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LIGHT IN PLACE



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Light Organizing/Organizing Light

Martin Schwartz

We have always organized ourselves and our places in light. The sun's cyclical relationship with the earth is a basis for measuring time and direction; its daily and seasonal cycles provide a framework for orienting buildings and cities.

But our craving for sunlight¹ is more than a matter of physical health and comfort, more than an expression of our need to maintain balance in space and time. For designers, light can be an important tool in creating environments in which people find pleasure, stimulation and emotional connection.

Daylight informs and delights us with its capacity for variation. As the sun moves across the sky, and as its light is swayed by changing weather and geography, light and shadows improvise over surfaces — revealing new dimensions of familiar buildings, landscapes, streets and squares.²

Light summons our spirit because it grabs our attention without calling forth the iconic meanings attributed to objects. Sparkling reflections, dimly lit rooms, multicolored skies, deep shadows and glowing electric oases attract our interest and stimulate our imaginations. The effects of light urge us to pause and reflect on what we see; they demand empathy and offer revelation.

Subtle or sudden changes in light and shadow parallel the ebb and flow of human emotion. Momentary, daily and seasonal changes in light are displayed all around us and influence our moods. It is not surprising that artists use descriptions of light and dark symbolically and allegorically to portray our inner lives.

A place organized in daylight establishes its identity by recognizing its location in the world. The strategies designers can use to accommodate local light and shadow are simple, but they have the potential for creating places that are rich and rewarding. This article will discuss four strategies and consider examples of each: orientation and attitude, structure and enclosure, ornament and detail, and animation. These approaches are qualitative rather than quantitative; as such, they tend to overlap, providing opportunities to design places that respond to light in multiple ways and offer people multiple experiences. Together, these approaches give us a set of tools we can use to organize light in places, and thus organize places in light.

Orientation and Attitude

Looking around a room in which you spend a lot of time, you might ask questions like: What color is the daylight in the room? At what time of the day does the room receive direct sun? What is the character of the light in the room? How does light make the room feel — expansive and open, mysterious and enclosed? Louis Kahn asked this question another way: “What slice of the sky does your building have?”

The *orientation* and *attitude* of a place are the way in which an architect anticipates questions like these. *Orientation* is the architect’s response to the way daylight organizes the world; it requires a recognition that daylight is neither static nor random. The light in different regions of the sky has dramatically different characteristics that depend largely on the sun’s daily and seasonal paths — a pattern of movement that is regular and predictable.

In the morning the sun appears low in the eastern sky and directs sunlight across the horizon. Morning sunlight passes through a maximum amount of atmosphere, whose particles and accumulated dust reflect that light and turn the sky a warm orange and red.

Soon, the sun abandons the east and starts to rise through the southern sky.³ It casts higher and higher angle, direct light until noon, when, by definition, it reaches its highest position above the horizon. This higher altitude sun is whiter and more intense because it passes through less atmosphere, less dust and fewer pollutants before it reaches our eyes.

In the afternoon the sun descends through the western sky, and the altitude of the sunlight gradually decreases. Eventually it sets in the west, providing light much like that which it broadcasts as it rises in the east.

The sun avoids the northern sky except for brief periods during the summer, when it rises in the northeast and sets in the northwest, following a longer path and lengthening the day. But, for the most part, light from the northern sky is diffused sunlight that has been reflected to us. It is cooler in color, characterized by clear blues and overcast white and gray.⁴

In extreme northern and southern latitudes, such as Scandinavia, the altitude of the sun’s path through the sky appears to be lower. In these regions, low-angle sunlight predominates and days are much shorter (less light) in winter and much longer (more light) in summer.

These seasonal and regional differences in the character of daylight offer designers opportunities to create places that resonate visually and thermally with their specific settings. This knowledge can lead to the design, for example, of city buildings clad with reflective materials to help illuminate an adjacent urban plaza or porches that create shade on the bright side of a house.

While *orientation* refers to a recognition of the path of the sun and the characteristics of the sky, *attitude* is the architectural response to those conditions, the physical evidence of the interaction between form and light. Attitude refers to the reorganization of daylight to suit our needs, for reasons of both function and pleasure. Architects can shape buildings to catch light, locate windows to reflect light deep into rooms, design skylights and transform roof profiles to capture light from the top of the sky, or push the southern face of a building behind an arcade to make shadows in summertime.

Obviously, it is not always possible for a place to capture light from an ideal region of the sky. Weather conditions are not constant; sometimes existing buildings obstruct desirable low-angle winter sun; sometimes a building site is oriented toward a less favorable region of the sky. But the difficult choices between good views, beautiful light and privacy often inspire masterful responses. In the face of these constraints, and with the proper sensibility, architecture can make its own light.

Structure and Enclosure

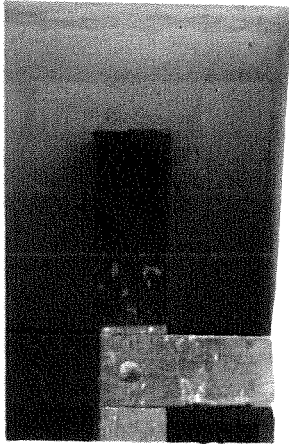
An incontrovertible fact about architecture is that the mass of a building prevents a person standing inside that building, or near it, from having unobstructed access to daylight. This is why Le Corbusier said, “The history of architecture is the history of the struggle for light.” The history of architecture is the record of our increasing sophistication at bringing light into spaces — creating light organized within the textures of structure and the boundaries of enclosure.

Structure refers to the elements of a building, such as walls, columns and beams, that are responsible for supporting the weight of a building and its contents. *Enclosure* refers to the elements of a building that create a distinction between spaces, such as walls that delineate rooms, streets and urban places and separate inside from outside and public from private.

By carefully organizing these necessary obstructions, architects can introduce daylight into a building. The struggle to gather daylight and sun often determines the final location, size,

Church at Bagsvaerd, interior.



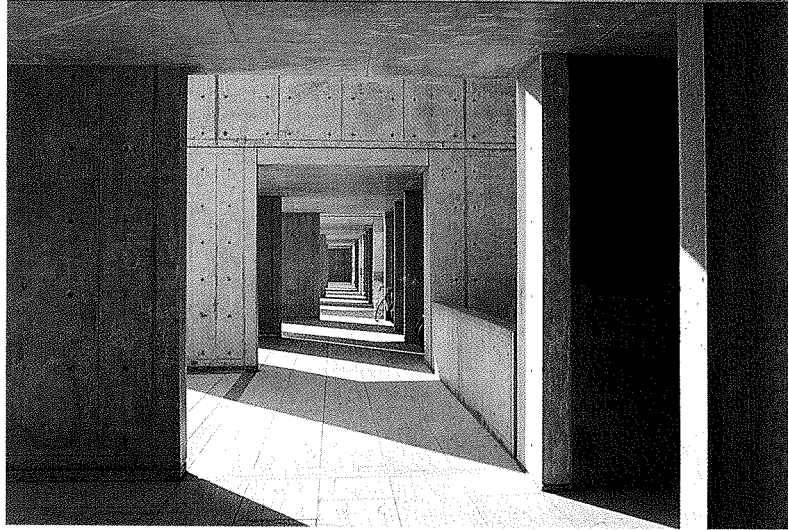




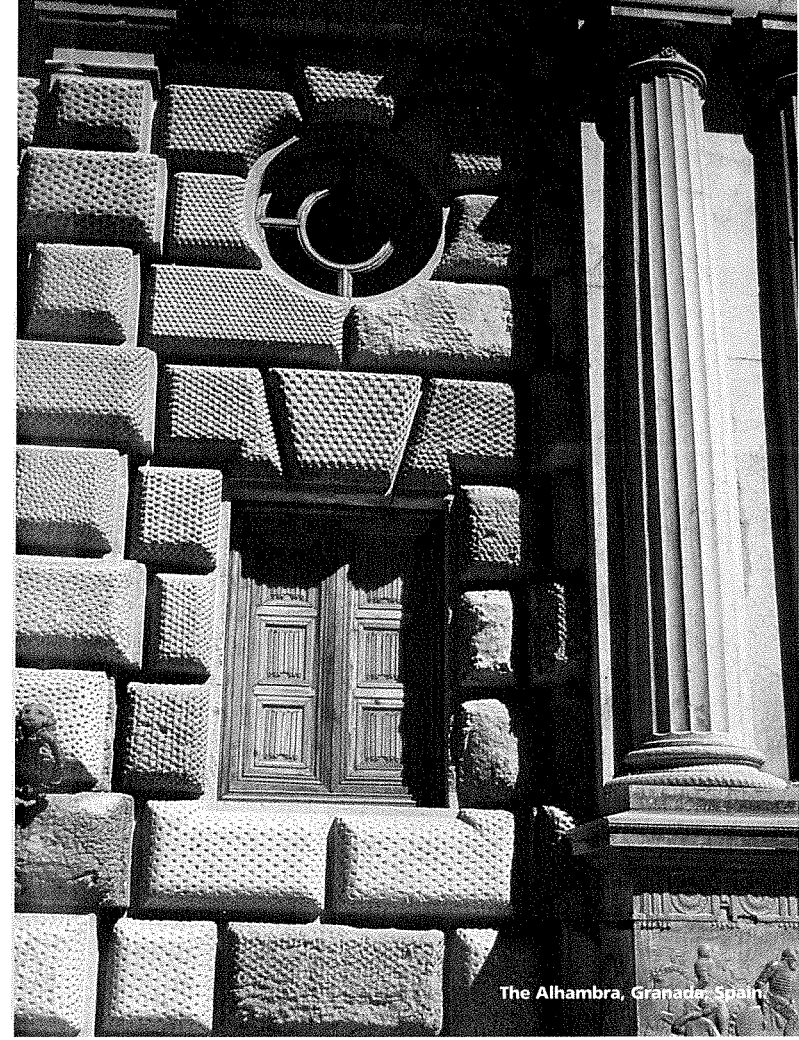
Bradbury Building, Los Angeles.



Two views of the Salk Institute, La Jolla.



Schirn Kunsthalle, Frankfurt.



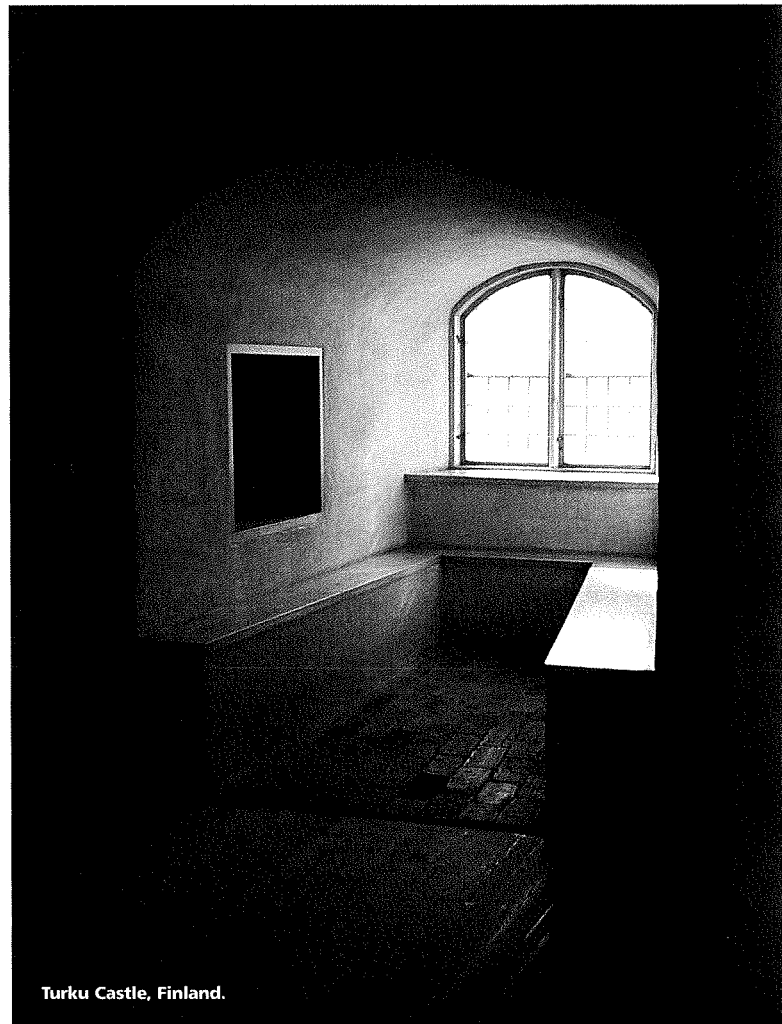
The Alhambra, Granada, Spain.



United Airlines Terminal, Chicago.



Street in Imperia, Italy.



Turku Castle, Finland.

shape and finish of the elements of a building's structure and enclosure and their arrangement into a cooperative system.

Walls: The traditional method of supporting a building is the load-bearing wall, which requires a building to have nearly continuous walls that thicken at the base. The wall also is the basic element of enclosure, offering a measure of protection from external threats.

Walls, of course, need not be entirely solid. They can incorporate openings like doors and windows, which allow the passage of light. These openings can be combined and arranged not only so that daylight creates well-defined interiors of light and shadow, but also to offer textures composed of wall and window, surface and source. Gothic cathedrals in particular are recognized for their supporting buttresses, an innovation that eliminated the need for continuous enclosure and provided the opportunity for large openings, which were glazed with stained glass.

Whether a wall offers structural support or enclosure, however, decisions about whether openings should be frequent or occasional, large or small, must be made judiciously. Where penetrations cannot be made easily, as in the case of fortifications, buildings often look inward to spaces like courtyards and atriums to gather light.

Walls also can be designed to be reflecting surfaces, as secondary light sources that increase the amount of available light. An exterior light-colored or reflective wall that faces the southern sun redirects sunlight to the areas facing it. Much of the ambient light in dense urban areas like Midtown Manhattan, in fact, is sunlight reflected from buildings.

A light-colored interior wall opposite a window or under a skylight gathers and reflects illumination, creating a brighter space; it can make a room appear to be infused with light. This technique is particularly appropriate in regions where diffused daylight, low-angle sun, or overcast skies are common. Scandinavian architects have frequently employed this approach. In the sanctuary of Jorn Utzon's church at Bagsvaerd (near Copenhagen, 1978) white painted concrete ceiling vaults diffuse daylight down to the congregation in a simulation of a bright, overcast sky.

Column-and-Beam Structures: Perhaps the most profound difference between traditional and contemporary architecture is that buildings no longer need to be supported by load-bearing walls. With the advent of column-and-beam systems, which rely on a rigid skeleton to carry a building's weight, architects now have greater opportunities for bringing daylight into buildings. Although people commonly built smaller column-and-beam structures (mostly of stone and timber) well before this century, only now is it possible for entire walls to be made of glass and transmit light.

Column-and-beam structures also offer the possibility of continuous, open interior spaces that provide opportunities for enhanced visibility and illumination. The grid of supporting columns and beams might be expected to enforce an evenness of illumination, in terms of both quality and quantity, but this is by no means inevitable. The most dramatic examples of the subtle and dramatic variations of light in a multi-columned space are

found in architectural history: the hypostyle hall at Karnak in Egypt and the Mosque at Cordoba. But most of us have seen these effects in the great railway stations of the late nineteenth and early twentieth centuries, and in many industrial facilities.

Ornament and Detail

At even the smallest scale of architectural expression, light and shadow support basic architectural intentions. From the finishing of building materials to the enrichment of space and proportion to the enhancement of illumination, *ornament* and *detail* contribute to the visual sense of a building or space by organizing light with form.

Ornament is embellishment and is often considered a luxury. Nevertheless, it can help identify the proportions of a building or space by delineating edges and centers, emphasizing direction, adding visual rhythms at a small scale, or emphasizing enclosure or openness.

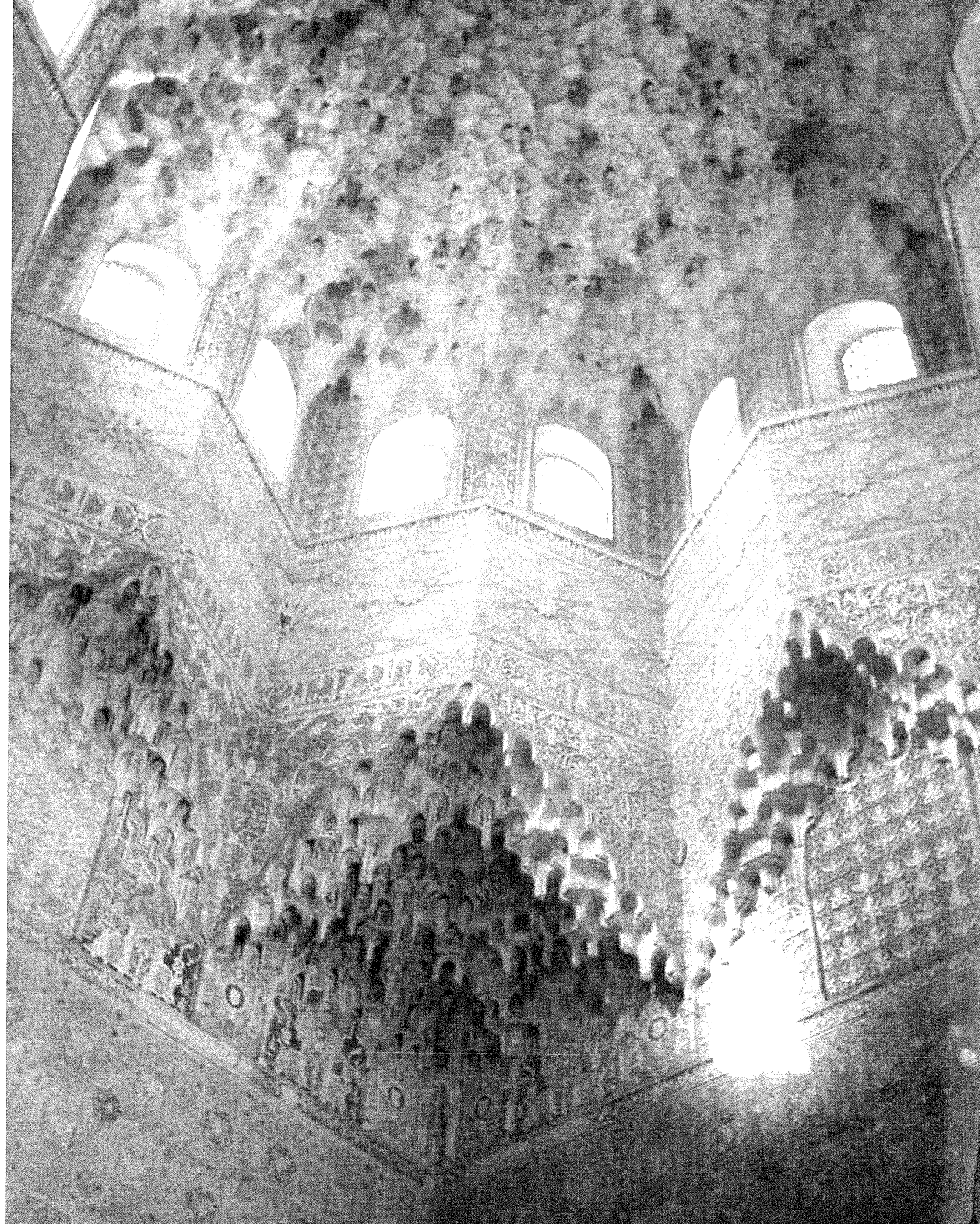
Detail stems from necessary functional decisions, such as how to join different materials, conceal imperfections and control the infiltration of rain or outside air. Details are thought to be more mundane than ornament, although in contemporary design they sometimes have been raised to a high level of significance. Details reveal the secrets of a building's construction by indicating changes of level, corners, the location of structural elements and the joining of materials.

Light, ornament and detail are connected with architectural organization in two important ways. First, ornament and detail can reorganize incoming daylight so as to reinforce basic architectural intentions. Our perceptions of a building's shape, edge and finish are functions of the way light reflects from the surfaces it strikes. A building that receives diffused skylight or direct sun perpendicular to its surface appears flattened due to the absence of shadow. But when angled light swipes a highly articulated surface, every recess or projection, small or large, intercepts the light and creates shadows. The light delineates ornament, highlights construction details and emphasizes the depth of spaces. Angled sunlight brings out tactile character, density and, therefore, the identity of a material.

When light plays on ornament and detail, adjacent highlights and shadows are created. The resulting lines, patterns and gradations of light and shade help us to recognize the identity of a material and the character of the surrounding surfaces. By these means, a change of shape, a protrusion, a recess, or a seam can reveal the cleverness or crudeness of a structure's assembly.

Perhaps the most significant clue to how ornament and detail work resides in the shadows they create. In *The Pantheon*, William L. MacDonald considers the cornices that encircle the exterior of the temple's rotunda:

They give shadow and articulation to the vast, seamless surface and so make it clearer and more comprehensible to the senses than it would be without them. With cornices, shadow is nearly everything and in a fundamental way shadow is architectural design. It explains the orders and their use, through millennia and in every kind of building, every bit as much as structural necessity does.⁵



The Alhambra, Granada, Spain.

The Pantheon, Rome.



Second, ornament and detail can improve the illumination of a space by redirecting light or refining its intensity. Color can be applied to a surface not only to create decorative schemes but also to subdue and alter the warmth or coolness of incoming light, or to simulate the play of light over a sculpted surface.

Victorian porches are magical because they make us feel as if we are both inside (protected in shade) and outside (exposed to daylight) at the same time. The ornamental array of spindles, balls and finials contributes to this sensation. These elements usually are oriented vertically, an arrangement that celebrates the arrival of incoming sunlight, rather than blocking it; the sun is filtered but still invited in. (Horizontal elements, such as shutters or awnings, block light coming from above, as the brim of a hat does.) The smooth gradation of light to shadow over each rounded, thin, or bulbous element also discourages glare. In these ways, the transition from public to private space is accompanied by a refinement of the quality and quantity of daylight.

Highly reflective, precious materials can be assigned special roles in detailing and in ornamental schemes. The tendency of gold, deep in a dark space, to find and reflect a small amount of light can be exploited to illuminate a room with great subtlety. Japanese novelist Jun'ichiro Tanizaki recalls the presence of gilt statues of the Buddha in a shadowed Japanese temple. "How, in such a dark place, gold draws so much light to itself, is a mystery to me." Only in a dark room, Tanizaki points out, are we fully able to appreciate the practical value as well as the beauty of gold, of which, he says, "Modern man in his well-lit house knows nothing."⁶

Animation

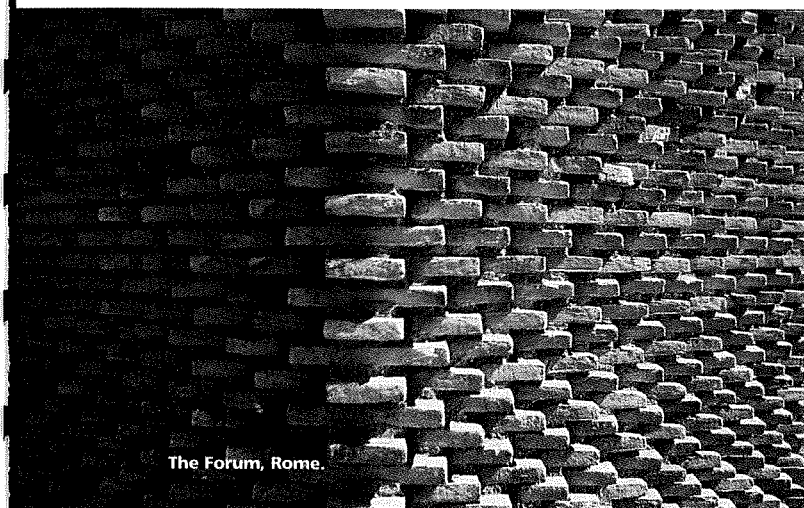
Places are never the same from one moment to the next. Daylight can animate a place by revealing different facets of its architecture as the path of the light and the position of the observer change. These ever-changing conditions can encourage movement through space and inspire the design of places in which light is meant to perform. Animation is the effect of coupling light with movement.

We do not always notice variations in daylight, perhaps because our eyes and minds adapt involuntarily to small or gradual variations in illumination, perhaps because we are preoccupied with our daily lives. Yet our everyday routines are particularized by light and dark conditions. Rooms brighten and darken. A cafe table may be perfectly placed to enjoy both morning sun and afternoon shade. Shadows expand into exaggerated shapes and contract again; they veer off over level changes and across boundaries, natural, architectural and legal. The reflective qualities of materials change, casting back different images at different times. Daylight improvises over streets and buildings, animating that which is otherwise fixed and unchanging.

Change is characteristic of daylight; it distinguishes daylight from electric light, which is dependable, predictable and compliant, but static. Neon lighting designs, for example, can be molded into thin lines, come in an array of sustainable bright colors and can be turned on and off with a simple switch. Life is character-



Perugia, Italy.



The Forum, Rome.

ized by its intrinsic capacity for change, and daylight's capacity for change enlivens an otherwise stable world.

Light also encourages movement. We read the potential for access in terms of brightness, darkness and color. We are attracted to contrast; we tend to move, with interest, toward light areas surrounded by darkness (such as the proverbial "light at the end of the tunnel") and, with curiosity, toward dark recesses set into bright masses. We gravitate toward luminous views and to well-lighted places, such as atriums, that open up and out to challenge the sense of enclosure. We are urged to move through space by lighting conditions that reveal views, enhance openness, establish or challenge enclosure, suggest direction and give a visual dimension to the tactile qualities of materials and surfaces.

Architectural rhythms of spaces, masses and intervals of structure, seen in light and confirmed in shadow, can be touched, counted, measured and timed. For example, the rhythms of a colonnade are recorded and multiplied by the shadows it casts. Most sunlight passes between the columns, but some is intercepted, resulting in light and dark patterns that lengthen, shorten and swing around the columns as the sun moves. The linear space inside the colonnade is a path and suggests direction; one's walking pace is syncopated with a rhythm of shadow and light.

We follow familiar paths, such as streets, as they are refashioned in changing daylight. Walking down a street through alternating areas of dark and light, we can sense a connected sequence of events that has a near cinematic quality. The orchestration of such events is one of the attractions of cities made for pedestrians, such as irregular medieval streetscapes and the regularized grid of New World colonial cities.

Architects can take advantage of the animating qualities of daylight to enhance spaces. A building can provide rooms that are theaters for changing light, both outside rooms (such as streets and squares) and inside rooms (such as window seats, bay windows, balconies, porches, arcades, colonnades, atriums and light wells). Rooms can be linked by passages lit from the side, from above or even from below to create a sequence of luminous spaces and views. Perhaps the finest example of this is the London townhouse designed by the eighteenth- and nineteenth-century English architect Sir John Soane for himself (now Sir John Soane's Museum). The rooms are arranged as a series of continuing and related stories in light, narratives with greater meanings than can be gathered from disparate objects or spaces.

Architecture in the Light of Day

Walking through alternating light and shadow or sitting in a special place in the path of changing daylight can be exquisitely satisfying, much like the thermal experience of walking through cold snow on a warm, sunny day. Places that offer options, places that recognize the range of experiences that can be crafted from orientation and attitude, structure and enclosure, ornament and detail, and animation, often are more interesting, fulfilling and pragmatic than those that present only one acceptable condition. Places should be able to accommodate people's movement, growth and activities, none of which are always predictable.

The study of the relationship between light and architectural form and urban design esteems the value of choices and appreciates improvisation. Our lives in a city street, an urban square, the rooms surrounding a courtyard, a colonnade, or even a window seat demonstrate that light and shadow perform in much the way that people do. Light and place do not work in opposition to each other, nor single-mindedly, but as an open ensemble, as complements. Places are the settings for the interplay of people, shadows and light. ●

Notes

1. In fact, it is the movement of the earth, not of the sun, that creates the effects described here. But for the purposes of this paper, I will employ the common figure of speech and describe the sun as moving.

2. The term "sunlight" refers to direct illumination from the sun. "Skylight" means light reflected to us from the sky, excluding direct sun. "Daylight" is used here to indicate both sun and skylight.

3. In the southern hemisphere, the sun travels through the northern sky.

4. The characteristics of northern and southern skies are reversed in the southern hemisphere.

5. William L. MacDonald, *The Pantheon: Design, Meaning, and Progeny* (Cambridge, MA: Harvard University Press, 1976), 67.

6. Jun'ichiro Tanizaki, *In Praise of Shadows* (New Haven: Lecter's Island Books, 1977), 22.

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Notre-Dame-du-Haut, Ronchamp, France.



A salmon ladder, Seattle.

