

# Human Comfort in Yacht Spaces

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## Abstract

Yacht spaces have complex interior systems which the human comfort became an important issue than ever. Increasing sizes and scales transform them as interior design spaces rather than industrial design objects. Because of the technological beings of yachts, they evaluated as floating machines. However the subject of spatial perception of human has a great number of data, the psychological comfort of human which could be responded by the space were not taken into enough consideration while designing yacht interiors. In this context, human comfort in yacht spaces in the scope of interior design elements will be explained by the different approaches from the architects who have applied the data of environmental psychology for buildings. The study shows, in reality architectural design codes were not applied to the yacht interiors. Being aware of the danger of stressful environments effects to the user's comfort on board, an architectural approach is basic for overcoming of these problems. Providing an architectural perspective to the yacht spaces aims to support the design process of future pleasure yachts for human comfort.

**Keywords:** Yacht spaces, human comfort, environmental psychology, architectural design

## **Introduction**

Today technological developments are enabled us to meet with great yacht sizes and volumes having more comfortable interiors. There has been a steady growth in boats over 30m, but in the last five years orders for boats over 50m has more than doubled. Vessels of 80m now being common place and yachts of up to 162m have been successfully constructed. With increasing size of yachts, new parameters are accounted for at both the design and manufacturing phase [1]. Innovations on technology, materials and design give us to handle the disadvantages of physical stressors and the yachts are began to thought not only a kind of transportation vehicle but also an option for comfortable holiday spaces and alternative living environments. Thereby time that spent on board increased. Because of the new scales of yacht interiors, a naval architect or industrial designer can feel alone himself while designing the yacht interiors according to human psychological comfort. Because, if a physical environment that did not match man's behavior, or psychological needs, can reduce the efficiency of the system. A well designed room (in terms of noise level, temperature, ventilation, etc.) may be rendered in effective if psychological comfort situations did not taken into consideration Until recent years attention is usually focused on those aspects concerning construction and structure (aesthetic overlooked). As we know because of they are floating structures and have a high technological profile, first of all the concentration was given to the engineering and safety regulation naturally. However the space as a living organism interacts with human and affects human psychology/behavior, by the way of the interior settlements. In that way, perception of space by the human is affected by interior design.

Some yachtsmen believe that perceptual problems and human error can be eliminated permanently by the new resources offered by modern navigational devices, thereby ensuring optimal safety levels at sea. But these items did not include the knowledge about spatial perception on sea-going environment and spatial elements affect the humans' behavior. To arrange interiors with the recognition of psychological element or the psychological patterns involved in a particular situation render it at once easier to manipulate, control or alter.

The objective of this paper, is to facilitate the people's recognition of the psychological and socio-psychological phenomena which encounters at sea, and thus to enhance to cope with them with spatial decisions. Additionally, this paper demonstrates that as much as how well the physical environment has been designed, psychological needs of humans like personal space, territory, privacy, density, should be taken into consideration. We will try to explain in terms of legibility criteria of Kevin Lynch which are used as a reference by the architects and environmental psychologists to turn an environments and spaces which people will be happy and satisfied in them, and will be discussed to apply these criteria into yacht interior arrangements [2]. It will be mentioned about some perceptual tricks for altering the appearance of shape, depth, etc., suggesting making further investigation of spatial illusion techniques used for yacht interiors.

## **Perception of space on sea**

In a play, the stage and scenery provide the context of what is going on: the kind of room, the characters in, the way it is decorated, and the amount and nature of its furnishing help us to interpret what is happening. They provide meaning for the actors' and actresses' actions and determine where they can walk, lean, or otherwise interact with probs. For the play, the stage and scenery is the environment in which the story unfolds. Environmental psychologists incorporate both of these levels of environmental influence-how environments influence people and how people influence environments-in studying how we interact with specific environments. In sum, space reflects by means of the transformations it undergoes, the characteristics of and the changes in the society that inhabits it [3]. While a yacht interior can be seen a stage of people with their specific roles, on the other hand their highly

technological characteristics make them a science objects. A yacht can be defined as a multifunctional vehicle, as well as a living space. So, the yacht design is often referred to as a careful blend of art and science. As an architectural artifact, that may provide clues to a more complex relationship between man, nature, and technology. With this point of view, the boat can be seen as transformation of a conventional building system. First of all as a manmade object, the boat shares many concerns with architecture, such as aesthetics, form and structure, but except from this the boat has been relatively isolated from the theoretical movements in architecture [4].

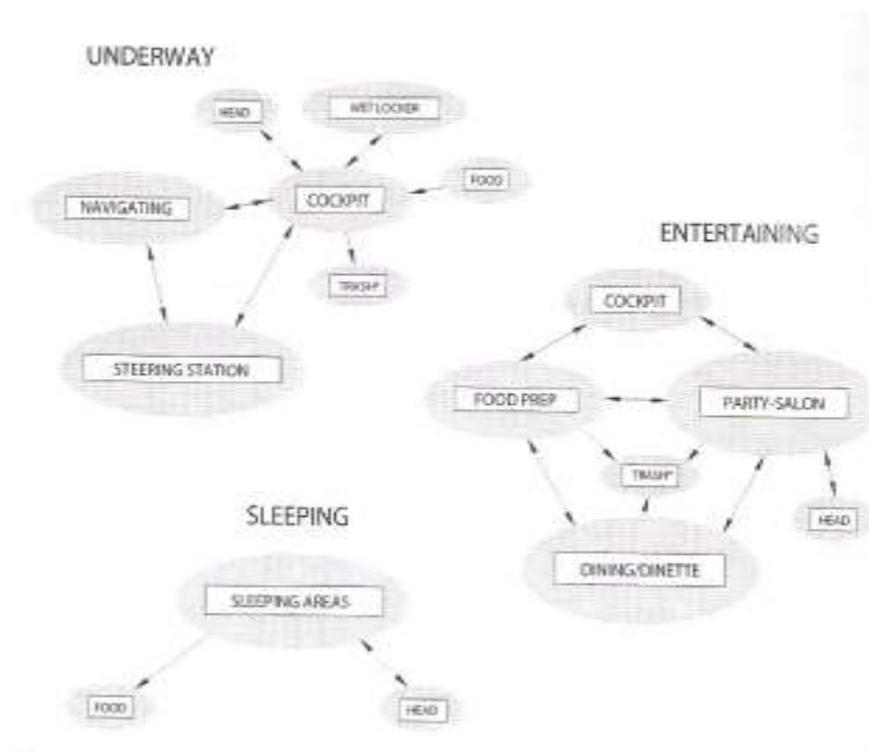


Figure 1: Space Planning for the Yacht Interior [5].

The most important boat function according to the owner needs to be given high priority in terms of space. The other activities they prefer become areas to integrate. The primary functions of an interior are eating, sleeping and taking care of personal hygiene which is the common points with traditional living space. While these functions occur in a stable basement of a traditional residential facility, the sea gives the dynamic character to the space and exposed the space with the changing situations of the environment. The design process of yacht interiors demonstrates ways of structuring the relationship between the measurable rational grid and the dynamic non-geometric forms and processes that are related to the changing natural environment. As a space planning the schema can be drawn in a parallel way (see Figure 1), but at the design process of a yacht interior the factors of the sea that affects the perception of human should be taken into consideration [5].

The sea-going environments have undergone profound and rapid change. Most of the changes that have come about have been in the physical conditions of the environment and have affected the air, light, colors, materials, dimensions, noises, smells, and spatial conformations. Considering a pleasure super yacht; she presents a clear example of a design customized to the owner's tastes, it is wandering and floating holiday home, where internal layout favors owner's areas and where much space is devoted to common activities and entertainment. Apart from that, the combined effects of vertical and transverse accelerations

generate a key factor in the mobility of passengers and crew and many on-board activities. They are a measure for the ability to walk or climb a stairway and other activities. By limiting the availability of yacht and on-board activities and through motion induced fatigue and seasickness, poor seakeeping affects the sheer enjoyment [6]. Especially vertical accelerations are prime measure for sea sickness, which is one of the comfort issues on board has also psychological alerts which will be evaluated following parts of the paper.

We receive external stimuli (light and sound waves) through the sensory organs and these are carried by the nervous system to the brain where, in conjunction with earlier experiences stored in the memory, they are coordinated to form a picture of our surroundings. The spatial dimension that most conditions our way of life is the interior and our perceptions and mental states at sea are directly influenced by it. As a creature with an upright gait, perception of the vertical for the human being is of such fundamental importance that this information is monitored by three different sensory systems: the visual system, the sense of position and the sense of balance. At sea, however, where the deck of a boat is to a greater or lesser degree in constant acceleration and deceleration in three dimensions (pitch, roll, heading) and which in addition periodically moves along the axis of gravity (up and down movements), exceptionally high demands are made on these sensory systems in order to maintain an upright position. The additional forces of acceleration caused by the movements of the boat are, for us, indistinguishable from gravity since they add themselves to it vectorially.

Under normal (land) conditions the visual system responds most accurately to vertical lines (trees, walls of houses etc.). By accuracy we mean in this case that we not only perceive vertical lines more quickly but also recognize the slightest deviations from the vertical immediately. The system also responds to horizontal lines with reasonable accuracy and very much better than to all the angles between the two main vectors. While a deviation from the vertical or horizontal line of even one or two degrees is noticeable, most people cannot differentiate between lines or edges at angles of 40 degrees. This alone serves to indicate how closely the aforementioned sensory systems, which ensure our orientation in space, work together.

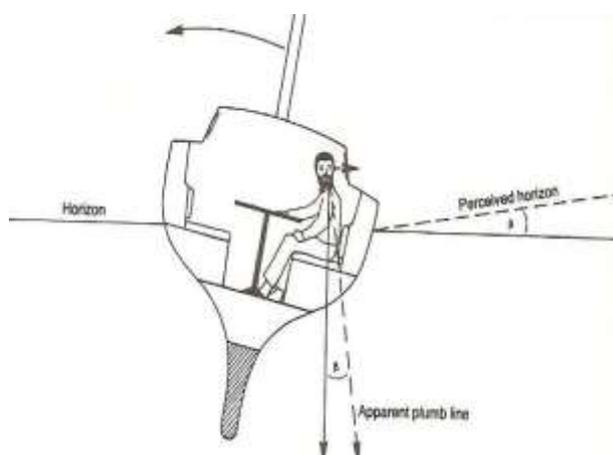


Figure 2: Perceptual yacht space

In figure 2, the continuous line represents the direction of gravity, the dotted line (perceived horizon) the additional accelerative force produced by the roll of the boat, and the dotted line at right angles to this indicates the result of these. The perceived horizon is classified in the perceptual space as being at right angles to the result of the relevant forces. In fact the direction of gravity always remains constant whatever the movements of the boat, but the additional accelerations are continually changing direction and strength and hence also

changing the combined result, so the horizon appears to be in constant motion. This effect occurs predominantly below deck because the horizon is only seen partially through the portholes or the saloon skylight and the visual impression is therefore comparatively poor. On deck, however the horizon, which stretches all-round the observer and which is visible from almost every head and body position, has a much stronger influence on our interpretation of the main parameters of the perceptual space [6]. Understanding the sea's effects on mind and body and the perception of the space is essential to achieve the vision of comfortable sea environments.

### **Physical and psychological comfort of human for yacht interiors**

In recent years human element has been taken into account more and more in the design and construction of sea-going vessels. Previously there was a prevailing tendency among boat builders and yachtsmen to entrust the ship's safety to technological factors above all, and to blame "human error" for accidents without taking the suitability of the technical equipment for human use into account. The problems of leadership and unprepared crew-members of long-distance voyages are also being discussed in the scope of human comfort on board subject.

Comfort and wellbeing on board are directly related with the seakeeping performance of a boat in a specified sea environment [8]. The seakeeping habitability can be improved and enhanced effectiveness, performance and safety of the yacht. But it is not enough to design a yacht purely focused on meeting technical aspects [9]. For example, the conflict of sensory information, explained in previous section about sea's effects on perception, is a trigger for the autonomic symptoms connected with sea sickness. With the physical point of view to the human comfort on board by considering human space interaction for yacht interiors achieved by the increasing range capability and good seakeeping through the optimization of hull and propulsion system, providing stabilization at rest, keeping the noise and vibration levels optimum [10]. It is important for human beings to feel, during infancy, that they belong to a place and establish with that place a relationship of positive, reciprocal interdependence. Space as a physical component of an environment has the power to condition behavior and form personality. We can say that the environment affects our emotions, feelings and reactions. The environment conditions behavior. Ittelson's and Barker's studies come to the conclusion that there is a very strong relationship between people and environment. The fact has to be emphasized that designing an environment, both in the physical and social sense (the two are anyway inextricably linked together) means provoking reactions in people (that are more or less predetermined) and affecting their personalities. Physical features of a space counted as legibility of the layout, noise, temperature, lighting, etc. and their effects on human psychology have the subjects of the studies which have been held by the architects and interior designers by the help of the environmental psychology based data [12].

High levels of noise leads to the heightened physiological activity typical of stress and suggested that physical health may be affected as well. Since stress is a casual factor in mental illness as well, we might expect noise exposure to be associated with mental health problems [13]. Effects of noise result annoyance and negative impacts on person's comfort, regardless of its sources [14]. The researches of the environmental psychology indicate that noise may have adverse effects on physical and mental health. Today many of the megayacht have wide solution possibilities of sound insulation systems. Temperature is another physical factor which is measurable and adjustable according to different conditions. But, perception of ambient temperature is not a function of temperature alone. Psychologically, the problem of perceptual measurement can be partially solved by taking into account a comfort level that is influenced by both temperature and humidity, thus creating a new ambient environment index. Because, attention, perceived control, and adaption level operate as explanatory

mechanisms in understanding the effects of stress caused by unsuitable temperature levels on task performance (Figure 6). Most individuals exposed to high ambient temperatures will report subjectively that they feel uncomfortable and perhaps irritable. Ruback and Pandey (1992), for example, found that rickshaw passengers in India reported more negative feelings as the temperature became uncomfortably hot; interestingly, they found that telling people about the effects of heat gave them a greater sense of perceived control. We might expect that unpleasant feelings associated with heat or other factors would also give us an unpleasant disposition toward others. In combination with other disciplines these studies can be interpreted for the interiors of yacht planning and furnishing arrangements [15].

Environments' effects on our organism are not limited to the physiological sphere; they also touch the psychological sphere. For this reason, it is vital, in the planning of highly artificial environments like yacht interiors to bear in mind the psycho-physiological mechanisms of perception. The planning of highly technological environments must take into account the needs of human beings. We sail with mind and body which is to say we do not function on a boat in a purely physical capacity; rather life at sea affects the entire being, behavior and personality. Mind and body form an inseparable whole. Our physical state affects our behavior and perception just as our behavior and perception influence our physical state. The best example of this is seasickness, which has interacting physical and psychological components. The perception of space is a very complex phenomenon in that it regards not only the perception of the surroundings (forms, objects, images) but has primarily to do with the way we balance our body and move around (walking, sitting, turning, bending). In fact, what is meant by perception of space is an intricate mixture of stimuli and feelings, concepts and sentiments that are difficult to single out and separate. To sum up, our perception of the distance, volume, size and shape of spaces is achieved on the basis of series of data and means of certain processes. Beyond these limits, the perception of size and recession is based on indirect signals such as a comparison with other objects, the dimensions of which are known, or sharpness of outline [16]. Designers now also consider how physical settings affect the people using them. Thus, we want to know both how the design influences people and how we can modify the design to facilitate the function for which the setting is intended. Principles of crowding, privacy, personal space, and environmental perception, as well as noise, temperature, air circulation, and cost may all be factors in how a building is designed and how well it serves its intended function.

## **Conclusion**

The purpose of gaining an understanding of physical discomfort affection on psychological discomfort may be used in order to understand what kind of influence a space, in its various aspects, can exert on our life and our body and the way in which it should therefore be designed. We know on the basis of the physiological dimension of the perception of space that to live in a given environment not only conditions behavior, but also influences our psychological being and sensorial world. In addition, it influences the way we perceive and stimulates to a greater or lesser degree our brain, thus influencing our psychological state. In a yacht environment in which almost everything that surrounds us has been created by human beings, such knowledge is essential. It makes possible to reproduce certain aspects of nature (temperature, air, light, etc) in a way that is artificial yet appropriate, or, that is, in a way that is not harmful to health, either from a psychological and physiological point of view. There has been a general trend for increasing both sizes and interior volumes to be used for supporting additional human functions. Technological innovations and production techniques of yachting industry, offer the possibility to build attractive high performance super and megayachts.

This paper emphasized on achieving the hydrodynamic principles of yacht interiors by considering human comfort on board while analyzing and designing interiors' psychological aspects on human behavior. This paper demonstrated the relationship between physical discomfort and psychological discomfort, using examples of interdisciplinary studies especially environmental psychology based knowledge that has been used by the architects and interior designers who intended to create the space satisfied the human both physically and mentally. Additionally, increased yacht sizes require to interdisciplinary approaching and collaboration at the very early stages of the design process and it is worthy of encouraging new designers to meet the characteristics of the field.

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