This requirement is mainly based on the task being performed in the space. Illumination levels in a space should correspond with the minimum illumination requirements for various tasks. It also depends on aesthetic considerations, mainly dealing with harmony. Distribution of light and fixtures needs to be in accordance with the design and spatial character.

*Uniformity of illumination.* Disturbing differentials of brightness distribution in the field of vision should be avoided. Although intentional differences are acceptable and even required in certain areas, a soft transition is desirable.

*Shading and incidence.* Recognition of shapes and forms depends largely on their perception resembling natural shading as viewed in daylight. Distortion of shapes or appearance as silhouettes is a result of false shading.

*Color of light.* It is essential to suit the color of light to the colors in the room so as to obtain desired color rendition. This affect has been noted to affect the psychological as well as aesthetic quality of space.

*Avoiding glare.* Glare results largely from excessive brightness differentials in the field of vision and should be avoided both in the form of direct glare from lamps and fixtures as well as reflected glare from illuminated objects.
Creating mood with light and color

Sorcar (1987) presented the association between illumination and the mood created in an interior space and his findings have been tabulated in Table 2.7. (p.172)

Table 2.7
Mood Created in a Space as a Function of Lighting and Color

<table>
<thead>
<tr>
<th>Mood</th>
<th>Light/illumination</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gaiety</td>
<td>High levels of light, movement and changing effects in illumination levels.</td>
<td>High levels, smooth, gradual, and warm.</td>
</tr>
<tr>
<td>Solemnity</td>
<td>Subdued patterns with emphasis on dramatic points.</td>
<td>Sparingly and with atmospheric effect.</td>
</tr>
<tr>
<td>Restfulness</td>
<td>No visible light sources, low illumination, low wall brightness that fades into dark upper ceiling</td>
<td>Subdued</td>
</tr>
<tr>
<td>Activity</td>
<td>High levels of light, perceptual clarity</td>
<td>Warm colors</td>
</tr>
<tr>
<td>Warmth</td>
<td>High levels of illumination</td>
<td>Combination of colors in the red end of the spectrum</td>
</tr>
<tr>
<td>Coolness</td>
<td>Moderate amounts of illumination</td>
<td>Blue, blue-green and violet mixed with white.</td>
</tr>
</tbody>
</table>

Impressions of a space as a factor of lighting

Sorcar (1987) studied the effects of environmental lighting in the perception of interior spaces and presented a compilation of experiments by various experts on the subject. (pp. 177-182) The association between light and appearance of a space provided by Sorcar include:

Impression of space. A moderate amount of general ambient lighting and a greater amount of peripheral (wall) lighting is known to create an impression of spaciousness. Mirrored walls with lighting directed at walls that are not mirrored increases the perceived space.

Impression of perceptual clarity. High level of uniform white light has been known to increase perceptual clarity. Overhead lighting with direct type of luminaries as opposed to perimeter lighting increases clarity.
Impression of relaxation. Glare needs to be avoided and low levels of ambient light in the form of a spill from accentuated or wall-wash light in a non-uniform pattern has been reported to enhance relaxation.

Impression of privacy. Non-uniform lighting with dim center lights and higher brightness beyond yields an impression of privacy and territory. People are known to prefer the dim areas but the peripheral brightness provides a sense of security.

Impression of pleasantness. Non-uniform lighting with strong emphasis on peripheral surfaces, particularly walls. In general, non-uniform lighting, which enhances impressions of pleasantness, can include special effects likee, scalloping, wall washing, concentrated light on sculpture, flowers, murals and paintings. This lighting technique primarily involves focused incandescent sources. These are generalizations by experts although research has been inconclusive on the exact type of lighting that produces this effect.

Impression of boredom, monotony and depression. Uniform blankets of light throughout the room with a dull-colored perimeter contribute to sensory deprivation and therefore boredom. Dim light and dim and dark colored surroundings are major contributors to the feeling of depression.

Impression of drama, excitement and gaiety. Non-uniform lighting of varying brightness, including sparkle, glitter, movement and peripherals of simulating color patterns create this impression and encourage conversation.

Impression of confusion and clutter. Non-uniform lighting and color patterns that clash with spatial information and a large deviation from general patterns and orientation create clutter and confusion.

Impression of cave effect, insecurity, and spookiness. A highly illuminated task area located in a large room with dark peripherals creates a cave effect. A very low level of light in the perimeter, as a result of spill from the task or ambient light leads to a deformed appearance of spatial elements and creates a spooky feeling.

Impression of a “black hole”. Reflection of luminaries on dark windowpanes at night creates the impression of a black hole and this effect is maximized if there are windows on either side of the room reflecting images of each other. Low brightness luminaries, curtains/draperies, and illuminated objects on the exterior for visual relief have been stated as some measures to reduce this effect.
Age-related response to light

Sorcar (1987) presented findings from various studies to summarize general conclusions regarding impact of age of occupants on lighting preferences. Studies indicate that infants and toddlers are attracted to light sources, concentrated light areas, and bright colors like yellow, white, pink and red. Moving, flashing or sparkling light sources are an attraction largely because of the visual impact. As the child matures, attraction to yellow has been known to fade gradually and is replaced by red and then blue. In the teen years sparkle, motion, flash and glitter, and wild colors in bizarre combinations have been found to provide emotional and psychological pleasure. Preferences change to more subtle colors with maturity. Elderly people rely more on the biological responses of abundant light and bright colors as the eyes become feebler and vision blurs.

Some general responses to light levels have also been reported by Sorcar (1987) and these are irrespective of age. Increased light levels report increased activity, including talking. Lighting has been known to direct activity as well as circulation. People have been reported to prefer looking at highly illuminated areas rather than being in them and avoiding areas where a lot of light falls directly on them.

Growing Trends and Concerns in Restaurant Design

There is a continually growing trend of eating out and more and more visitors are demanding restaurant environments that are more stimulating and active (Ursin 1996). Restaurant designers are providing means of entertainment and stimulation in their designs in a market of growing competition as consumers become more aware of design and ambience. Following is a discussion of some of the growing trends in restaurant design.

Display kitchens

Panitz (2000) discussed the increase in the desirability of tables closest to or even within kitchens in restaurants. Panitz refers to a report by the National Restaurant Association 2000 Restaurant Industry Forecast, which stated that 45 percent of adults reported an interest in full service restaurants with a lively, entertaining atmosphere and 4 out of 10 adults indicated interest in display cooking. Several restaurants are reported as making immense profit out of their tables located either next to the kitchen or even inside the kitchen. Panitz discussed concerns about
noise and heat in display kitchens. Some restaurants have been reported to have air-conditioned sections in kitchens and others have air-conditioned and sound proof glass enclosures adjoining the kitchen.

Panitz (2000) reinforced the concepts presented by Belman (1996), where he supported the concept of display kitchens with the positive reaction of customers to the smells and process of cooking. Belman stated that this concept attempts to integrate restaurants into the lives of customers by responding to the needs of those customers who rarely have time to cook. At the same time it also provides a new marketing paradigm.

**Kitchen gardens**

Panitz (2000) reported a survey by the National Restaurant Association’s Table-service Restaurant Trends in 1998. The survey concluded that 62 percent of table-service restaurants with an average per person check of $25 or more reported that locally grown produce is gaining popularity. The same was reported for 47 percent of restaurants with average per person checks of $15 to $24.99.

Restaurants are moving towards serving produce from their own kitchen gardens. Panitz (2000) referred to certain restaurants that grow items that are either hard to find elsewhere or are too expensive to afford. Herbs and adornments for food to make it look more authentic to the cuisine being served are common items being grown in restaurants. Several restaurateurs reported a growing interest in people to sit at tables located in these gardens. Dining in natural settings enriches the dining experience as a whole.

**Sports bars**

Roberts (2001) discussed the concept of sports bars and how they have been reinvented to attract a more diversified group of people. Women and families were not a common sight at sports bars but restaurants are designing these areas so as to accommodate these groups as well. Simple solutions like using less masculine color treatments have been suggested by restaurateurs. Other interactive entertainment and games have added to the popularity of these areas. In order to add a touch of sophistication to sports bars restaurants changed the menu from the stereotypical chicken wings and hamburgers to more elaborate preparations like gourmet sandwiches, etc. Concerns of security that arise due to fanatic sports fans getting emotional while cheering for their teams are primary but have been reported to be easily dealt with by having a
security guard present in the vicinity. Most sports bars have been reported to place more than one television telecasting different matches in order to cater to a wider range of fans.

*Theme restaurants*

The concept of theme restaurants, which transform the interior space into an entertainment zone, is one of the trends in restaurant industry that has been around for a long time but has increased in the recent past (Ursin, 1996). These restaurants follow a certain theme in every aspect of design and service from music, lighting, color and decoration to servers’ uniforms. Ursin reported the increase in consumers’ expectation from theme restaurants and states that these restaurants are now focusing on entertainment and interaction. Some restaurants even have full time entertainers who interact with diners while they wait for their orders to be prepared.

Reflecting upon the concerns in the development of theme restaurant Ursin (1996) stated that the most important aspect is the selection of the theme itself, which is largely based on the demographic group that the restaurateur is planning to target. The theme has to be creative and flexible. Another concern reported by Ursin is the maintenance of these restaurants, which is extremely high, and that is the reason that most of these restaurants are very high volume restaurants catering to at least 450 people. Selling of merchandize is another way that these restaurants generate money.

Writing on the concept of theme restaurants Hamaker (2000) discussed the trend of historical themes in restaurants. This concept is exploiting people’s curiosity about the preparation of food in the past and these restaurants serve authentic dishes from the era on which the restaurant is based.

Apfel (1998) discussed the need for restaurants to create more enticing and entertaining environments to curb the increase in the number of people opting to take their food home. The article discussed the trend of theme restaurants based on magic and magical performances, most of which are interactive. Tableside tricks are a good way of providing entertainment while diners wait for their food. This is also more popular from the logistics point of view as it requires less infrastructure and expenses than stage shows.

*Controlling customer theft*

Ursin (2001) discussed concerns about customer theft in restaurants. Thefts ranging from tabletop items for souvenirs to expensive art and antiques have been a growing concern to
restaurateurs. Tabletop items are stolen most often when as part of the design theme and concept restaurants use custom designed and unusual items. Restaurateurs have tried methods like mentioning on their menu that the items displayed on their tabletops are also available for sale. Framed artwork is bolted on the walls and sculptures and floral arrangements are secured with glues or tapes normally used in museums. Displays are placed away from exits to reduce the risk of someone escaping with them. Restaurateurs prefer to have design solutions that would help avoid theft rather than having to confront diners when they catch them in the act.

Ergonomics of the work environment

Another important concern in the design and management of restaurants is the comfort and safety of the restaurant’s employees. Ergonomics may be defined as the applied science of equipment design, as for the workplace, intended to maximize productivity by reducing operator fatigue and discomfort. For the workers of restaurants it is essential that the design work towards addressing major ergonomic issues. The common problems encountered by people working in restaurant kitchens or as servers are carpel tunnel, back problems, nagging foot problems, etc. Apfel (2001) suggested some of the solutions that restaurateurs can adopt to avoid such injuries to employees. Aside from educating the employees about simple warm-up and stretch exercises, the author mentions examples of establishments that incorporated changes in the interior environment to make the facility more ergonomically suitable. Padding hard floors or using rubberized surfaces is one of the solutions mentioned for nagging foot and back problems.
Chapter 3
The Design Program

Project Description

The proposed restaurant ‘CORAL REEF’, located approximately 8 miles North from N. Monroe Street on Thomasville Road, is aimed at being a sophisticated and executive level restaurant, which also serves as a retreat from the everyday routine life of the city. The cuisine is largely seafood. The restaurant is proposed to have an outdoor seating extension and other elements to create an atmosphere of “dignified relaxation”. A grocery store and kitchen garden have been proposed as extensions to the restaurant. The grocery store will be required to provide ingredients pertaining to seafood cuisine and would also supply produce from the kitchen garden.

Site Conditions

The chosen site is located at a 3-way intersection of Thomasville Road and Kerry Forest Parkway. A 160x100 meter leveled plot of land extends onto a green area with a small natural water body. The plot is lined with a thick growth of trees on the west side and overlooks Thomasville Road on the east. The green area is visually shielded from Thomasville Road by a thicket of trees.

The area, although outside the city limits, is not completely isolated. A small shopping center exists on Kerry Forest Parkway on the East side of Thomasville Road. There are some small pizza and Chinese eateries and a grocery store. A branch of Wakulla Bank is also proposed there.

Apart from the entrance from Thomasville road, there is a narrow single lane approach from the adjoining Ox Bottom Road. This narrow lane leads to the rear of the green area.
Tallahassee is a university town with a large student population. Many residents also consider it to be a family town, which includes working as well as retired couples. To add to that, is the significance of the city as the state capital, which implies governmental activities and an executive class of workers. All these factors make Tallahassee a town with a wide range of activities, requirements and a wide spanning psychological and sociological spectrum.

When designing a restaurant for such a town, it becomes essential to consider requirements of all the sectors including, (a) the students with a more boisterous and active social life, (b) retired couples who require a quiet and secluded social life in their more limited social circle, (c) families that need to get away from all other work and spend time together, and (d) government officials and executives who treat socialization as a part of their job or networking business opportunity.

Students in Tallahassee have many places to go to meet their daily dining and recreational needs but informal interviews with them have indicated their desire for a restaurant which they can occasionally visit that would give them a look and feel of dignity and would demand a level of decorum. This would be a retreat from their regular “wandering into a pizza place for a bite” lifestyle. Retired couples would probably look forward to escaping city life to an open, quiet area which feels much like “how it was in their times”. At times they would want to shed their inhibitions and be able to relax in an atmosphere that makes them feel much younger and more active. It is becoming increasingly important for families to get together without any other obligations and a place that would be slightly secluded from the daily activities of the city is what they desire. Government officials look for a place that would reflect upon their status and dignity and would impress guests.

It seems apparent that Tallahassee would benefit from a restaurant that caters to all walks of life and is dignified without feeling stuffy or overpowering.

Client Philosophy, Background and Goals

The client, Retired Gen. Triviani, is an ex-naval officer and the requirements for the restaurant are highly influenced from this background. The naval background has led to a
philosophy that demands that the restaurant portray a neat, sophisticated look. It is required to
cater to a more high-end clientele. He requires that there be a sense of dignity and importance
about the restaurant while at the same time it is expected to be a place where the visitors can
escape from their routine lives. The restaurant is not to be looked upon as a “hangout” but as a
retreat. The place should not be one that commands a formal dress code but definitely one that
commands certain decorum.

Target Users and Clientele

The client, Gen. Triviani (Ret.), wishes to target is from the middle to upper socio-
economic bracket of those groups indicated in ‘Social, Psychological and Cultural Context’
section.

Functional Requirements

The following are the functional requirements as provided by the client and also
concluded from research:

*Exterior façade* The project aims at a contemporary façade for the restaurant with marine or
nautical references.

*Driveway and parking* Parking required for 60 guest cars (2 disability parking spots)

*Take-out parking.* Parking area next to the grocery store and take-out section with one disability
parking spot.

*Staff and service vehicles* A separate parking area is required for service and loading vehicles,
and 10 employee cars.

*Entrance*

*Entrance lobby.* Waiting area for 10 guests and an adjoining coat closet.

*Valet station.* Valet parking will be provided and needs a valet station at the entrance.

*Host station.* The restaurant is intended to portray a sophisticated look and that is exactly
what is expected of the host station, which is intended to be more like a formal reception desk.

*Dining area – first floor*

*Dining section.* Seating for 70 people with three 2-top tables, two 8-top tables and eleven
4-top tables.
**Bar and lounge.** Space required for 10-12 bar stools and seating for 25 people. Furniture to include only lounge chairs and coffee tables. An imitation fireplace is required in the lounge area.

**Wine display.** The restaurant needs to have an impressive wine display as the wine collection is considered as one of the assets of any fine-dining restaurant.

**Display kitchen.** This area needs to be off of the main kitchen with a communication window.

**Desert bar.** A small desert bar where the variety for the day can be displayed. This space may also be approachable by guests.

**Restrooms.** Same set of restrooms to cater to bar as well as dining area.

**Specialty foods store and take-out.** The concept of Marketplace restaurant is to be incorporated and requires a grocery store preferably close to the exit. Needs to have a visual barrier with the dining area.

**Waitra station.** A separate waitra station will be required for the kitchen and for the bar lounge.

**Dining area – second floor**

**Indoor dining section.** Seating for 55 people with three 2-top tables, one 8-top table and ten 4-top tables.

**Outdoor dining section.** Seating for 35 people with all 4-top tables.

**Bar.** Service bar connected to the first floor bar and lounge seating for about 6 people.

**Restrooms.** Same set of restrooms to cater to indoor dining, bar as well as outdoor.

**Pantry.** Connected to the first floor kitchen through dumbwaiters for hot and cold food, and dirty dishes as well as a service staircase. Meant only for presentation and service.

**Staff and Service Areas**

**Manager’s office.** Conference desk required apart from the desk and guest chairs.

**Assistant manager’s office.** Desk with guest chairs.

**Accountant’s office.** Space for two clerks and filing space.

**Employee lounge.** Lockers required for 25 staff members. Restrooms, change rooms, and shower required with the lockers.

**Kitchen.** Space to be allocated as 30% of the dining area.
Food preparation area on the second floor. Dessert preparation and presentation of food. Served by dumbwaiters from the first floor kitchen. A deep freezer will be required.

Store. Accessible from the service entrance and close to the kitchen. Storage required for kitchen raw materials and equipment.

Cold storage. Cold sustainable lamps required.

Service entrance. May serve as an unloading dock for the store as well as an employee entrance. Double doors are required.

Janitor Closet. Small 3.0 m² space with a floor sink.

Type of Construction Materials

The construction materials proposed for the project are largely wood and brick. The exterior façade has been proposed as a combination of plaster and exposed brick with reinforced concrete coping. A wood and tensile structure has been proposed to resemble a sail and the wood in this structure will be treated for waterproofing. Skylights throughout the restaurant are meant to provide a more nature-oriented setting and use tinted glass sheets to avoid excessive glare from direct sunlight. Bamboo floors dominate the restaurant and have been chosen with considerations of the proposed color scheme as well as sustainable design.

Codes and Regulations

The site selected for the restaurant is a part of the urban fringe district of Tallahassee and zoning regulations for the site have been considered in the proposed design. The regulations for non-clustered commercial use were consolidated from the Florida Building Code including setbacks, required parking spaces and the maximum permissible height. Table 3.1 is a compilation of applicable building codes for the proposed project.
Table 3.1
Applicable Building Codes and Regulations

<table>
<thead>
<tr>
<th>Minimum setbacks (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front/Corner yard</td>
</tr>
<tr>
<td>Building</td>
</tr>
<tr>
<td>Parking</td>
</tr>
<tr>
<td>Side yard</td>
</tr>
<tr>
<td>Building</td>
</tr>
<tr>
<td>Parking</td>
</tr>
<tr>
<td>Rear yard</td>
</tr>
<tr>
<td>Building</td>
</tr>
<tr>
<td>Parking</td>
</tr>
<tr>
<td>Maximum impervious surface area</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Heights (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum at building envelope perimeter</td>
</tr>
<tr>
<td>Maximum additional height/ additional zoning setback</td>
</tr>
<tr>
<td>Total maximum height</td>
</tr>
<tr>
<td>Minimum lot frontage (feet)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Minimum off-street parking</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-premise</td>
</tr>
<tr>
<td>Take-out</td>
</tr>
<tr>
<td>Ratio of full size to compact parking spaces (full/compact)</td>
</tr>
</tbody>
</table>
Energy Conservation and Sustainable Design Issues

The materials proposed in the restaurant as well as the types of lighting have been chosen with considerations of energy conservation and sustainable design. The flooring in the restaurant is largely bamboo instead of wooden planks and variation in color will be achieved by staining the bamboo with different shades of natural wood. Bamboo is a fast growing plant and thereby reduces the need to destroy hardwood trees required for wooden floors.

Another major issue was the selection of lighting in order to minimize energy consumption and also maintenance. The lighting fixtures proposed for the restaurant are largely fluorescent and will use compact fluorescent lights, which provide greater number of hours and also generate less heat thus reducing the load on the cooling system.

A fireplace was required in the bar lounge on the first floor. It is proposed to use a gas fireplace that does not generate smoke or excess heat.

The water body running through the restaurant serves a major aesthetic purpose but is also meant to provide support to the cooling system. The southwest wall of the dining area has slit windows with sheets of water on both sides and this is proposed to minimize heat transfer. The window in the waiting lounge faces southwest but it has been inclined to avoid direct glare and also has landscaping on both sides.

Skylights and large window openings are located only on the northeast wall of the restaurant and will thus provide glare-free natural light during the day. The southwest wall of the restaurant is thicker than the other walls. This wall is proposed to block heat transfer from those cardinal directions and the sheet of water on this wall will further reduce heat transfer.

A large water body has been proposed outside the restaurant and this flanks the paved areas on either side of the restaurant. This feature is proposed to minimize the effect of reflected heat from the paved surfaces.

Overall attempts have been made to avoid excessive heat – generated or transmitted, and also to provide sufficient lighting with minimum energy conservation. The materials selected are also conducive to issues of sustainable design.
The following images are the drawings of the proposed restaurant. All drawings have been reduced to fit.

Figure 4.1
Proposed Menu Cover Design
Figure 4.2
Site Photographs and Location
Figure 4.3
Proposed Site Plan
Figure 4.4
Proposed First Floor Plan
Figure 4.5
Proposed First Floor Reflected Ceiling Plan
Figure 4.6
Proposed Second Floor Plan
Figure 4.7
Proposed Second Floor Reflected Ceiling Plan
Figure 4.8
Front and Rear Elevation
Figure 4.9
Sections
Figure 4.10
Details of Sail

Coral Reef
Seafood restaurant and bar

Anubhuti Bhatia
Figure 4.11
Perspective View of Sail
Figure 4.12
Details of Bar
Figure 4.13
View of Bar and Furniture
Figure 4.14
Details of Water Channel
Figure 4.15
Perspective Views and Materials for Bar Lounge

Coral Reef
Seafood restaurant and bar

[Image of perspective views and materials for bar lounge]
Figure 4.16
Perspective View of Water Feature in Bar Lounge
Figure 4.17
Perspective View of Water Wall
Figure 4.18
Perspective View of Dining Area from Bar
Figure 4.19
Perspective View of Dining Area from Emergency Exit
Figure 4.20
Perspective View of Display Kitchen
Figure 4.21
Perspective View of Grocery Store from Kitchen
Figure 4.22
Perspective View of Grocery Store from Entrance
Figure 4.23
Perspective View of Entrance Lounge
Figure 4.24
Perspective View of Waiting Lounge from Dining Area
Figure 4.25
Perspective View of Dining from Waiting Lounge
Figure 4.26
Perspective View of Second Floor Dining from Bar
Figure 4.27
Perspective View of Second Floor Dining from Staircase
Figure 4.28
Perspective Views of Outdoors Seating
Figure 4.29
First Floor Materials
Figure 4.30
Lighting and Accessories
The design fulfills all functional requirements provided by the client. It was an attempt at developing a prototype based on the functional as well as ambient requirements laid out by the client.

The major challenges faced in the design were the integration of the grocery store, kitchen, storage and display kitchen in order to ensure smooth services. Integrating all these service areas together and ensuring that the guests only had access – physical and visual – to the grocery store and the display kitchen was a problem that needed to be solved.

A restaurant with a seating of approximately 160 is quite large and laying out the dining area so that it would not seem like one large space and afford every table some amount of privacy and its on territory was a task that needed careful handling. Introducing elements like the water channel and the tall wine display and desert bar, as well as level changes and a low partition wall served to divide the large space on the first floor into smaller areas. A difference in the color of flooring in the three sub areas of the dining space – the bar lounge, the main dining area and the display kitchen area – also added to the visual separation.

Following is a list of design techniques and ideas that led to the design and fulfillment of all functional requirements as well as the development of the image as desired by the client.

*Exterior Façade*

The exterior façade is meant to provide information to the guest about what to expect inside. Several people base their decision to visit a restaurant on the façade. The exterior of the proposed restaurant is a combination of exposed brick and plaster. The exposed brick as well as the colors of the coping have been picked from the proposed colors for the interior walls and upholstery. The water body and the large anchor on the window indicate the nautical theme of the interior of the restaurant.
Incorporation of Trends in the Restaurant Industry

The review of literature revealed several trends in the design and development of restaurants and these trends were incorporated as part of the requirements. The green house and grocery store were incorporated as a result of studies that indicated a growing trend in the direction. The display kitchen was indicated as one of the elements in restaurants that visitors are taking more interest in and this was made part of the restaurant but care was taken to ensure that there are sections of the dining area that are away from the kitchen to cater to the guests who feel otherwise.

Segregation of Different Areas

The entire restaurant has been divided largely into three areas: the entrance lobby, the dining area and bar, and the kitchen and services. The entrance lobby provides a view of the entire restaurant but does not interfere with the diners. The dining areas have been carefully laid out to ensure that there are no dead spaces or completely secluded areas but the human need for privacy has not been overlooked. There are several tables that provide the opportunity for a small amount of seclusion. The bar lounge has been separated from the dining areas with the water channel as well as the tall wine display but few tables have been provided in this area also. The kitchen is connected to the display kitchen through a communication window. The grocery store has access to the kitchen but there is a visual barrier between them.

Focal Points

The focal points of the design are the water channel and the wine display. The water channel serves the purpose of providing relief from heat generated within the restaurant or transmitted from the southwest wall. The sound of water is pleasing to the human subconscious mind and will also serve to compensate for the noise generated from the bamboo flooring. It is a major feature of the design and serves to tie the entire restaurant together while also segregating the main dining area, the bar lounge and the display kitchen dining. The wine display and the desert bar are the central feature of the dining area and serve to unite the first and second floor. The display feature creates a focus that serves to establish an image for the restaurant. The desert
bar below the tall wine glass is a space that the guests can walk up to from the main dining area as well as the bar lounge.

The Color Scheme

The color scheme was proposed to be reminiscent of an evening scene at the beach. It was meant to create an atmosphere that would allow people to relax and forget the routine hectic everyday life. A lot of information acquired through the review of literature also guided the selection of colors like orange and red, which have been stated as the most appetizing and thus highly appropriate for restaurant interiors. The dark blue ceiling with satin nickel finish fluorescent light fixtures is indicative of an evening sky. There are accents of metallic grey to indicate streaks of light. The bamboo flooring provides the sandy color and bright shades of orange have been picked from the colors of the setting sun. The upholstery on furniture of neutral colored wood, and colored fiberglass structures provide color to the setting.

Sustainable Design Issues and Energy Conservation

The design has successfully handled issues of sustainable design through material selection and other features. These issues have been discussed earlier in chapter 3.

An overall inviting design proposal, I believe that the water feature that serves purposes of creating the restaurant image, several green design aspects as well as strengthening the layout through segregation of spaces; is the most powerful feature in the design.
Appendix A

Symbolism of Color

<table>
<thead>
<tr>
<th>Color</th>
<th>General Appearance</th>
<th>Mental Associations</th>
<th>Direct Associations</th>
<th>Objective Impressions</th>
<th>Subjective Impressions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Brilliant, intense, opaque, dry</td>
<td>Hot, fire, heat, blood</td>
<td>Danger, Christmas, Fourth of July, St. Valentine’s day, Mother’s day, Flag</td>
<td>Passionate, exciting, fervid, active</td>
<td>Intensity, rage, rapacity, fierceness</td>
</tr>
<tr>
<td>Orange</td>
<td>Bright, luminous, glowing</td>
<td>Warm, metallic, autumnal</td>
<td>Halloween, Thanksgiving</td>
<td>Jovial, lively, energetic, forceful</td>
<td>Hilarity, exuberance, satiety</td>
</tr>
<tr>
<td>Yellow</td>
<td>Sunny, incandescent, radiant</td>
<td>Sunlight</td>
<td>Caution</td>
<td>Cheerful, inspiring, vital, celestial</td>
<td>High spirit, health</td>
</tr>
<tr>
<td>Green</td>
<td>Clear, moist</td>
<td>Cool, nature, water</td>
<td>Clear, St. Patrick’s day</td>
<td>Quieting, refreshing, peaceful, nascent</td>
<td>Ghastliness, disease, terror, guilt</td>
</tr>
<tr>
<td>Blue</td>
<td>Transparent, wet</td>
<td>Cold, sky, water, ice</td>
<td>Service, Flag</td>
<td>Subduing, sober, melancholy, contemplative</td>
<td>Gloom, fearfulness, furtiveness</td>
</tr>
<tr>
<td>Purple</td>
<td>Deep, soft, atmospheric</td>
<td>Cool, mist, darkness, shadow</td>
<td>Mourning, Easter</td>
<td>Dignified, pompous, mournful, mystic</td>
<td>Loneliness, desperation</td>
</tr>
<tr>
<td>Color</td>
<td>General Appearance</td>
<td>Mental Associations</td>
<td>Direct Associations</td>
<td>Objective Impressions</td>
<td>Subjective Impressions</td>
</tr>
<tr>
<td>-------</td>
<td>---------------------</td>
<td>---------------------</td>
<td>---------------------</td>
<td>-----------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>White</td>
<td>Spatial-light</td>
<td>Cool, snow</td>
<td>Cleanliness, Mother’s Day, Flag</td>
<td>Pure, clean, frank, youthful</td>
<td>Brightness of spirit, normality</td>
</tr>
<tr>
<td>Black</td>
<td>Spatial-darkness</td>
<td>Neutral, night, emptiness</td>
<td>Mourning</td>
<td>Funeral, ominous, deadly, depressing</td>
<td>Negation of spirit, death</td>
</tr>
</tbody>
</table>

Note. This table has been reproduced from the book *Color Psychology and Color Therapy* by Birren (1961). (p.143)
## Appendix B

### Color of Ceiling, Walls and Floor

<table>
<thead>
<tr>
<th>Color</th>
<th>Ceiling</th>
<th>Walls</th>
<th>Floor</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Intruding, disturbing,</td>
<td>Aggressive, advancing</td>
<td>Conscious, alert</td>
<td>Modifications are found more suitable than saturated red.</td>
</tr>
<tr>
<td></td>
<td>heavy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pink</td>
<td>Delicate, comforting or</td>
<td>Aggression-inhibiting,</td>
<td>Perhaps too delicate</td>
<td>Characteristics may vary as per personal preferences.</td>
</tr>
<tr>
<td></td>
<td>too intimate</td>
<td>weak, too sweet if not</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brown</td>
<td>Oppressive and heavy (if</td>
<td>Secure and assuring if</td>
<td>Steady and stable</td>
<td>May evoke fecal associations in certain institutions.</td>
</tr>
<tr>
<td></td>
<td>dark)</td>
<td>wood, less so if paint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orange</td>
<td>Stimulating, attention-</td>
<td>Warm, luminous</td>
<td>Activating, motion-oriented</td>
<td>Reflections on skin may enhance skin tones.</td>
</tr>
<tr>
<td></td>
<td>seeking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yellow</td>
<td>Light (if toward lemon),</td>
<td>Warm (if toward orange),</td>
<td>Elevating, diverting</td>
<td>Useful in poorly illuminated and dim spaces as it appears brighter than white.</td>
</tr>
<tr>
<td></td>
<td>luminous, stimulating</td>
<td>exciting to irritating (if highly saturated)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green</td>
<td>Protective (reflection on</td>
<td>Cool, secure, calm,</td>
<td>Natural (up to a certain saturation point), soft, relaxing, cold (if toward blue-green)</td>
<td>Along with blue-green provides a good environment for meditation and high concentration tasks.</td>
</tr>
<tr>
<td></td>
<td>skin may be unattractive)</td>
<td>reliable, passive,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>irritating when glaring</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(electric green)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Color</td>
<td>Ceiling</td>
<td>Walls</td>
<td>Floor</td>
<td>Remarks</td>
</tr>
<tr>
<td>--------</td>
<td>----------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>--------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Blue</td>
<td>Celestial, cool, less tangibly advancing (if light), heavy and oppressive (if dark)</td>
<td>Cool and distant (if light), encouraging and space deepening (if dark)</td>
<td>Inspiring feeling of effortless movement (if light), substantial (if dark)</td>
<td>Effects vary with the size of the space and also the length of stay in the space. May cause distress over a long period.</td>
</tr>
<tr>
<td>Gray</td>
<td>Shadowy</td>
<td>Neutral to boring</td>
<td>Neutral</td>
<td>Not much psychotherapeutic application.</td>
</tr>
<tr>
<td>White</td>
<td>Empty</td>
<td>Neutral, empty, sterile, without energy</td>
<td>Touch-inhibiting</td>
<td>Off white and white should not be used as dominant colors.</td>
</tr>
<tr>
<td>Black</td>
<td>Hollow to oppressive</td>
<td>Ominous, dungeon like</td>
<td>Odd, abstract</td>
<td></td>
</tr>
</tbody>
</table>

References


Anubhuti Bhatia was born on February 8th, 1978 in Indore, India. She completed her Bachelor of Architecture degree from The Maharaja SayajiRao University of Baroda, Vadodara, India. Anubhuti worked as a training architect in Indore, India for one year and also independently designed and supervised residential projects during this time. She completed her Master of Science in Interior design from Florida State University, Tallahassee, Florida, U.S.A. She is interested in pursuing further research in the field of human interaction with the built environment and built environment education.