

Natural Climatic Control using Conceptual Elements in a Building for Human Comfort

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ABSTRACT

With respect to comfort inside the building to distinguish between thermal comfort lighting important of these effects is thermal comfort which is primarily compared by four major factors the air temperature, Main radiant temperature, Humidity and Air flow. An extended work of the American society of heating, refrigerating and accordingly engineers ASHRE. The thermal comfort is that condition of mind which expresses satisfaction in the thermal environment. Basic physical and physiological measurements of temperature and heat flux of represent location of a human body have yielded the following results.

KEYWORDS: Conduction, convection, evaporation, air cooling, thermal index, altitude, topography, human body, buildings, temperature, energy balance, thermal comfort, surfaces, wind, solar, heat loss, heat gain

INTRODUCTION

Shelter engineering efforts for marking to provides itself with an indoor climate to which man is best adopted. The design of building and the choice of building materials a great deal to external climate and thermal optical and statically requirement of human being.

Planning and design of buildings as well as the proper selection of building material can improve the interior condition of a building very close to the desired level. It is necessary to understand the conditions which are likely to be acceptable as also the condition that should be avoided.

These conditions serve as guidelines in accessing the range of values of parameter are would feel comfortable. The thermal condition of the body is essentially observed by the thermal receptors (temperature sensor) and hot by the receptors (heat flux sensor). Receptors which age respond of temperature below 37 degree centigrade and the warm receptors, which are which respond at

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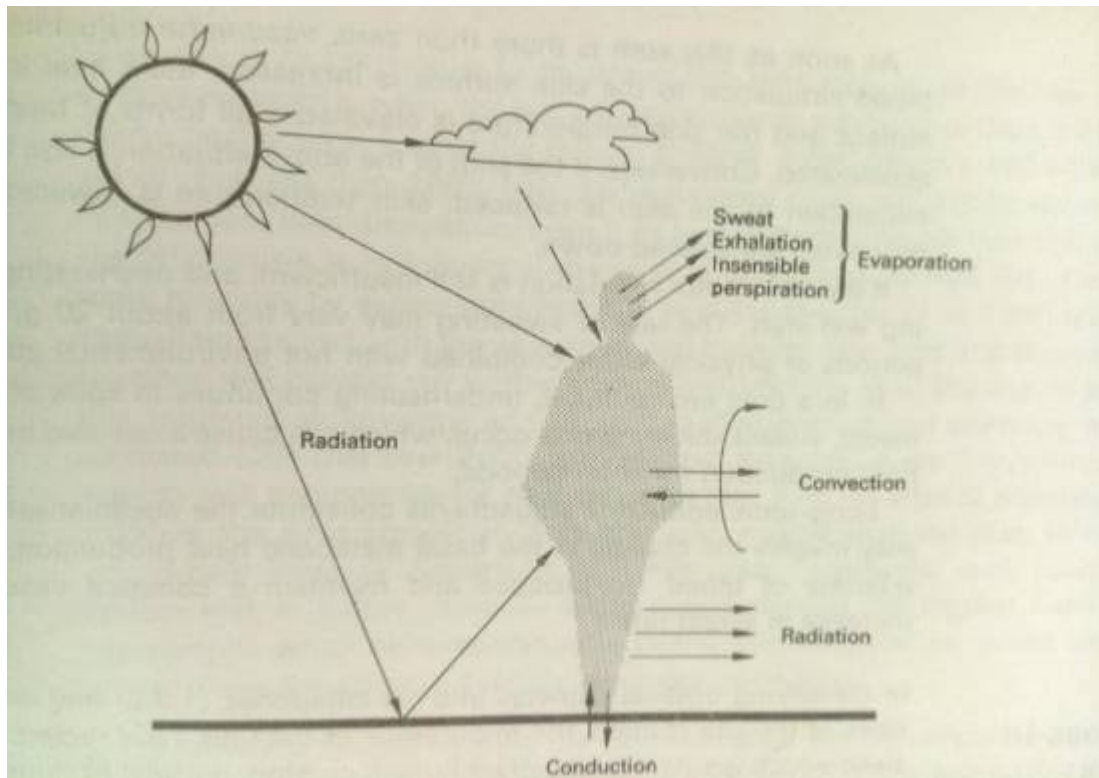
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temperature above 35 degree centigrade as approved by neurophysiologist. The response of thermal receptors is caused by electrical and mechanical impulses.

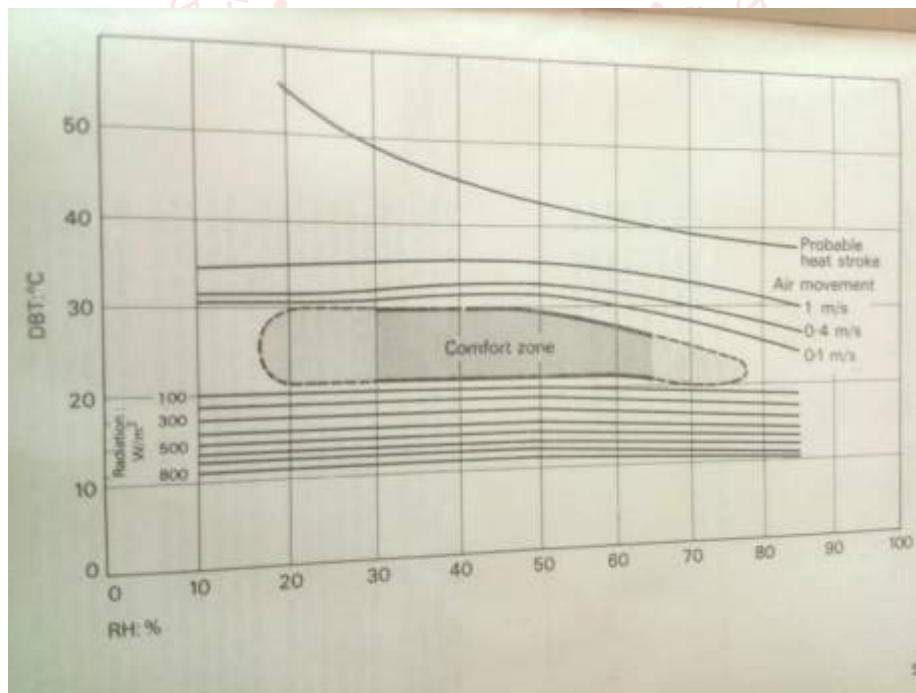
The feeling of thermal discomfort due to cold is observed by the cold receptors lying on the upper surface of the body (skin). These receptors start reacting at a hold value of 34 degree centigrade and sense the temperature below this value in case of increase in cold the metabolic heat Increase. The feeling of thermal discomfort due to heat is is rotated to perspiration. It is observed by the pinhead size worm receptor revert in the brain and start going the heat when temperatures have extended a fresh hold value of 37 degrees centigrade.

Define the feeling of thermal comfort as the absence of such electrical and mechanical impulses bye both the receptor of the body which head to change of thermal environment.



Body heat Exchange (conduction, convection and radiation)

Human body and environmental conditions- Through the metabolic process food energy is converted to body energy by digestion, the human body comfortably generates excess heat. The amount of excess heat produced by the body is proportional to the level of activity with higher activity level producing higher level of thermal energy. The excess heat produced in the body needs to be dissipated because the deep body.



Bioclimatic chart for men at work

Temperature remains at 37 degree centigrade to prevent medical complications. The human body exhibits all normal heat transfer mechanisms i.e. conduction, convection, and radiation in addition to its removable ability to repair and cool itself by evaporative heat loss. Total heat production rate in human beings as per activity and rate of heat production as follows. Sleeping 35 W/m², resting 45 W/m², sitting normal and office work 55 W/m². Typing work 85 W/m², slow walking 110 W/m², fast walking 140 W/m², hard work more than 170 W/m².

Parameters of thermal comfort factors are responsible for the feeling of comfort inside the buildings. These physical and physiological factors, which determine the state of comfort. The primary and dominant

Factors determines the state of comfort

- Air temperature
- mean radiant temperature
- air humidity
- air motion
- clothing
- Activity level.

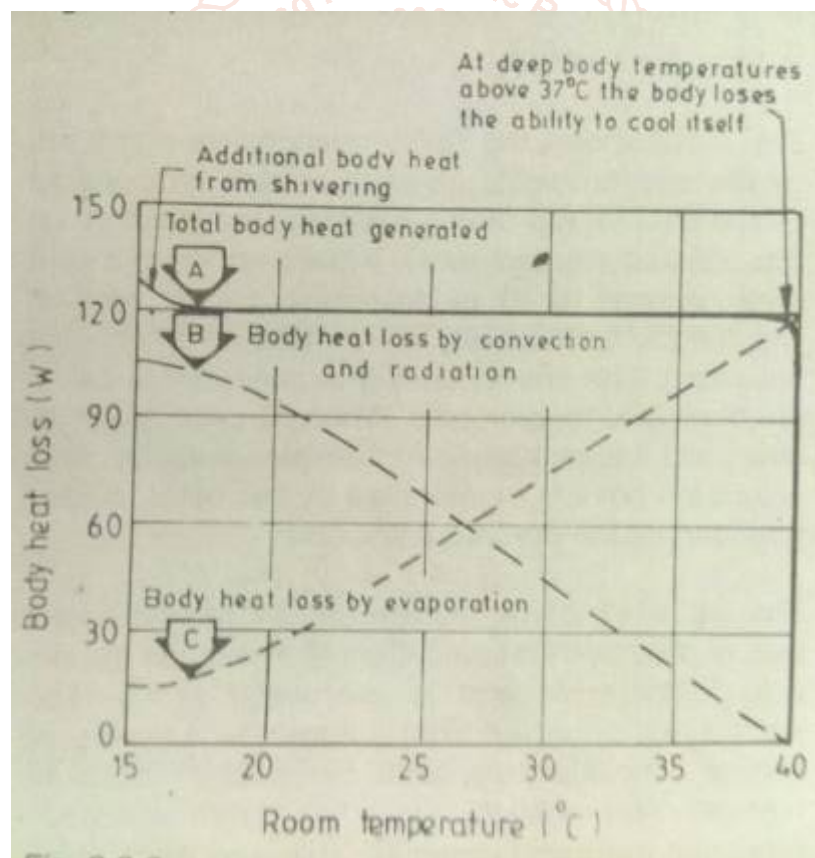
The basic relationship expressed by the psychrometric chart (figure attached)

Relative humidity= (amount of moisture kg of dry air of sample/amount of moisture per kg of air at situation) x100

Air humidity- the basic relationship expressed by the psychrometric chart. A trailer temperature on the abscissa (humid axis).It is the temperature of a given volume off air is decreased to the point at which it cannot hold any more moisture it becomes saturated. The corresponding temperature is called the dew point it is at 100% relative humidity. This saturation point is represented by the alter curved boundary of the psychrometric chart.

Another important parameter express by the psychrometric chart is the enthalpy expressing the energy e content of the air.

Mean radiant temperature and globe temperature- the mean radiant temperature and a building environment is a great importance to comfort since the heat losses by the body through the mechanism of radiation are dictated by this parameter. The mean radiant temperature is the area weighted average temperature of the surface.



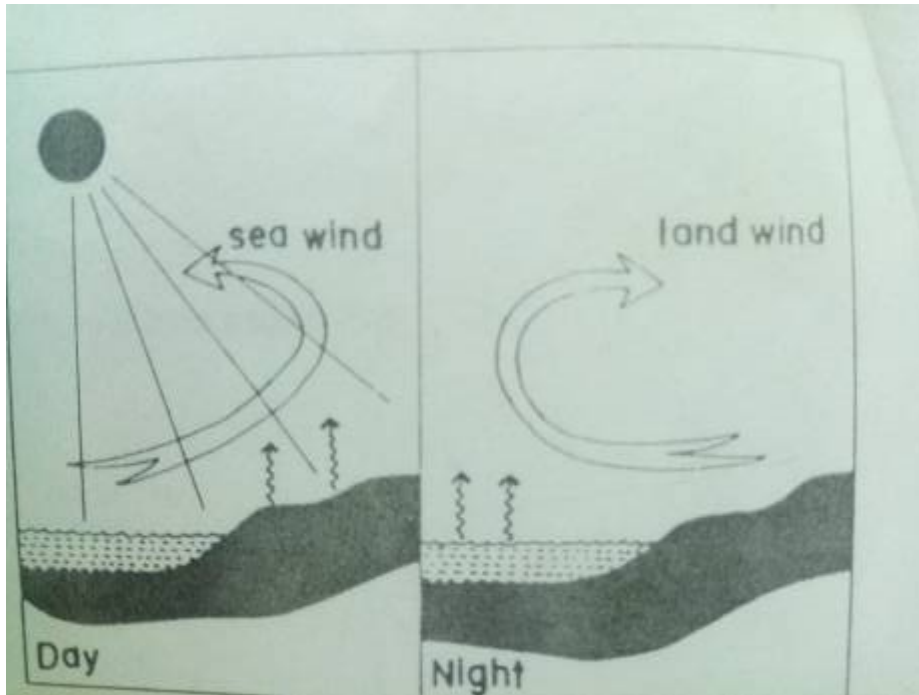
Body heat loss and air temperature

Topography- The climatic parameter is influenced most by topography is the wind pattern Valley tends to channel wind along their arm axis. Rising contour opened to the wind produce up currents on the wind ward side, revers Eddy current over the crest on the lee ward Side. The wind speed begins to decrease on the windward side off of a wind break and regains, it's full magnitude of a distance depending on the types of barrier.

The temperature at a a certain location is is greatly affected by water masses, search age rivers and lakes that are close due to its smaller heat storage capacity, land gets hated at list price as early as the sum volume of water while water losses some energy additional as a a result of evaporation. The rising hot air from the lands surface

draw air from the water surface and this explains the following of cooler air from the sea during the day during the night. The land surface cools much faster and the wind pattern reverses from the land to sea due to the evaporation of water.

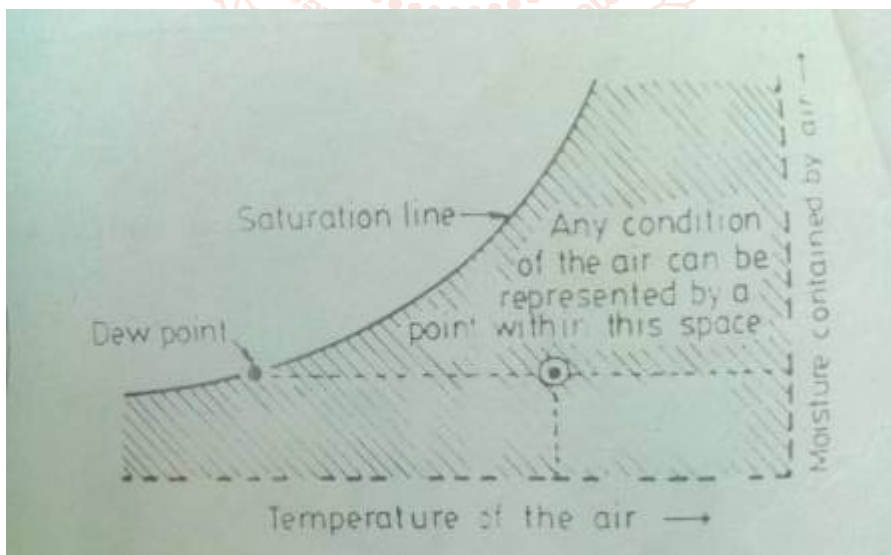
The relative humidity increases as resulting in decreasing radiation off heat from the surface. This results in the moderation of night time cooler temperatures.



Land and sea wind (topography)

Natural and environment- trees, water and vegetation have a pronounced effect on on the sites climate trees and vegetation from and intermediate layer between the surface of the Earth and the atmosphere, covering the ground with vegetation, results in increasing the contact area by 4 to 12 times man made phenomena, such as changes in vegetation Earth and water surface can create considerable micro climatic changes.

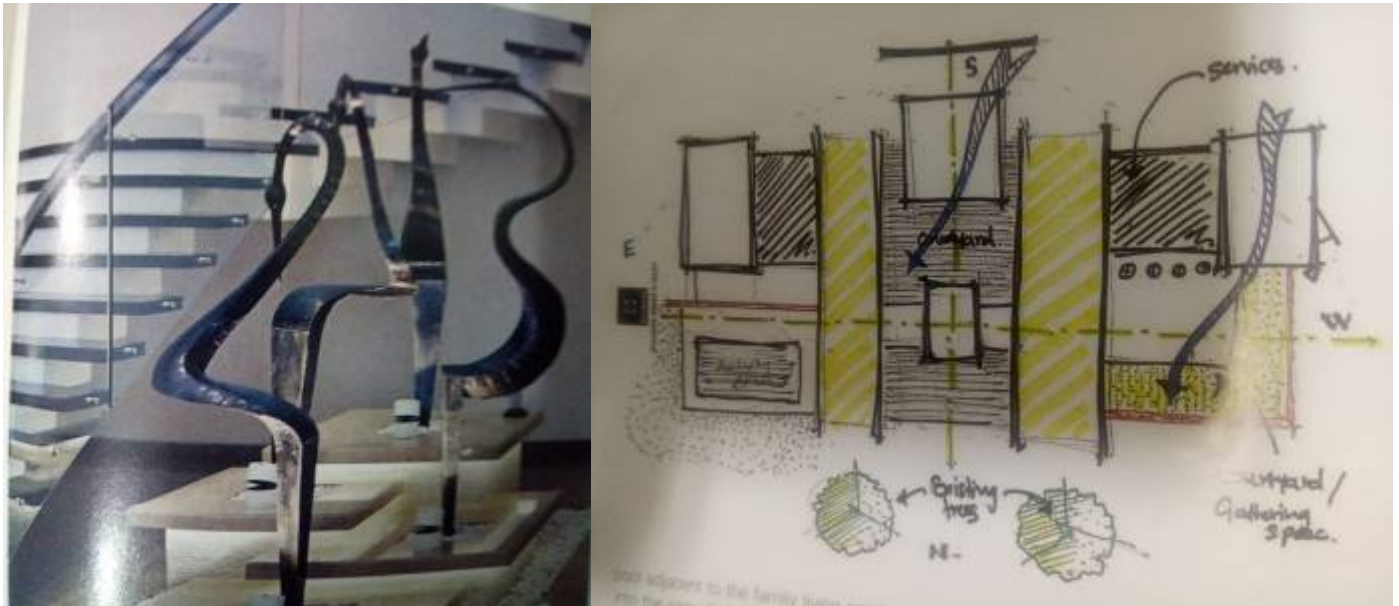
Changing of water streams, Street traffic and large building masses are all responsible for climatic changes around a city.



Basic relationship expressed by the psychrometric chart

Building forms- the energy demand for heating or cooling a building depends on a number of parameters one of the influencing parameter is the volume of the air thatIs needed to be heated or cold and its relationship with the area of the envelope closing the air space.

This parameter known as the surface to volume ratio is determined by the building form.



Orientation of building- the maximum solar radiation is interrupted by the roof (horizontal surface) followed by the East and West walls and then the north wall during the summer period, when the South oriented wall receives minimum radiation. It is therefore desirable that the building is oriented with the largest wall facing north and South, so that only short wall face East and West. Thus only the smallest wall areas are exposed to intense morning and evening Sun.

The East and West windows are the surface of most solar gain and should therefore either be eliminated or reduced in size. It is also advisable to place unconditioned spaces like garages, closets and other buffer spaces on the East and West sides. Orientation to take advantage of prevailing breezes in warm and humid climate and prevention of hot winds in hot and dry climate it is also important. It is however not as critical as an East west orientation for sun control.



Visual character in whole building



Visual character in façade



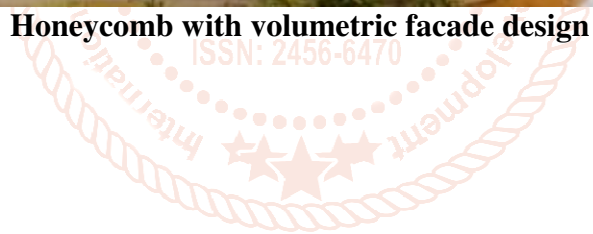
Variable geometrical spaces creates artificial landscape for COVID patients



Geometric configurations Approach



Honeycomb with volumetric facade design





Bioclimatic Architecture in Design



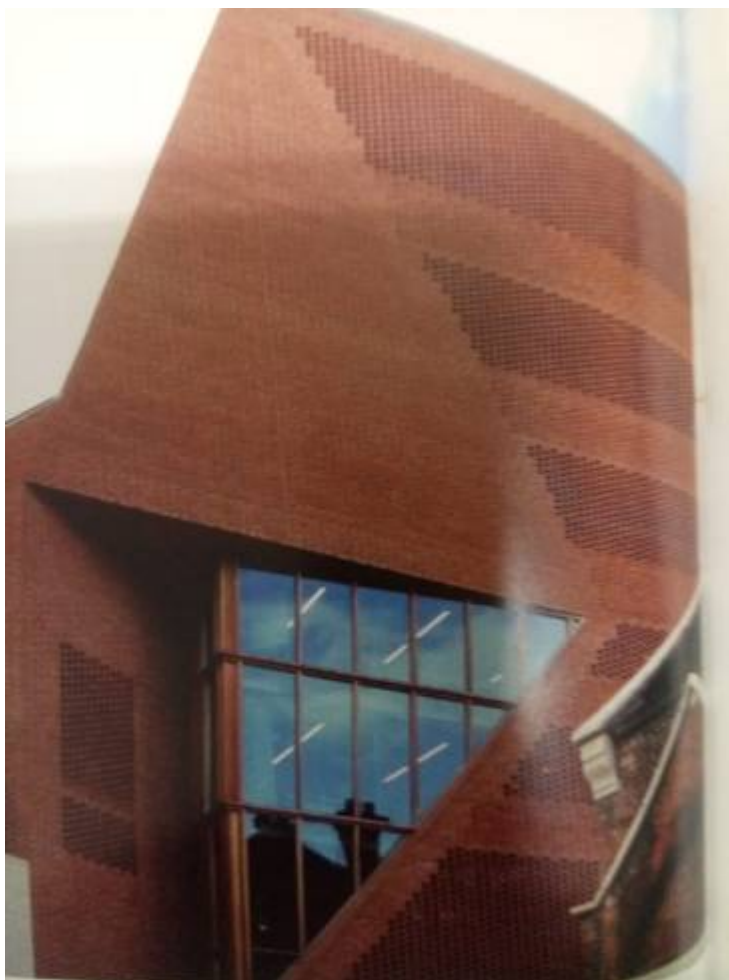
Combination of solids and voids with green spatial approach



Modern smart building approach



Surface creating an opulent atmosphere



Aesthetic Approach



Ecological approach



Sun-soaked building juxtaposition of masses, activity space with curves, surfaces, masses, voids with functional spaces creates a harmonic symphony

Conclusion:

The main aim of designing buildings is to create a comfortable environment for residents. Currently, there is an argument that by using the passive design principals of traditional architecture, more thermal comfort can be achieved in buildings. In vernacular architecture, it was not possible to create a 100% thermal comfort zone, so the attempt was made instead to reduce the amount of dissatisfaction. Therefore, architects tried to use thick walls, high ceilings and big openings to gain more benefit from natural environments in hot summers, with spaces heated by fire in winters. However, in recent times, by using mechanical ventilation systems, achieving comfort zones is easier. Based on the results, although increasing height leads to increasing the free-run periods in traditional buildings and at the same time increasing the sense of thermal comfort, it does not affect insulated contemporary buildings.

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