

Spatial Orientation

In the exterior environment there are several types of orientation, dependent upon the scale, which should be considered. The first of these is that of large-scale orientation or loss of direction. It is important from this standpoint to maintain a sense of direction and a sense of place, especially in low cost housing where many of the units may look similar. Lower income groups, striving to be like the middle income groups, would desire to have "a place of their own" with which they can identify. This can be achieved by the relation of one cluster to another, the overall design of each cluster and the design of the units within each cluster.

While the general materials used and the individual unit design for each cluster would be similar and become an integrating feature for the clusters, there should be enough differences in each cluster to give it an identification of its own. This can be done by varying the approach to the cluster by different landscape materials as well as varying the central commons area by offering different features in each cluster. Selection of a site which has enough natural variety would aid greatly in achieving this "sense of place."

The treatment of the elements around each unit in the clusters can also be used to achieve an individuality of the units. While materials which are used throughout the cluster such as walls and walkways should be the same for the purposes of unity, some individuality could be expressed in the detailed design of the private and semi-private areas of the courtyards and entryways. The major part of this individual expression should be provided in the original design as lower income persons would not be as prone to make changes or additions to make their space different from others. In other words, they would desire their own identifiable unit but would not want to do it themselves.

The other type of orientation is that of physiological orientation in relation to a specific space and energy surrounds to accomplish certain tasks within that space. It is through our

reaction to the surfaces, materials, colors and textures that we achieve this orientation to perform or move through space in a balanced relationship with gravity. Where there are curvilinear elements in the environment, there should also be enough straightness of verticals and horizontals for us to orient to.

### Living Space

Low income families being desirous of those items commonly found in middle income areas would want provision for outdoor sitting and eating, areas for social gatherings and meeting neighbors and general recreation, relaxation and children's play areas.

Informal or "chance" meetings with neighbors is a more common occurrence than formally planned visits in these families. For this reason, it would be desirable to provide a commons area for this activity in the central area of the clusters.

Persons in this group would prefer to keep in visual contact with their cars and have them in a fairly prominent display area so other people can easily see that they are their cars. This is rather important for lower income groups as they usually take great pride in ownership of their cars and want to be identified with them.

*was built!*

The gathering of mothers in supervision of small children's play would form an important part of their social contacts and meeting neighbors. It would be desirable to provide this play area for small children and the supervisory space in the central commons area in close proximity to the living units.

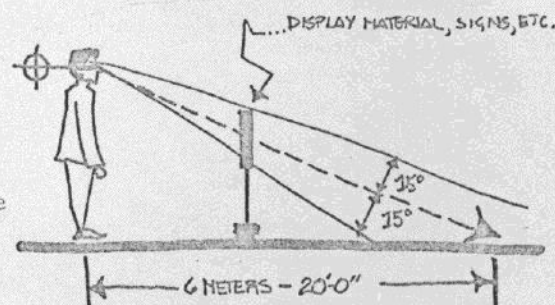
In addition to this supervised play, there should be separate general or common play space for older children. Much of these children's time will be spent on a peer group basis rather than on a child-parent basis as the parents, on the average, will not be spending as much time with their children.



All of this play space should be designed to accommodate the developmental needs of the child for good perceptual and motor skills. Activities to meet these needs would be those which would enable the development of bilateral alignment, balanced posture and bilateral eye-hand coordination. General types of play activities and equipment which would be desirable from this standpoint would be: balancing devices, running in conjunction with manipulative skills and climbing and jumping tasks.

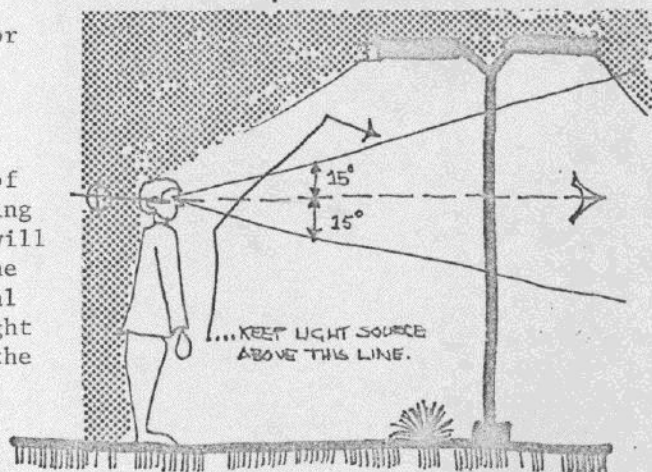
While private outdoor living areas should be provided, it cannot be assumed that persons in low income groups will provide the care and maintenance to keep their spaces in good repair. For this reason, the private spaces should be screened to provide privacy as well as providing a visual control. The materials selected for these areas should be of a durable quality and of a type which would require little maintenance.

Visual requirements play an important role in the design of the exterior spaces. The normal sight line when standing is directed at a point on the ground which is approximately six meters or twenty feet in front of the observer. It is the sight line assumed under least effort in a balanced posture. The central visual field where we receive the most critical undistorted vision is a circular cone which is  $15^\circ$  around the sight line. This would imply that elements which should receive the most critical attention such as the location of stairs, ramps and directional indicators in circulation systems should be intersected by this visual area.



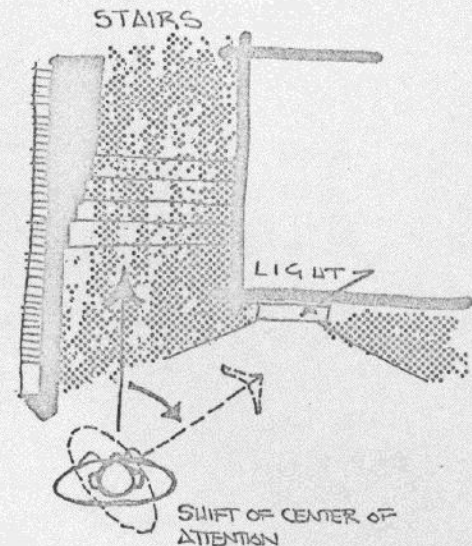
### Light

Areas which receive general use and the major walkways should be provided with lighting. The visual requirements would indicate the general location and type of lighting to be used. The lighting should be placed so the source is not located in the central field of vision. This will reduce the effect of having brightness spots in the environment and it will appear to be more evenly illuminated. If the lighting source does project into this visual field, the spot of light will appear so bright in relation to the objects and surfaces in the space that we will orient to the source of



the light and will not be able to see the other elements in the environment. This will act as a hindrance to the safety of our movement at night as we will be orienting to the source of this light and adjusting the light-dark adaptation of the eyes to this high brightness level and will not as easily see the walking surfaces, stairs or objects that may be encountered. This central visual field is a circular cone,  $15^{\circ}$  around the normal sight line, projected out into space. This does not imply that the lighting fixture has to be placed in a position so we do not see it, but that the bulbs could be concealed while in the visual field area.

Lighting containing a narrow or single chromatic band should be avoided under all conditions. Because of the chromatic aberration of the eyes, we will get a false accommodation which will minimize our depth perception. What this single band lighting does is cause us to focus our eyes at a certain distance and will not allow for enough freedom to change focus.



#### Surfaces and Materials

The materials used in the low income housing should be those which reflect a quality of durability and permanence, which persons in this group would desire. Materials used should be consistent with what is consistent with their present experiences and should not be a radical departure from what is considered as conventional building materials.

An important aspect, and one that is not often considered to the extent that it should be, is the use of landscape materials and surfaces as a modifier of the natural light and glare to provide more useful outdoor spaces. This reduction of glare is especially important in task areas where accurate vision is either very critical as in play areas; movement requiring rapid visual decisions as in drives and parking areas; and where accurate vision is desirable as in conversation or entertainment areas. In these areas, as uniform as possible a light distribution at a level lower than direct sunlight would be most effective. In these areas, darker surfaces



which would reflect less sunlight and shading would be quite important. High reflective and light colored surfaces should be avoided where sustained activity and critical vision is used. High reflective surfaces causing glare will result in faster visual fatigue, and in cases where the light intensity is high, can result in retinal burn. An example of the glare problem which can exist in play areas is evidenced in an open sun exposed area where light colored concrete surfaces and play sculpture and white sand is used. In this situation, the reflectance of all the materials is very high so the surfaces and objects visually appear closer than they really are which impairs the child's perception of distance, which induces a safety hazard while climbing around the play sculpture. Because the overall high intensity of light over a prolonged period could cause visual impairment by retinal burn, the overall intensity of the light should be reduced by shading the area and using darker colored materials which would reflect less light and would result in a generally lower intensity of lighting.

High intensity light levels and glare in a conversation area is a distracting condition which will cause an avoidance reaction and induce movement away from the activity.

It is often stated that because all the colors are evident in the natural landscape, designers can use a wide variety of colors and still be compatible with the naturals. While it is true that all colors are available in nature, all of them are of a desaturated type, and there are no pure colors in nature. This is an indication of why all the colors of nature blend together and should be used by designers in selecting colors for the man-made elements. Because these desaturated colors contain a wide chromatic band, they will not visually advance and recede as much and will appear on the same visual plane. We can then visually move from one color to another without greatly changing our accommodation.

It can be generally stated that the coarser the texture of a surface, the closer it will appear to us. This can be used with care in the outdoor

spaces to imply more three-dimensionality in the design, where because of the larger scale of the space, we often lose the feeling of depth. The texture and pattern in any area should communicate only to that particular area and should form the background support for other areas.



### Spatial Orientation

The living area should provide some definitive visual horizontal and vertical elements. These can be expressed in the structural components, room decoration, lighting treatment or furniture arrangement and selection. The human mechanism requires this degree of visual horizontal and vertical reference in the living environment to facilitate body balance and gravitational alignment. This is of particular importance to the growing child in form perception development.

### Space Requirements

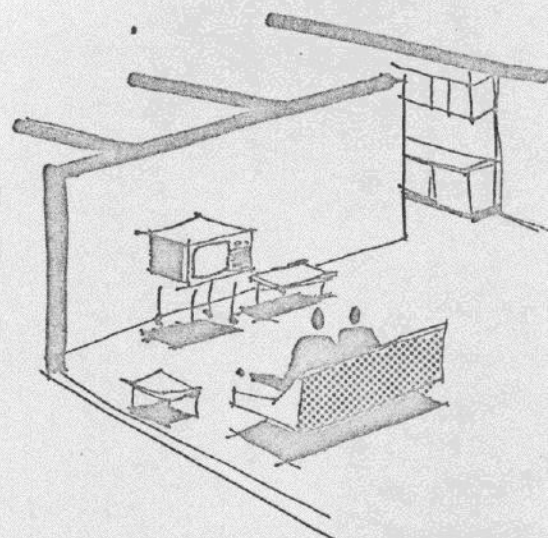
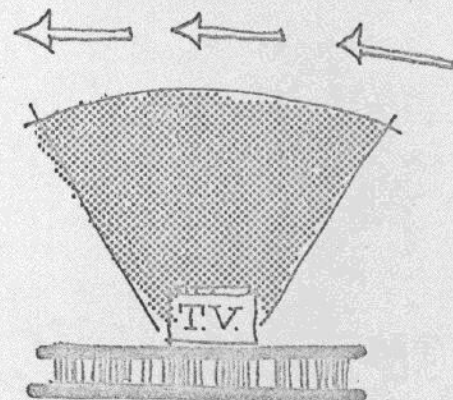
The living space should allow sufficient area around the major conversation and furniture groupings for human movements (freedom of locomotion) to various areas within the given space and to other areas of the living unit.

It is desirable that movement to other parts of the living space do not pass through the various areas such as discussion, TV watching, etc.

Sufficient space should be provided to allow for separation of the various activities in order that multiple activity may occur in the living area if separate space is not provided in other areas of the living unit.

The strong desire for communication and social interaction among low income families would imply that sufficient space should be allowed for this sociological and psychological necessity. Some sociological studies have shown that lack of space for such activities in housing decreases the amount of interaction.

If there are a number of small children in the family and TV is a source of entertainment and education (with mental health implications), then sufficient space for furniture arrangement should be allotted for viewing. The amount of time during the day and night that is spent in this type of activity should be considered in determining the space required. Visual specifications for optimum television viewing distance will also be a determinant of the amount and dimensions of



the space.

Space requirements for reading and related activities such as hand sewing, knitting, etc., includes area for adequate seating, space for specific light source and placement of reading material, ash trays, etc. If this is a major interest of some members of the family, then adequate separation in terms of space from other activities in the living area and sufficient storage space for the reading material (books, newspaper, periodicals) must be provided.

Space is an amenity of physiological, psychological and sociological significance so that means to achieve as much apparent space as possible is desirable; not all space will have to serve a particular functional role.

#### Light

General light characteristics in this area should be those of uniform distribution and brightness. Natural light (window orientation) and artificial light should be manipulated in such a way as to light the living space as an integrated whole. If window orientation is restricted to one wall, artificial lighting should be located in areas of greatest shadow. Acceptably uniform light distribution and brightness should be provided for both day and night activities without using artificial lighting during daylight hours. The general light level need not be high in this area for maximum resolution of detail is not critical. Care should be given to establish good modeling shadow (between 3 to 4 1/2:1) for contrast is more important than resolution in this area. Effort should be taken to eliminate gross contrast ratios of 7:1 and greater between either side of the visual field. (Elements and planes in space may appear different because apparent distance is a function of light intensity (modeling shadow). The general principle that light areas approach while dark areas recede may be used as a guide.)

Man's visual mechanism is structured such that when light strikes the eye, the individual attempts to align himself so that the light will be uniformly distributed over the visual



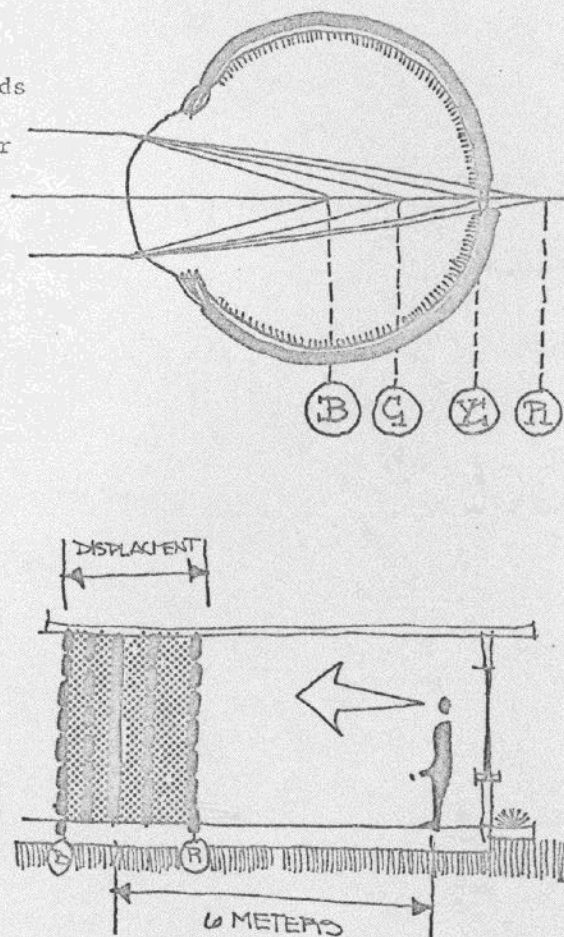
field. Each center in the living room should, therefore, be lighted in such a way as to provide equal amounts of light for each eye. Various centers of interests in the living room should be equipped with some means of variable light control to establish this needed distribution and brightness.

### Surface Color

The human eye is not color corrected so that we experience an optical distortion in perceiving color. The eye is structured in such a way as to allow for light of different wave lengths to focus at different distances along the axis of the eye. This phenomenon is referred to as chromatic aberration. It is because of this aberration that we experience a color phenomenon called color displacement. The various color bands of the spectrum appear to be displaced at different positions in space. Warm colors appear closer because, in effect, they are falling to focus behind the retina. Cool colors appear to recede for they fall to focus in front of the retina. By reaccommodation of the eye to bring each spectrum band to focus on the retina, the apparent position of that color band displaces in space.

In room decoration it should be remembered that the opposite ends of the spectrum (red and blue) displace to the greatest extent. When these two extremes of the spectrum are placed together or are mixed in order to produce a magenta color, the eyes are changing focus or convergence by the distance of displacement of those two color bands of the spectrum. A surface that is this color will vibrate accordingly and, although it is a psychologically stimulating and exciting color, it requires a change of focus that is equivalent to 2 1/2 feet and will vibrate back and forth that much when viewed at a distance of 20 feet.

In relation to living room color surfaces, it is recommended that walls, furniture, space dividers or decorative elements located near stairwells, or sustained visual task centers (reading or study center) not be decorated with color mixes

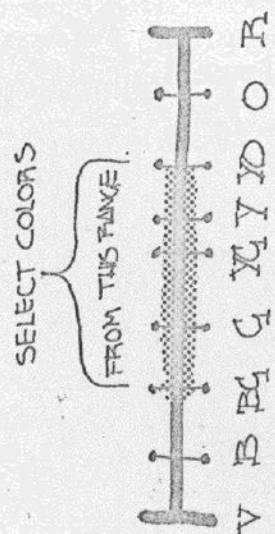


from opposite ends of the spectrum. This will result in elimination of unnecessary visual oscillation in the performance of these more critical visual activities. The center of attention in the living room should be focused on the occupants' activities, conversation, relaxation, reading and communication. A room for conversation where several people are scattered over the space should not have a background surface of pure color for that will localize the center of attention. Pure color builds up avoidance quickly. Communicative color should be partly desaturated in order to allow for free movement of the eye from one area to the other and to introduce harmonics. For a space conducive to conversation and relaxation, a desaturated color background (similar to the pastels) should be used.

Age is an important factor in determining a surface color selection. As people get older they become presbyopic, and this shows up at 35-40 years of age in our current population. People with presbyopia tend to displace surface colors away from the plane of regard. A color scheme should be selected which will keep the surface color on the surface plane. Far-sighted people will generally be unhappy with colors on the cool end of the spectrum. Color schemes for this age group would be on the warm side of the color spectrum but desaturated as much as possible. A combination of brightness and color displacement characteristics may be employed to bring wall surfaces forward.

Surface colors of walls, floors, ceiling, and furniture in various centers of attention in living room areas should communicate only to that area of activity; however, at the same time, they should integrate into the color pattern and texture of the whole room. Each center should be definable but should not stand out by sharp color or high contrast.

If it is desired to integrate two centers with each other, it is necessary to control the color and contrast to produce a satisfactory adjacency relationship between them. This can be achieved by lighting and color selection.





In the living room the contrast level between walls, floor and furniture should not be high in contrast. A high contrast light ratio will visually distort dimensions. In low cost housing where space may be at a minimum, this is of particular importance. A dark piece of furniture would require a low reflectance wall as a background within the contrast range of 4 1/2:1.

Any illuminated environment, particularly the living room where many hours are spent, should reflect to some degree all of the chromatic bands, no matter what the dominating scheme. A low dark monotonous color will tend to physiologically and psychologically create a monotonous existence. Colors that are of low brightness and consist of a single chromatic band are, in effect, taking all of the light out of the room, and the eye will only have to accommodate and focus for the chromatic distance of that one band.

The characteristics of the color and lighting being reflected from the various surfaces of floor, ceiling, and wall, etc., are the basis of perception of interior space.

#### Surface Texture

Surface textures in wall coverings, furniture fabrics or window treatments should be considered in relation to the size and scale of the interior space. Texture also implies depth perception. A generalized rule to follow is the coarser the surface, the more it will approach the observer. A very coarse texture on a background surface such as a coarse texture on a wall covering will cause that surface to advance. In a confined living room space where a sense of spaciousness is desired, it is a recommended practice to keep background surface textures to a small scale. It would also be desirable to keep the color of the background textures more toward the cool side of the spectrum; this too will depend upon the orientation of the living area space. If a coarse texture is desired, it should be more "apparent" than real. It need not necessarily have a great

degree of roughness. The more coarse the texture, the more apparent the displacement of that surface in the visual surround. Lighting and modeling shadow will also have an effect on surface texture. A long pile rug with low modeling shadow may not be as objectionable as a shorter pile of heavy thread or cord with high modeling shadow. In the low income home, the living room should be provided with a moderate variety of textures. Scale of textures should be selected on a basis of where surface plane is located (background or foreground).

#### Surface Pattern

The manner of pattern or design on a texture surface of any area should communicate only to that particular area. It should be scaled to blend as a part of the overall room texture. If there is too much extraneous detail (bold or complex pattern) in the surface texture design, attention will be directed to some particular area of the pattern and the eye will be unable to move away from it. A pattern should be selected that will minimize or integrate the extraneous details. If a strong pattern is desired, select a pattern with a figure color or contrast character that will recede into the background.

#### Sound

In the living area of the house, a definitive identification of the activities that are to be carried on in the space should be enumerated for the planning of effective sound control. Since sound control implies the production, transmission and perception of wanted sounds and the exclusion or reduction of unwanted sounds or noise, identification of the activities will clarify the requirements for that particular area.

If the activities in this area of the living unit are to be somewhat quiet in nature, then the treatment of the floors, walls and ceilings would imply the utilization of materials that would be sound absorbing. If the living area



of the house also contains mechanical equipment or other noise producing objects, then the location of such equipment should be considered to enable wanted sounds to be received by the listeners.

Highly polished surfaces, open floor planes, thin structural walls and materials that would have a vibratory quality would all tend to make for difficult sound control.

In considering the total plan of the living space, some areas may need to be multiple purpose areas for economic reasons. If this is the case, then a division of these activities throughout the living unit should be considered. A living area that will serve multiple functions will need to provide enough space division for these multiple activities as far as is feasible and then, through manipulative devices of sound control, light control, etc., develop a solution that allows for the needed communicative aspects of sound or the reduction of sound in areas where sound is not desired.

#### Care and Maintenance

Perhaps one of the most neglected areas of consideration by the designers of living units is the factor of care and maintenance of the equipment, facilities, spaces and the mechanical devices and storage that this activity requires.

Space must be first allotted for the storage of the equipment for this activity in the areas close to where it will be needed, rather than a remote general storage area.

With the advent of many new cleaning products, mechanical equipment and materials, a knowledge of their usage is almost as important as the "tools" themselves. Several of the newer prefabricated imitation materials do provide a prestige value but also require a different type of care than most of the occupants will have been accustomed.

Knowledge of the amount of care of various household decorative materials such as flooring materials, wall surfaces, furniture surfaces and

upholstering, coupled with all the other considerations as to color, texture, thermal, etc., must be taken into account to provide units with a minimum maintenance for these large surface areas. One will need to establish an optimum priority of "value" considerations, but the recommendation is to satisfy the physiological, psychological and sociological requirements and in so doing also provide for minimum care and maintenance.



### Spatial Orientation

The dining area is not normally a center of critical visual activity but in low income housing might become a place for study if inadequate space is provided elsewhere. However, even if not planned for study, the overall room space should provide adequate cues for spatial orientation. It is recommended that angles and free-forms in structure and decoration be avoided for these will conflict with horizontal and vertical reference points needed for gravitational alignment and stability. Excessive angular expression in this area will also tend to increase body or muscular tension conflicting with the physiological necessity for body relaxation during eating activities. If the dining room is located near or in conjunction with the living or kitchen area, some spatial continuity should tie both areas together. Basic visual elements (walls, columns, window divisions) should not conflict between these areas of common activity.

### Space Requirements

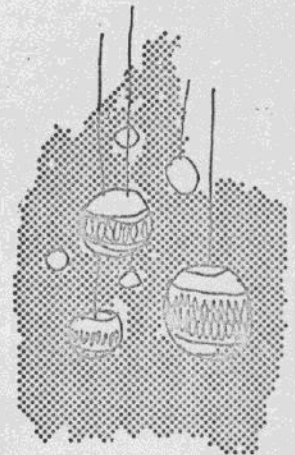
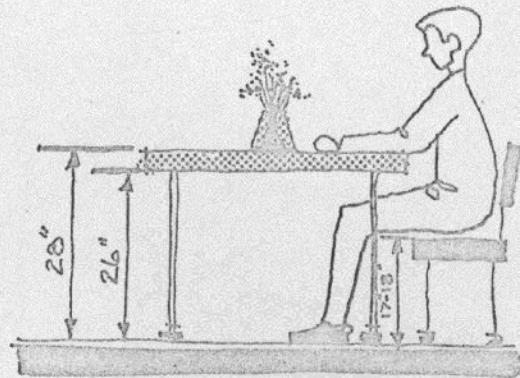
In the low cost home, kitchen space may not be sufficient to facilitate eating, either in terms of time, number of people, etc. As a result the dining space should be large enough to provide service, storage and eating space for immediate family and friends. Because of the desire of low income families for communication spaces, the dining room/living room combination space is desirable. In addition the desire for greater social interaction among the low income groups would necessitate that this space be as large as economically feasible. There is some indication that low income families do not invite people into their homes as often as they would like because they feel their space is inadequate both in size and quality. The dining room should be large enough to encourage this social interaction. Sufficient space should also be allotted for circulation paths particularly for the activities of food preparation and serving. Sufficient space in this area brings with it an additional human consideration -- that of safety. Home accident rates are noticeably reduced in

spaces that are less crowded. The more space per person, the lower the accident probability. Dining room table and chair selection should consider human anthropometric data. Minimum clearance from floor surface to underside of table should be around 26 inches. Maximum height from floor surface to table top should be 28 inches. This will accommodate free leg clearance for 80% of the adult population. A 17-18 inch compressed seat height will accommodate 80% of the adult population.

#### Light

The close proximity of dining and living area will require an integrated general light characteristic. This light characteristic must facilitate the common use of the general space for the multi-purpose activities to be carried on in this particular space, such as discussion, relaxation and entertainment.

The overall light pattern, both natural and artificial, should be uniform in distribution and brightness. Window orientation should be considered from outdoor views, sun angle and light distribution. Consideration should be given to establish an integrated light distribution and brightness for both day and night activities. Light level in the dining area need not be high for major activities in this area do not require critical resolution of detail unless the space is to be used for study, in which case two light levels should be provided. Because this space will be used for various activities, a light center for more critical visual activities (reading, sewing, writing, etc.) should be considered. Good modeling shadow (3 to 4 1/2:1) should be established by both natural and artificial light sources. As in the living room, gross contrast ratios (7:1 or greater) should be eliminated. The low income occupant seeks to simulate environments of the typical middle class family. To facilitate this desire, provisions for some type of overhead lighting (chandelier or ornate fixture) should be considered.





### Surfaces

In selecting the dining room color scheme, it is recommended that walls, space dividers, furniture or decorative treatments near staircases, major traffic thoroughfares or reading centers avoid color mixes of opposite ends of the spectrum (magenta, red violet, violet or purple). These color bands should be eliminated for they stimulate visual oscillation and consequently have a negative effect on these more critical visual activities. If these colors are selected, they should be used in small amounts and placed in areas where critical visual activity is at a minimum. The dining room color scheme should support the major activities of eating, relaxation, communication and entertainment. The walls should provide a background to support the task. Color range to support these group activities should be partly desaturated. The pure colors should not be used for they attract too much visual attention. Pure yellows and blues should be avoided for they are the two most retinal fatiguing colors. To provide an atmosphere conducive to relaxation and communication, desaturated (medium pastel range) colors should be selected. High contrasts in luminosity such as black and white should be avoided.

Middle aged and elderly occupants may desire pastels from the warm end of the spectrum. People in this age group tend to displace colors away from the plane of regard. They will not feel happy or be able to relax with the cool colors. This implies that colors should be selected from the warm side of the spectrum and desaturated as much as possible. The surface color of walls, floors, or furniture should, to some degree, define the dining area apart from the living area. The dining area should have a color and decoration scheme which communicates mainly to that area; however, because of the space limitation, this scheme should blend into the overall living/dining area interior. Contrast levels between surface colors in the living and dining area should be within the 3:1 ratio. It should be remembered that high contrast, like intense color, distorts the apparent interior space. Saturated intense colors displace to the greatest extent and can

