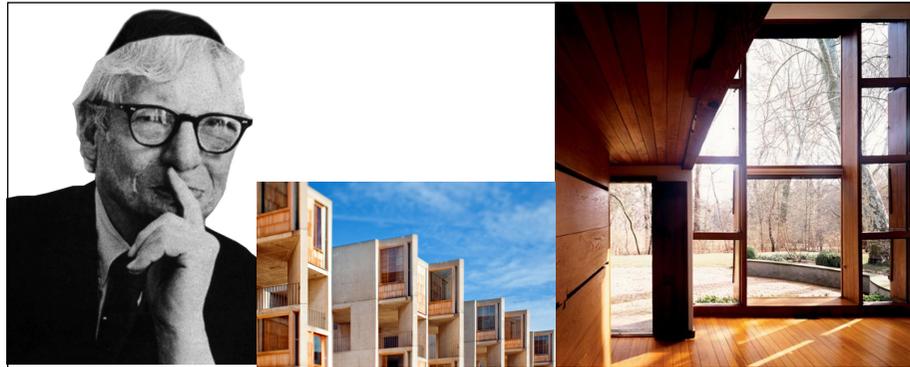


Natural Lighting in Architecture

Ivan Tizikara



Salk Institute, San Diego, CA.

I can't define a space really as a space, unless I have natural light . . . natural light gives mood to space by nuances of light in the time of day and the season of the year, as it enters and modifies the space'

Louis Kahn (American Architect)

earliest caves,

daylight informed the lives of the inhabitants,
initially in the difference between night and day

crude openings,

letting in light, air, heat and cold, the window was the
vehicle for the introduction of daylight

Sophisticated Openings

wondrous interiors of the mediaeval cathedral, the
Baroque churches, or the many private buildings of the
eighteenth century

Window

but its purpose of letting in daylight has remained its
primary role

Materials

thin slabs of marble, sheets of mica, oiled paper, glass

mediaeval period,

the shape and location of the windows being functionally related to the **role played by day lighting**

renaissance period

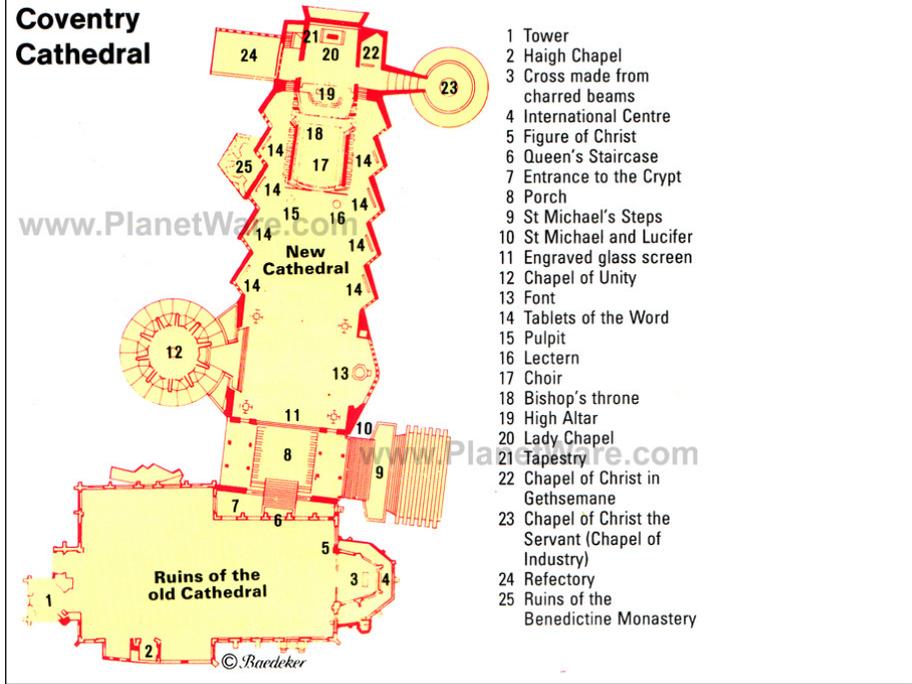
the **location** and form of windows became more formalized, often being less well **related to the interior spaces** they served

Stained Glass

Innovation – cathedrals, **telling the Christian story,**

whole walls of glass were made possible by structures such as the **flying buttress.**

Coventry Cathedral



- 1 Tower
- 2 Haigh Chapel
- 3 Cross made from charred beams
- 4 International Centre
- 5 Figure of Christ
- 6 Queen's Staircase
- 7 Entrance to the Crypt
- 8 Porch
- 9 St Michael's Steps
- 10 St Michael and Lucifer
- 11 Engraved glass screen
- 12 Chapel of Unity
- 13 Font
- 14 Tablets of the Word
- 15 Pulpit
- 16 Lectern
- 17 Choir
- 18 Bishop's throne
- 19 High Altar
- 20 Lady Chapel
- 21 Tapestry
- 22 Chapel of Christ in Gethsemane
- 23 Chapel of Christ the Servant (Chapel of Industry)
- 24 Refectory
- 25 Ruins of the Benedictine Monastery







Interior Gloucester Cathedral



Benefit

1. Association with the natural environment,
2. savings in electricity and cost
3. seeing in order to function within a space.
4. The natural appearance of a space – objects and surfaces, are modelled in daylight
5. The cyclical change from morning to evening, weather, seasons
6. Orientation comes with the knowledge of a person's whereabouts in relation to the outside world.
7. The experience of the world beyond the building
8. The experience of natural colour

Cost of Daylight

1. the control of sunlight, heat gain and loss,
2. the association of windows with ventilation
3. and the question of whether the windows should open or the building be sealed,

Factors to Consider in Designing with Daylight

- Site Location– Rural or Urban context, orientation, existing buildings,
- The building function – room dimensions, heights, subdivisions,
- Window size and disposition – views, heat gain and loss,
- Control systems, outside/ inside condition, glare, noise

Change/ Variety

Change – in appearance of the daylit interior

human body has a capacity for adaptation

- change from day to night
- changes of the weather – bright sunny days , dark and cloudy or rainy days
- changes of season –, winter snows to summer sunlight

Modelling

- Objects derive from its physical form (whether round, square or otherwise) based on the way in which light plays on their surfaces.
- Emphasis provided by shadow patterns on surfaces and form resulting from the direction and flow of natural light, is related to building orientation, coupled with the nature of the windows or means of daylight entry.
- The appearance of the interior architecture is determined by the physical surfaces, edges and textures when acted upon by the light falling on them.
- Interior spaces are judged to be pleasant, bright or gloomy as a result of modelling effects.
- overhead daylight is useful in art galleries displaying sculpture – more closely resembles that from the daylight outside



Michaelangelo's David statue lit from a dome roof light allows the modelling to change from day to day and hour to hour.

Orientation

- setting of the building on its site
- relationship to the sun path
- to achieve the optimum natural lighting solution
- knowledge of the world outside
- individual's understanding of his where about within a building especially shopping malls.
- When sunlight is available, there is a human need for it to be taken into account, and a sense of disappointment when this is denied

The color of anything depends on the type of **light sent to our eyes**; light is necessary if we are to have any perception of color at all. An object is "colored," as stated above, because of the light it reflects—all other colors are absorbed into that specific object. So then, an apple appears red because it reflects red light.

Colour

- Colours of objects seen under daylight.
- We take things to the natural light to confirm their true colour,
- Benefit for those who need to exhibit goods in their true colours



View

- out through a window
- how we perceive the world outside
- a dynamic experience
- associated with changes
- in daylight, sunlight and season

Research in Pennsylvania suggests that patients in hospital recover more quickly where there is a view.

(Uhlrich, R. (1984).

View through a window may influence recovery from surgery

school classrooms

1. Does preventing children from having a view out of the window would ensure greater concentration on their work ?
2. Or stimulates to the learning process as well as having many other advantages ?



**Jubilee
Church,
Rome,
by Richard
Meier,**

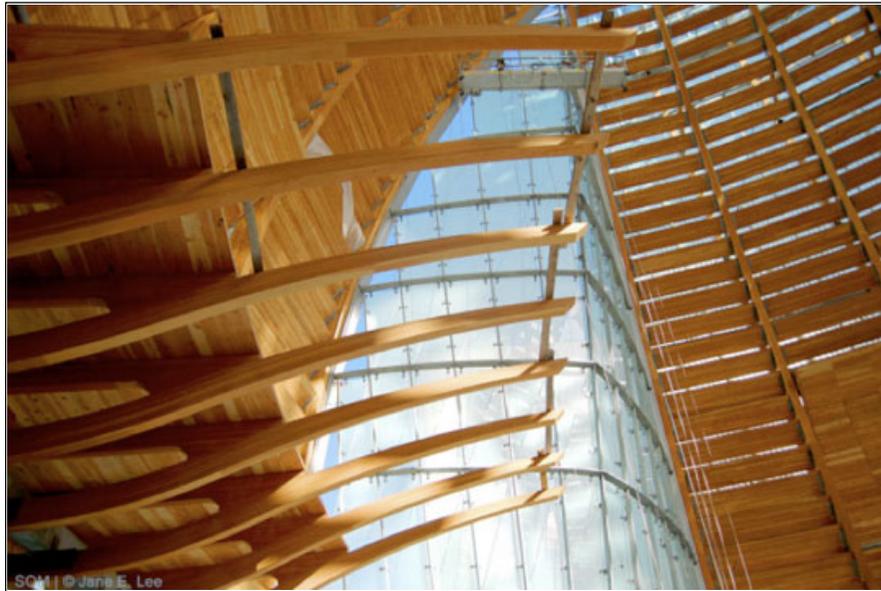
The perceptual volume of the church is directly influenced by natural light since the zenith light and the glazed skylights between the successive shells are continually responsive to the changing pattern of light and shadow as the sun moves across its trajectory.



According to the season, the weather, and the time of day, light is variously graduated down the inner surface of the shells thereby imparting to the church, the chapel and the baptismal font a particular character



Cathedral of Christ the Light in Oakland, by SOM Architects



light would be the key “to create a contemporary design that was still evocative of the Church’s two millennium–old traditions.”





The skylight focuses light onto the center altar, allows views of the sky, and is also part of the unique passive cooling system. The system uses natural convection to cool air as it rises up through floor vents and out through openings in the oculus.



Architecture Institute, Amsterdam



