

Pattern and Fabric
The Role of Craftsmanship
in Contemporary Architecture

by

Hank Reisen

B. A., Antioch College
(1973)

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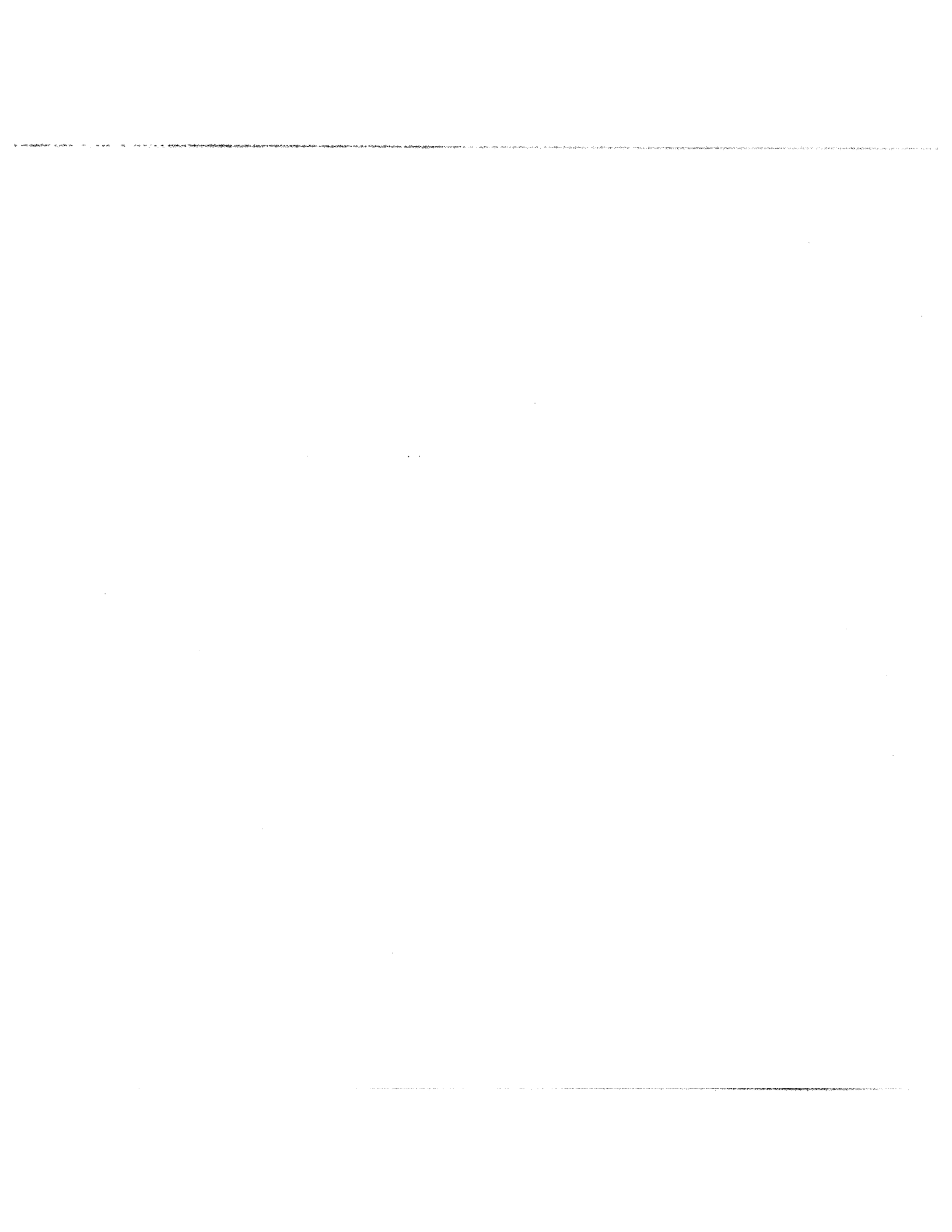
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Pattern and Fabric

The Role of Craftmanship in Contemporary Architecture

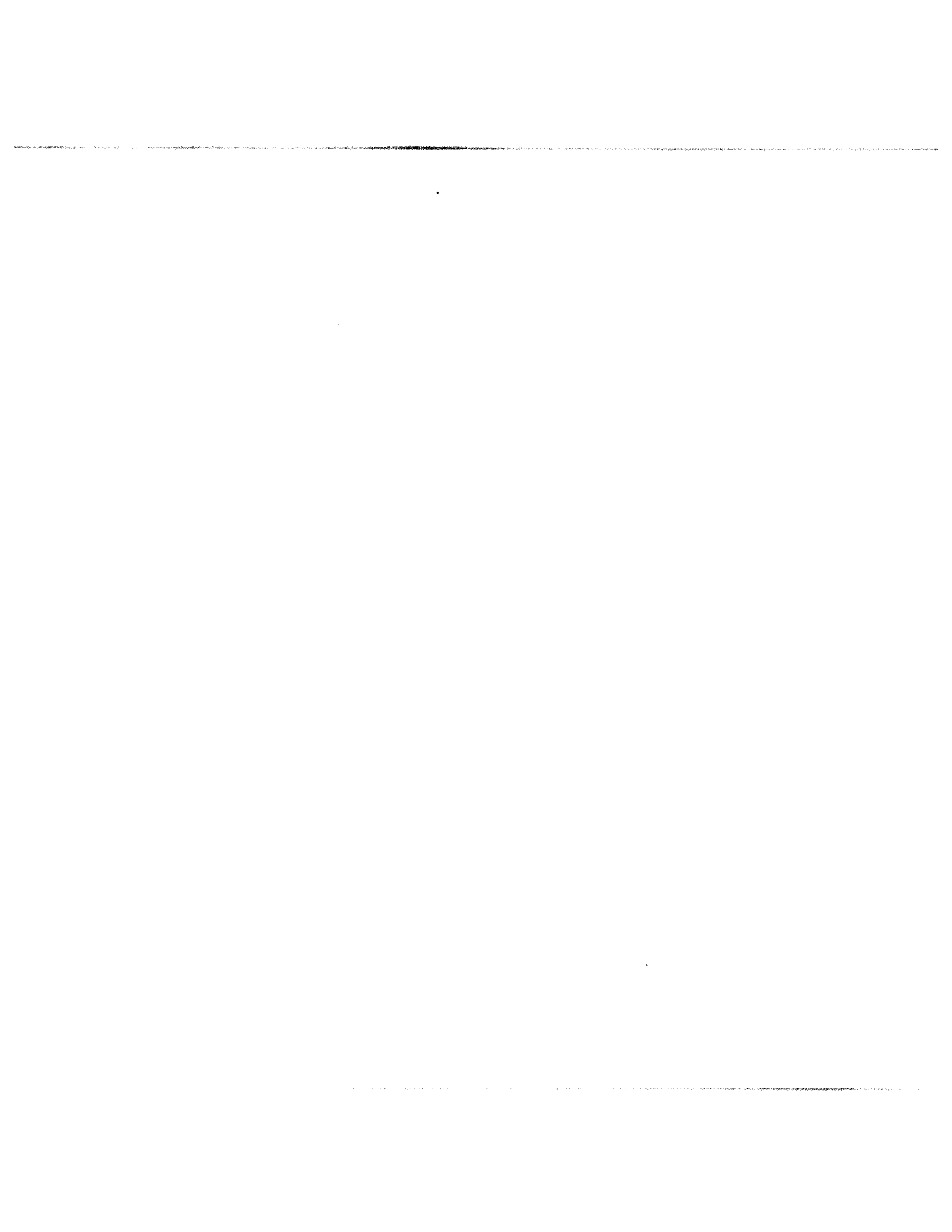
by
Hank Reisen

Submitted to the Department of Architecture on
January 13, 1983 in partial fulfillment of the
requirements for the Degree of Master of Architecture

ABSTRACT

During the Twentieth Century industrial production has largely replaced the hand of the craftsman. As a result most modern buildings lack the qualities of craftsmanship. This thesis seeks to identify and define these qualities, speculates on their importance to the human psyche, and suggests ways that they can be adapted to modern design and construction techniques.

Thesis Supervisor: Richard Tremaglio
Title: Adjunct Professor of Architecture



To Scheri

for four years of
patience and support

Many thanks to

Tremie for advising

John Habraken and
Bob Slattery for reading

Maurice Smith for teaching
me more than he realizes

Nick for getting me unstuck

and the numerous friends and
teachers at MIT and outside
who have helped me live and learn.

5. ~~Interfere with the operation of any aircraft, vessel, or other conveyance, or with the navigation of any aircraft, vessel, or other conveyance, or with the operation of any other means of transportation, or with the navigation of any other means of transportation, or with the operation of any other means of transportation, or with the navigation of any other means of transportation.~~

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"The instant you speak about a thing you miss the mark."

Zen phrase

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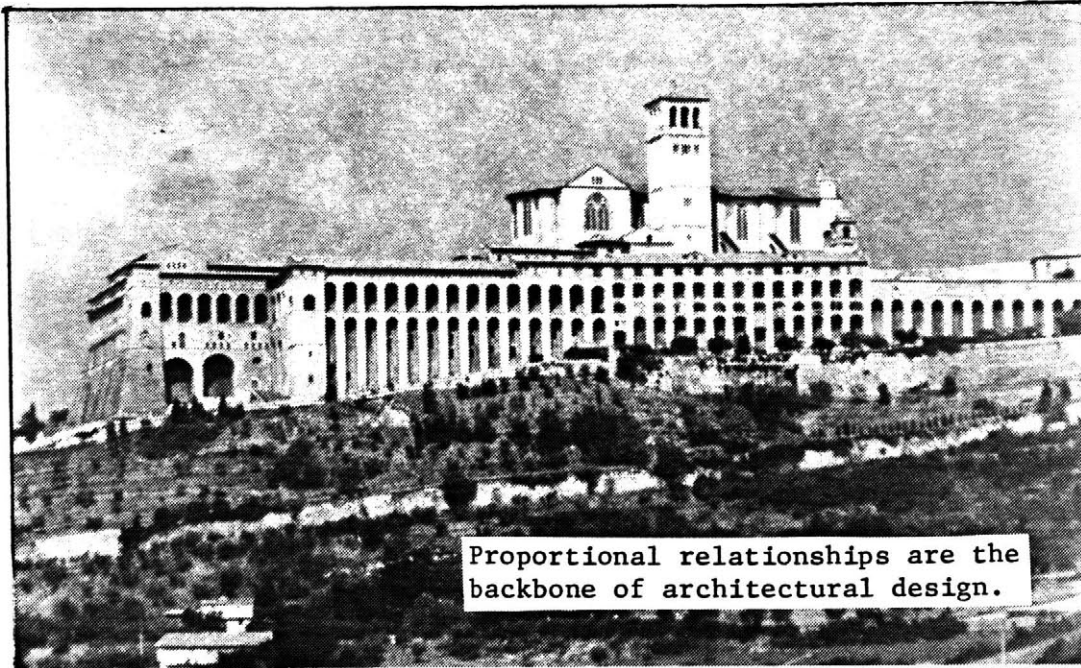
"You know, it is always life that is right and the architect who is wrong."

-Le Corbusier

AUTHOR'S NOTE

The opinions expressed in this thesis are those of the author, and while there may be no absolute truths in the realm of architecture, these opinions are expressed as fact for the sake of the argument.

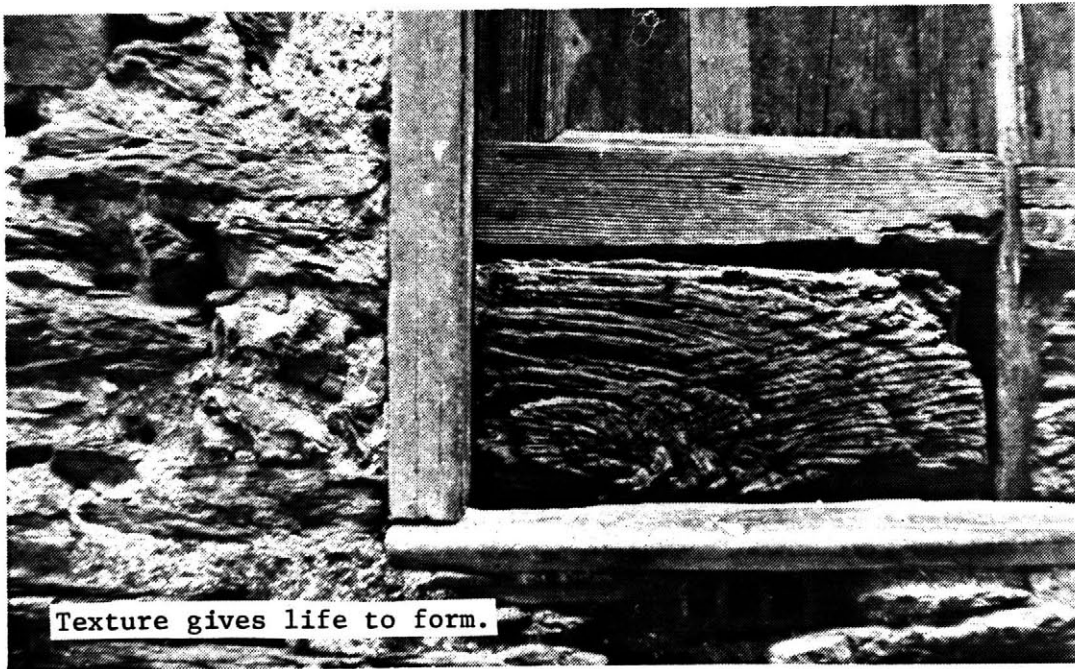
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Proportional relationships are the backbone of architectural design.

FORWARD

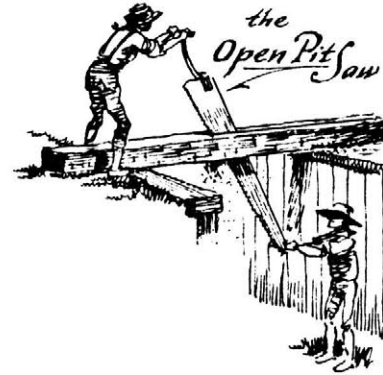
If proportion is the skeleton for architectural form, fabric is the "meat on the bones." Contemporary architects pay much attention to proportion and form, but the qualities obtainable through a sensitive working of the fabric have become somewhat neglected.



Texture gives life to form.

Right: It is obvious that machines do a lot of our "dirty" work.

"Our machines are treacherous. And I don't just mean they bite; they do. But the real treachery is more elusive. On the one hand they help the cabinet-maker greatly; on the other they corrupt him. Somewhere between these two ways there is a sensible and sensitive balance which our craftsman must try to find before it is too late."



James Krenov's remarks for cabinet-makers are also appropriate for contemporary designers.

Before the industrial revolution building, fabric was worked by craftsmanship, thus bore the imprint of the human hand and heart. In a subtle, yet very profound way, people could sense something in the material and the forms it created that reflected themselves. This identification with the crafted fabric caused an empathetic relationship between architecture and its human users. People experienced a direct, even if subconscious, emotional association with the built environment.

In this century, with the advances in mechanical production methods, this situation has changed. Much of the tedious labor and work requiring a high degree of precision and regularity that were formerly done by hand are now produced accurately and efficiently by industrial means. But modern construction's dependence

on industry has grown to the point where the fabric of architecture has a machine-made soul. The individuality and diversity that characterize the craftsman's work, and are so necessary for human empathy, are almost entirely missing.

It is unrealistic and unnecessary to return to a primarily craft-based architecture to recover this diversity. The empathy-inducing qualities of the craft-built environment can be identified and incorporated into our contemporary design and construction methods.

This thesis will initially concentrate on spatial and proportional relationships that encourage emotional association by their reflection of human and natural ordering and diversity. The section on the qualities of craftsmanship is concerned with the textural treatment of fabric and the way the craftsman forms his material to have a visual and tactile appeal. Traditional Japanese architecture is presented as a case study because it is a highly standardized system, yet it successfully evokes empathic response both spatially and texturally. Thus the principles involved are useful to contemporary designers. The final section initially examines the failure of contemporary architecture to provide an environment that encourages direct emotional association from its users, then suggests ways this can be accomplished today.

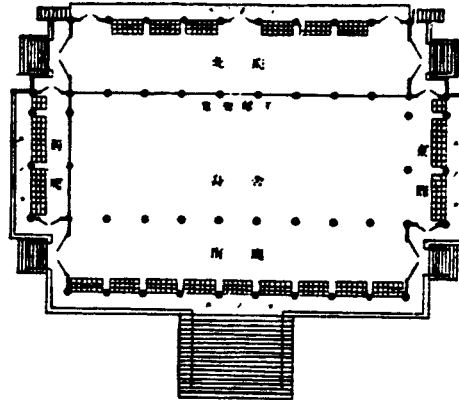


INTRODUCTION

There are many buildings which show a successful interplay of proportion of built space and the texture of its fabric. The above example illustrates a simple design enriched by the careful and sensitive treatment of materials.

The polished wood floor, textured screen, clay wall panels, and the heavy timber framing immediately evoke a sense of awe and delight. In contrast to the rich and varied use of wood is the simplicity of the floor plan. Though it may be simple, it is not simplistic. The spatial relationships are based in canons of proportionality that prescribe column spacing, heights of ceilings and beams, and structural requirements. The overall building size has been built up from a

Left: A Japanese
Palace Interior

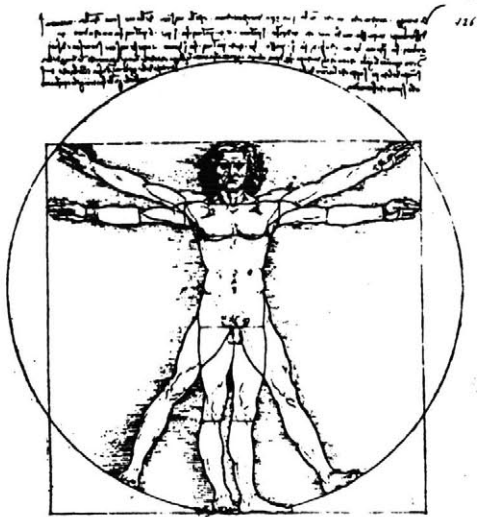


Right: Plan of a
Japanese Palace

module (the space between columns) that a person can immediately comprehend. The result is a space that "feels right," both in scale, proportion, and texture.

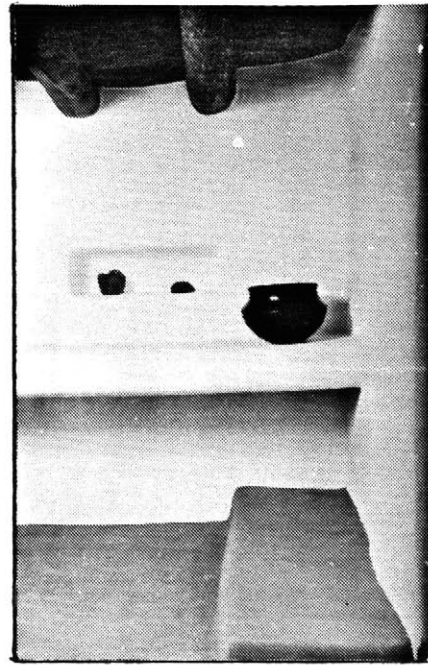
If the space were constructed with one uniformly surfaced material, smooth, gray concrete for example, the character of the space would be entirely different and the simple regularity of the plan might feel oppressive. The quality of and contrast between the tones and textures of the building fabric makes a tremendous contribution to the human experience of the architecture, giving life to the form.

Though proportion and fabric can be examined separately, there is a strong correlation between them, and they are best understood together. The investigation of the treatment of materials needs to be seen in the context of form and proportion. Thus the inquiry into fabric begins with proportion.



Above, left: Leonardo da Vinci's famous drawing relating the human body to the circle and the square.

Above, right: Dimensions in Georgia O'Keefe's adobe house reflect human measurement.



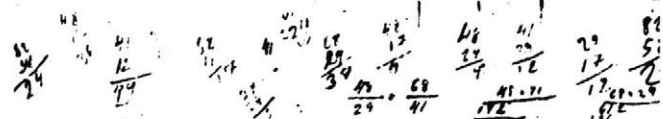
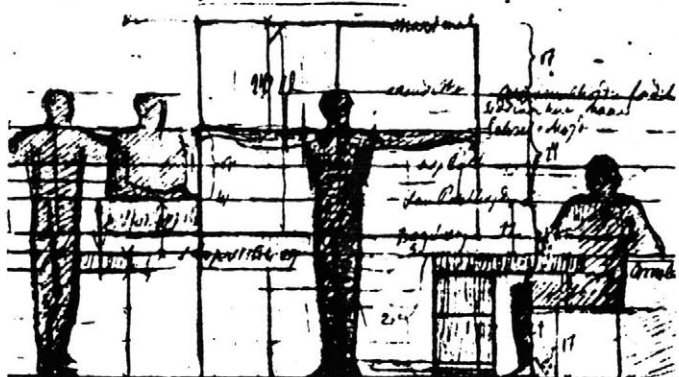
HUMAN SCALE

People feel more comfortable, more "at home" in spaces that "fit" the human body. As Protagoras said in the 5th Century B.C., "Man is the measure of all things."

In fact the human scale actually refers to not a single entity, but a family of architectural dimensions. The height of a person determines the door size; the hand determines the size and shape of the door knob. Less obvious is that the perception of architecture is enhanced by the body dimension, since a building is perceived by the whole being broken down into parts. The size and proportions most easily understood are those which have a close relationship with human dimensions.

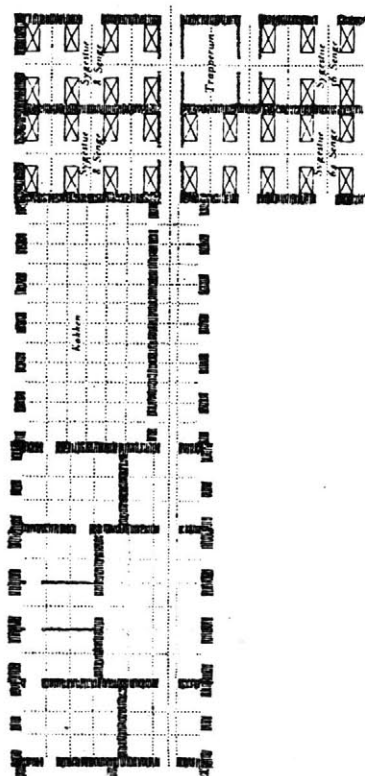
Diferencia millon de la medida de medida... H. Klint

Left: Kaere Klint studies for factory made furniture.



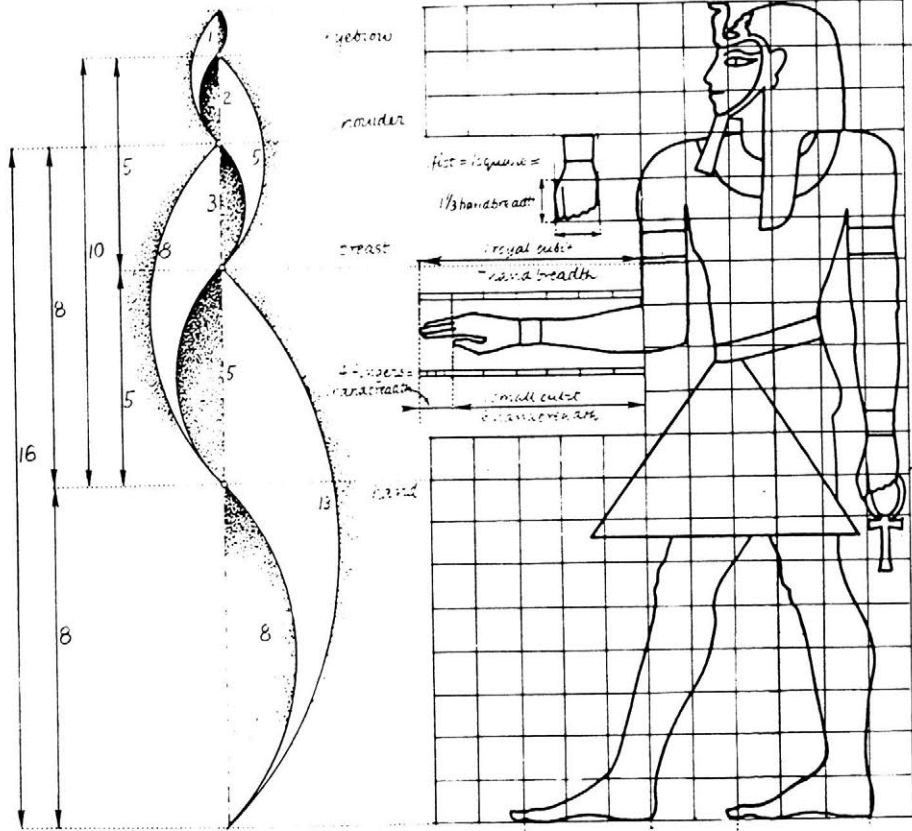
Below: A facade built up from human scale parts.

Below: Kaere Klint Hospital floor plan built up from 3' x 6' bed dimensions (1918).





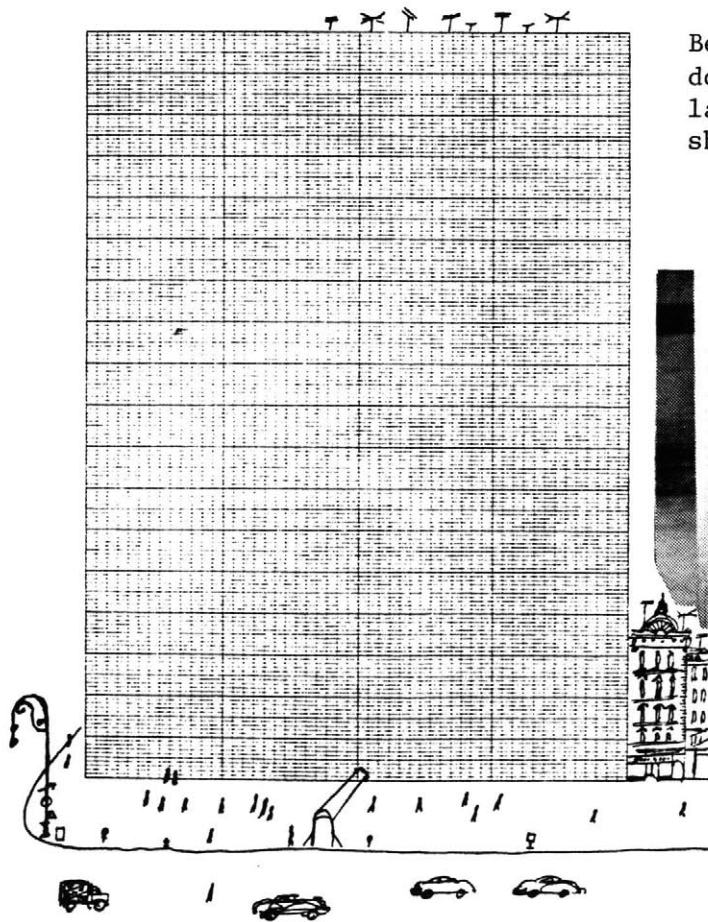
Below: The use of the human body as a basis for measurement is not new. The Egyptians' 'small cubit' equaled six handbreadths (four fingers each) and the 'royal cubit' equaled seven. Each square on the grid is a fist, which corresponds to $1\frac{1}{3}$ handbreadth and one-third a foot.



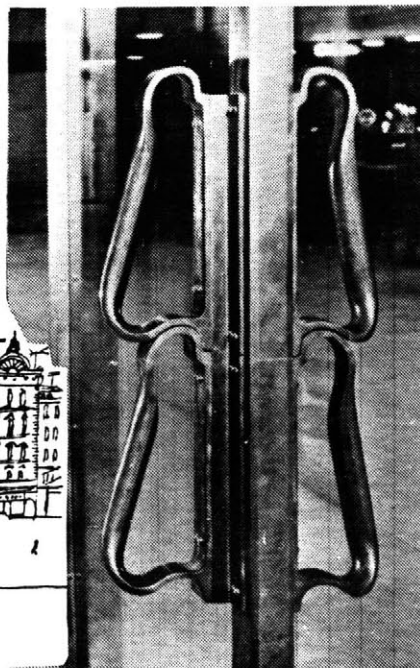
Right: The Cobblestone pattern is the result of the arc of the mason's arm in laying the stones.



Below: Steinberg's cartoon of the modern skyscraper is an excellent depiction of what happens when the human scale is ignored.



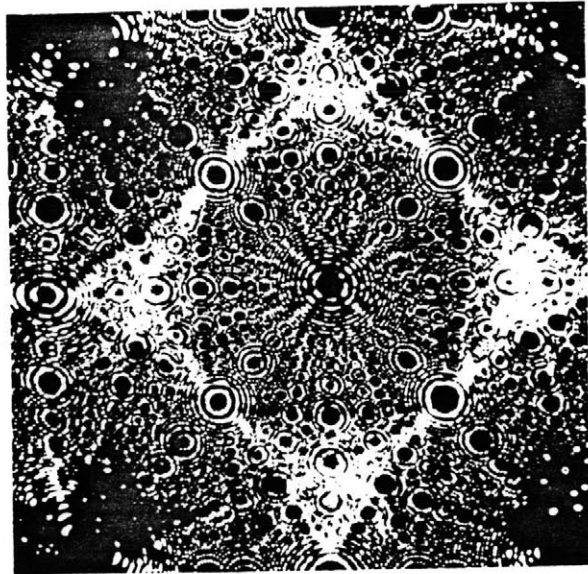
Below: Alvar Aalto's door handle form relates to the size and shape of the human hand.



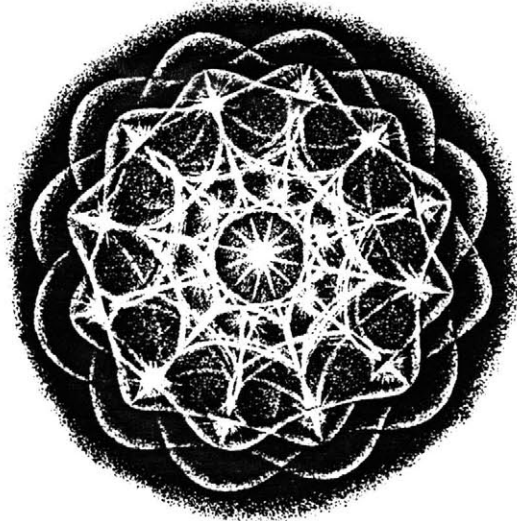
Upper Right: Tip of platinum needle enlarged 750,000 times.

Middle Right: Harmonic vibrations in liquid.

Lower Right: Enlargement of a diatom center.

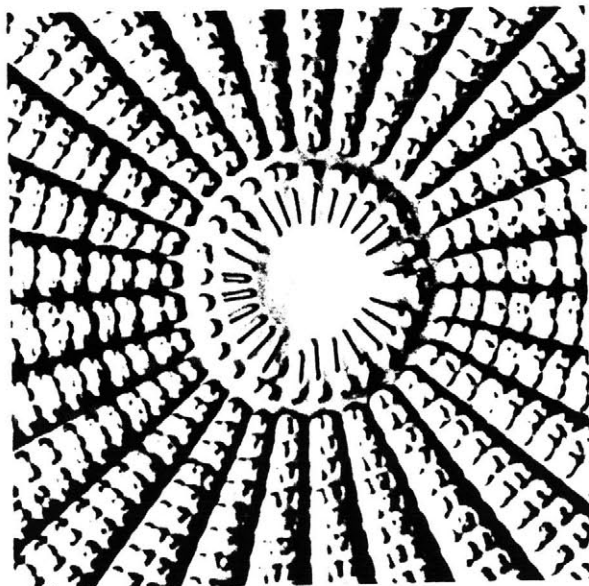


HARMONIC RELATIONSHIPS



"Mathematics are the result of mysterious powers which no one understands, in which the unconscious recognition of beauty must play an important part. Out of an infinity of designs a mathematician chooses one pattern for beauty's sake and pulls it down to earth."

-Mathematician
Marston Morse
(As quoted by
Igor Stravinsky)



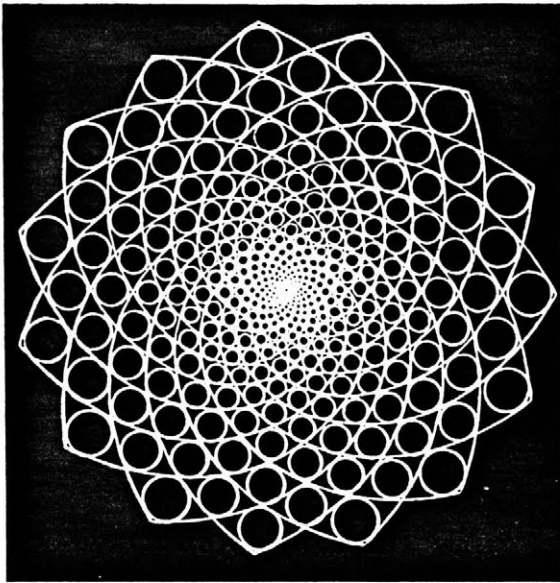
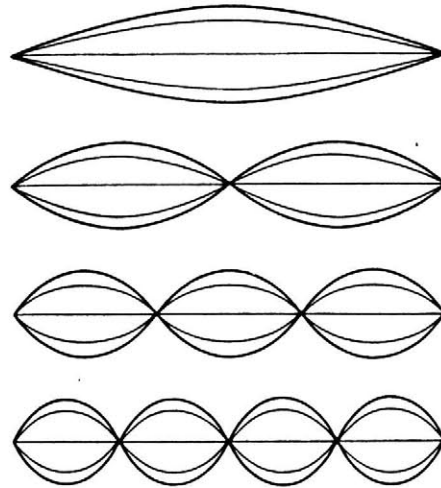
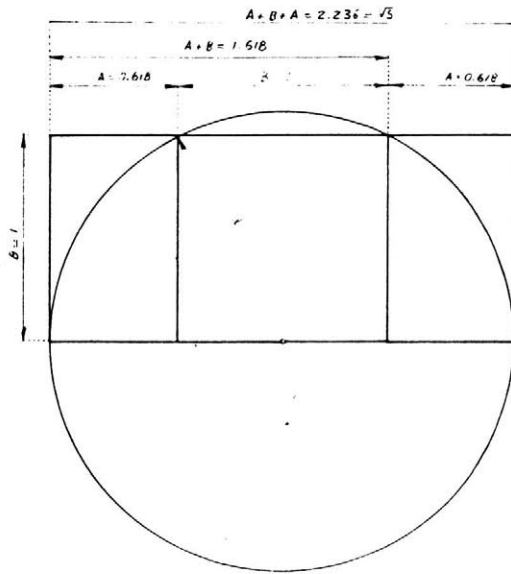


Diagram of the center of a daisy.



Standing wave patterns of vibrating string.

The mathematical proportioning of harmonic relationships in music has been recognized throughout history. In the third century Euclid speculated on why certain combinations of tones are more pleasing than others. Three centuries later the Pythagoreans discovered pleasing musical intervals by dividing a vibrating string into ratios formed by the first four integers. 1:2 yields the octave, 3:2 yields the fifth, 4:3 yields the fourth, ratios which form the root harmonies of music and are present in the music of every culture. It is obvious that man has a special intuition that enables him to perceive simple mathematical relationships in the realm of audible tones. This is true in the visual world as well. Ordering, scale, and proportion are the visual equivalent of tonal harmony.



"...every part is disposed to unite with the whole, that it may thereby escape from its incompleteness."

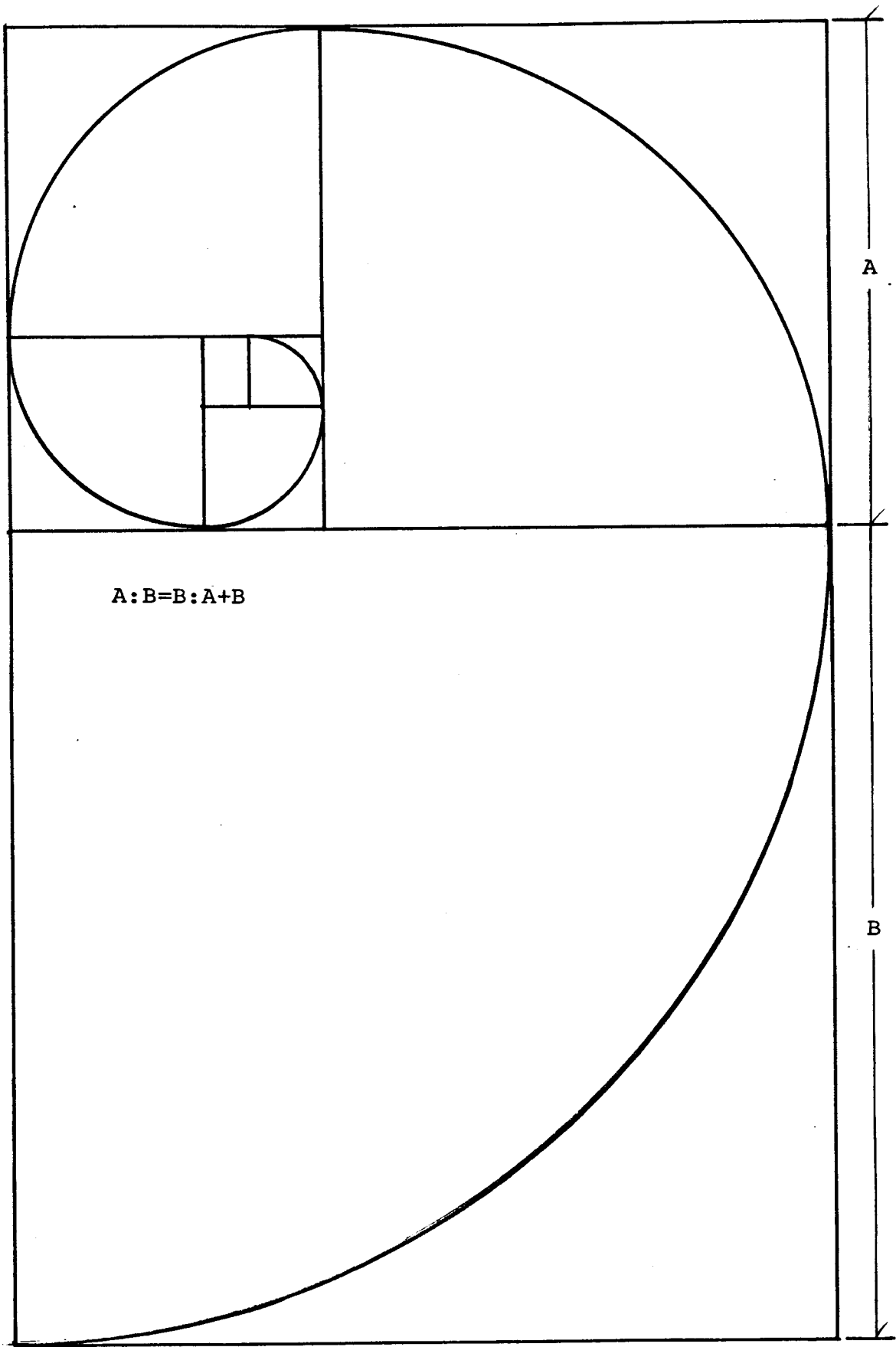
-Leonardo da Vinci
(on the Divine Proportion)

Left: Classical construction of The Golden Section

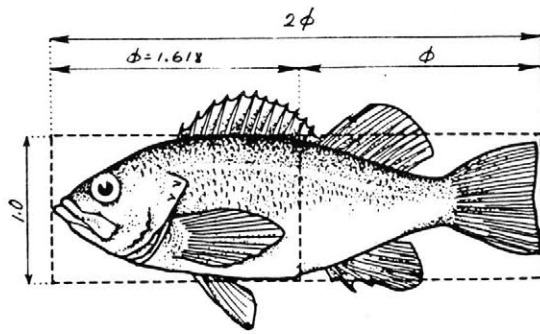
Opposite page: curve generated by series of golden rectangles - typical of chambered nautilus shell.

GOLDEN MEAN

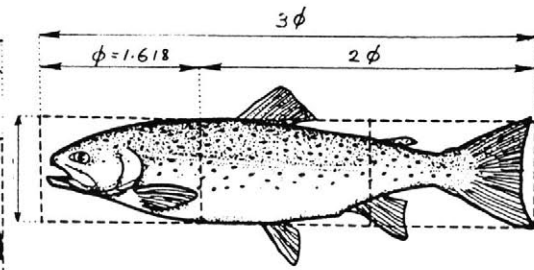
Of all the visual harmonic relationships, the golden mean, or the "divine proportion," is the most celebrated. It has been considered by many artists as the most beautiful proportion and has been linked with the Parthenon, used by Leonardo Da Vinci and artists of the Renaissance, provides the principle of proportioning of Corbusier's "Le Modular," and was integrated into the musical compositions of Bela Bartok. It is expressed by the equation $A:B = B:(A+B)$, the reciprocal relationship between two unequal parts of a whole in which the smaller part stands in the same proportion to the large part as the large part stands to the whole.



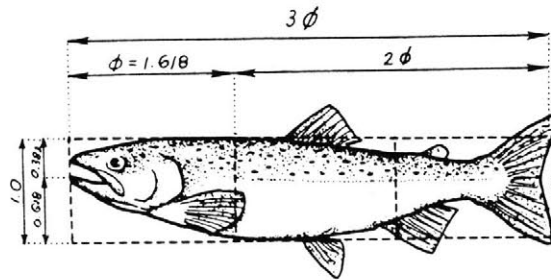
$$A:B=B:A+B$$



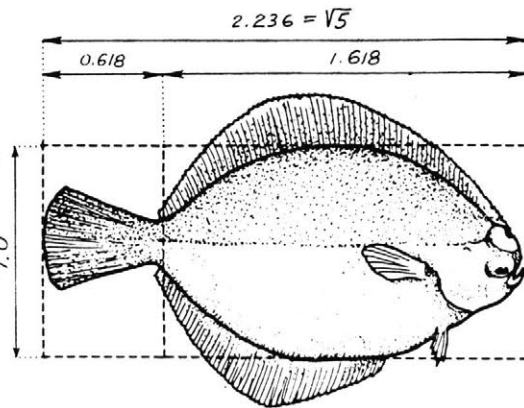
Black Rockfish



Brown Trout



Coho Salmon



Curlfin Sole

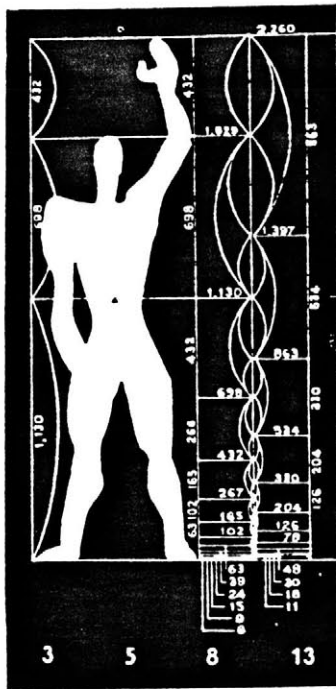
The Golden Rectangle
in fish dimensions

The "Fibonacci Series," 1,2,3,5,8,13,21,etc., where each integer is the sum of the preceding two integers, is related to the golden section. As the values in the series increase they more closely approximate the golden ratio, 1:1.61803. Both this series and the ratios of the root harmonies of music occur frequently in the branching of plants, the spirals of seashells, flowers, pinecones, and many other organic growth forms. Perhaps the frequent presence of these ratios in nature, of which man is a part, explains their appeal to the human subconscious.

It is conceivable, as suggested by the 17th century astronomer, Johannes Kepler, that there exists a "music of the spheres," which governs the physical world. Aesthetics may be partially based in the recognition of this ordering system. In any case humans do seem to possess an intuitive capacity for aesthetic appreciation that transcends cultural differences.



Chambered Nautilus Shell and
Johannes Kepler

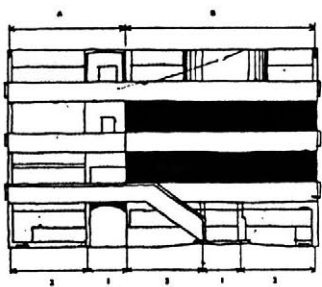
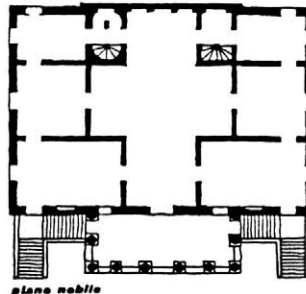
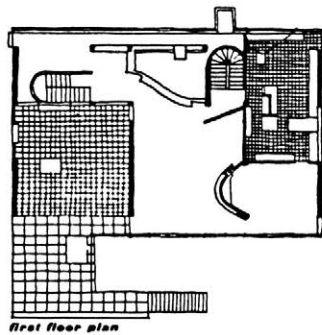
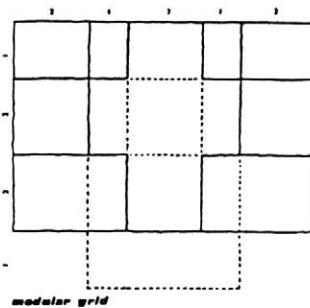
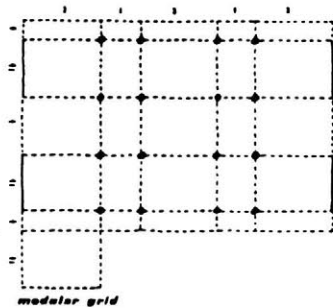


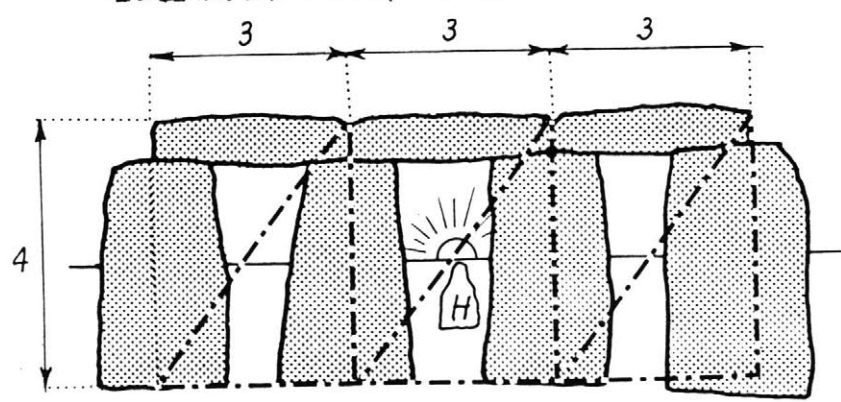
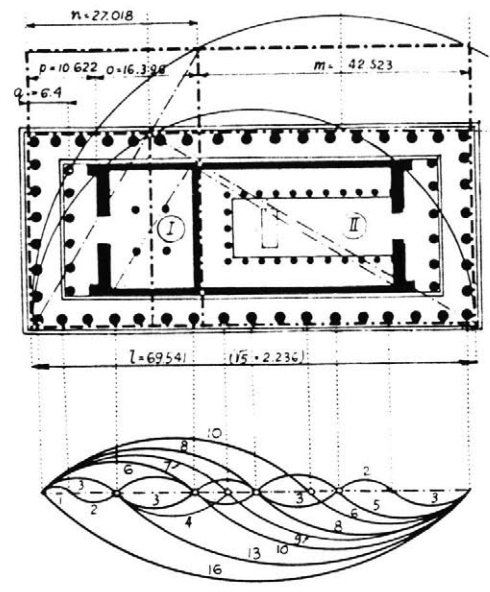
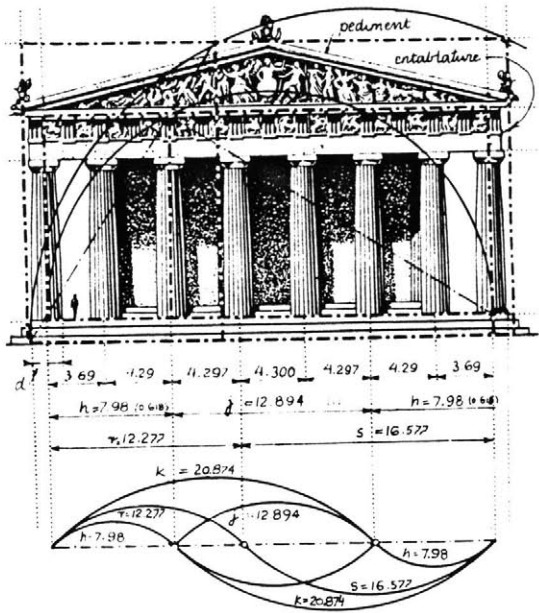
Opposite: The golden section and root harmonies in the plan and elevation of the Parthenon

Opposite, below: Archways at Stonehenge based on 3-4-5- triangles.

Left: "Le Modular" shows proportion of human body: Height of navel is in "golden" relationship to full body height and in 1:2 relation to height of upraised hand.

Below: Colin Rowe's comparison of Le Corbusier's Villa at Garches and Palladio's Villa Foscari, showing both based on the simple ratios of musical harmony.







RHYTHM AND RHYME

Rhythm and variation in facade Fort Point Channel, Boston.

Science is nothing other than the search to discover unity in the wild variety of nature, or more exactly in the variety of our experience. Poetry, painting, and the arts are the same search, in Coleridge's phrase, for unity in variety.

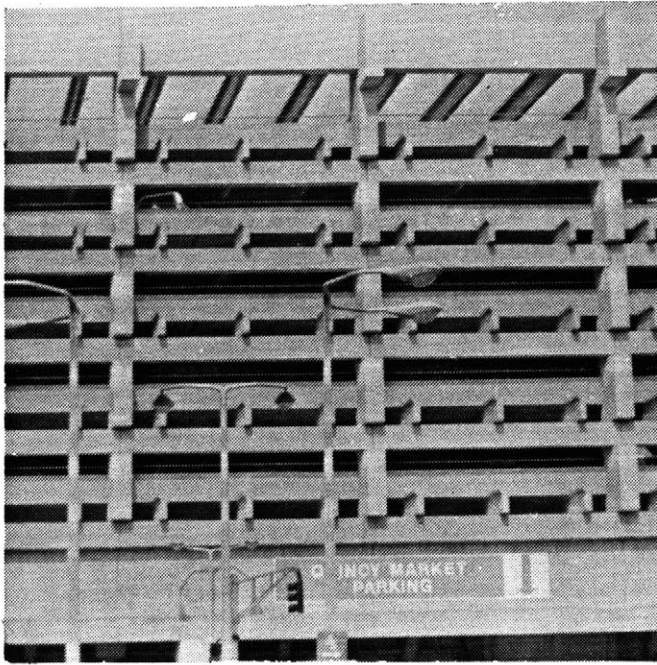
J. Bronowski

Aesthetic appeal in music and architecture results not only from proportional relationships but also from the way in which the pieces go together, or the "rhythm" of the construction. This rhythm comes from subtle variety in a repeating pattern. Nicholas Humphrey, an expert on animal behavior, proposes that the aesthetic appeal of variations on a theme developed directly from the survival mechanism of classification by which an animal can recognize objects, anticipate the course of events, and act accordingly.

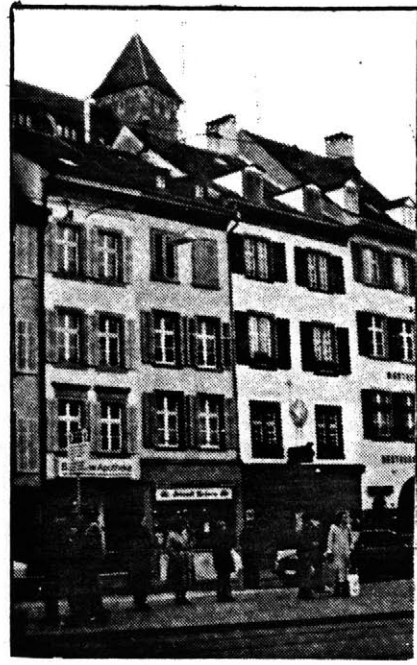


Animals (including man) learn to classify things by their similarities and their differences. The recognition of likeness with difference in the visual world might be a major influence on the human sense of beauty. Humphrey believes that "...just as with eating or with sex, an activity as vital as classification was bound to evolve to be a source of pleasure to that animal. Both animals and man, after all, can be relied on to do best what they enjoy doing."

There is strong evidence that all higher species have a psychological appetite for both familiarity and novelty, the balance being critical for pleasing effect. It seems that too much likeness results in boredom and too much difference in chaos. The 19th century English poet Gerald Manley Hopkins gave "likeness tempered with difference" as a definition of rhythm. As the scientist



Likeness: Parking Garage,
Boston

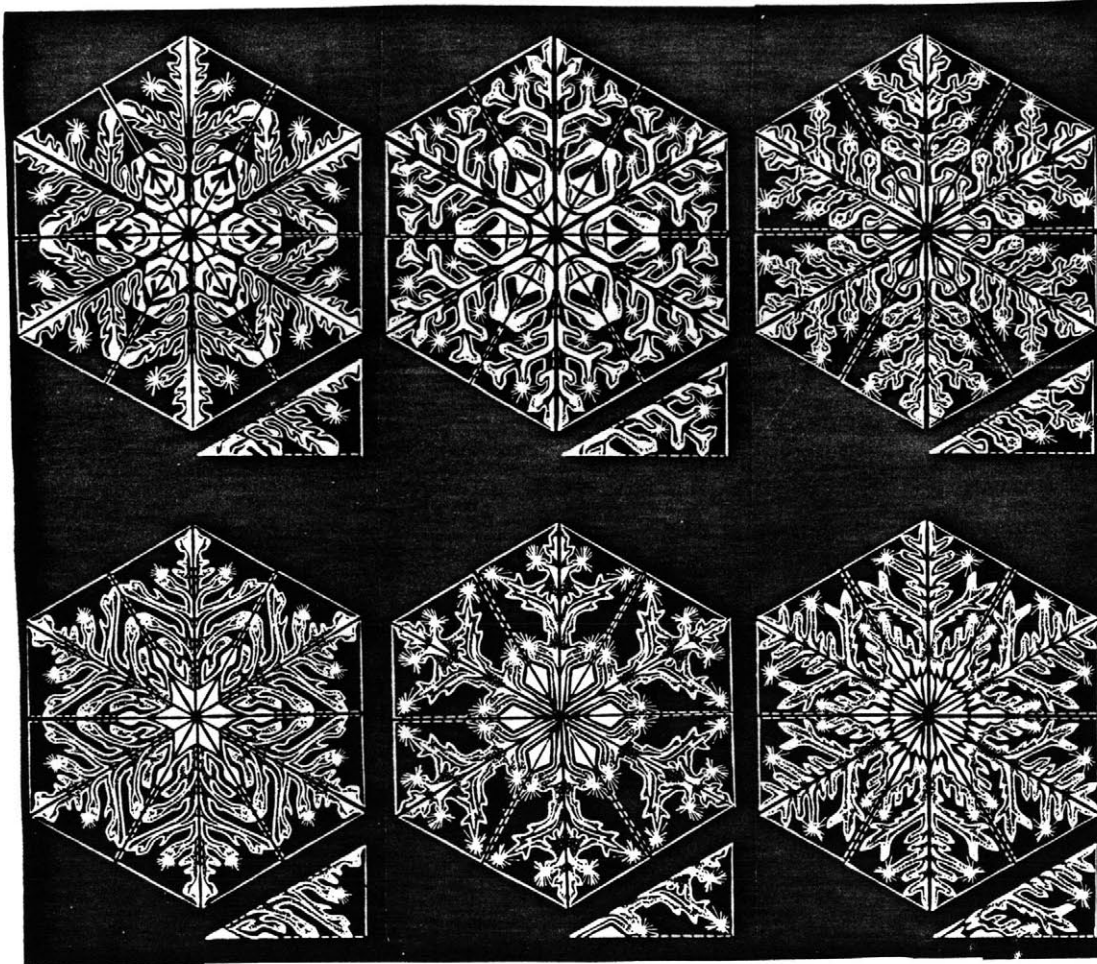


Variety: Row houses,
Basel, Switzerland.

Humphrey considers the classification ability as the basis for aesthetic sensibility, Hopkins believed, "All beauty may by a metaphor be called rhyme" having called rhyme "the agreement of sound--with a slight disagreement." The philosopher Alfred Whitehead wrote, "The essence of rhythm is the fusion of sameness and novelty; so that the whole never loses the essential unity of the pattern, while the parts exhibit the contrast arising from the novelty of their detail. A mere recurrence kills rhythm as does a mere confusion of differences" (1919).

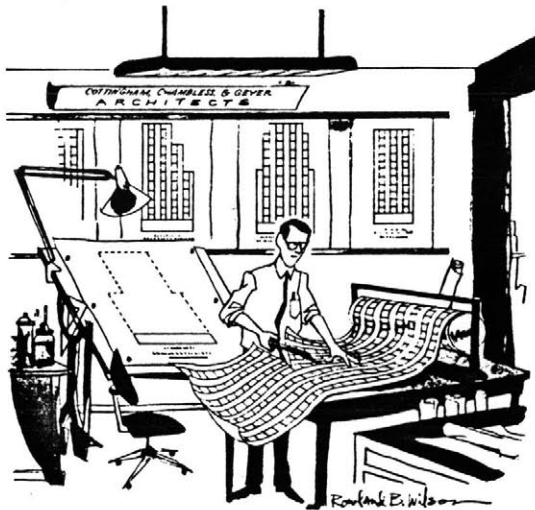
Jack and Jill
Went up the hill
To fetch a pail of water
Jack fell down
And broke his crown
And Jill came tumbling after.

Even children delight in the recognition of likeness with difference as rythm and rhyme.

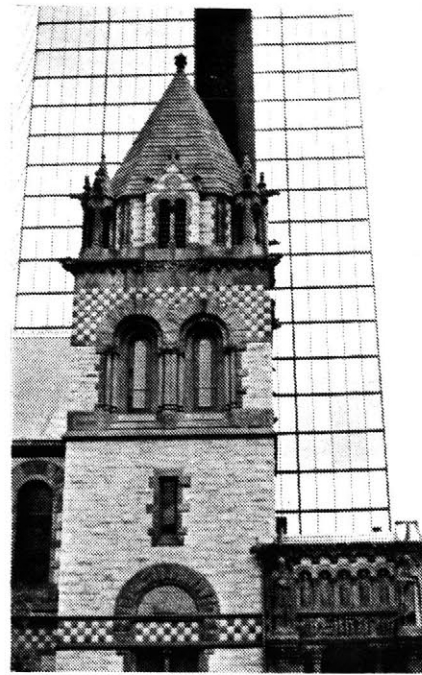


Snowflakes - infinite variety within ordering similarity in nature.

Rhythm, as the proper mixture of likeness and difference, seems to be a key element in the beauty of art, be it music, poetry, or architecture. Just as nature is based on replication of living creations, architecture with rhythm needs ordering to provide similarity. As in nature where no two leaves on a tree are exact copies, the repetition of similar elements in architecture needs to be tempered with difference. This can be seen on an old street where a row of houses were built individually but in the same style and period, within the framework of a general plan.



Foreground, 19th century diversity;
Background, 20th century uniformity.



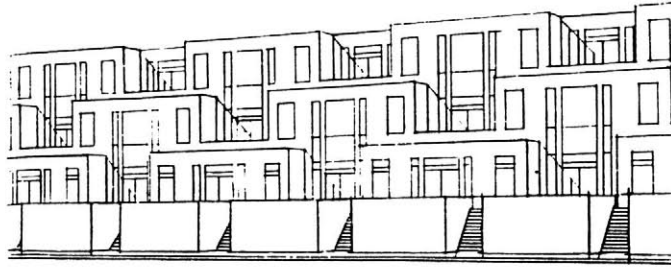
20th CENTURY STANDARDIZATION

During the past sixty years the trends of industrial standardization and the decline of craftsmanship have upset the balance between Likeness and Difference in architecture. The repetitious use of uniform mass produced components has created a deadening monotony in large buildings and developments.

Before the industrial revolution pre-construction design was usually quite general, since the idiosyncrasies of the materials and the hand-techniques presented problems that could be solved most efficiently during

"Standardization means industrialized violence to individual taste."

-Alvar Aalto



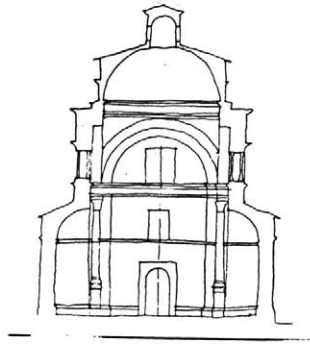
Right: Likeness tempered with difference. Row Houses, Venice, 15th Century.



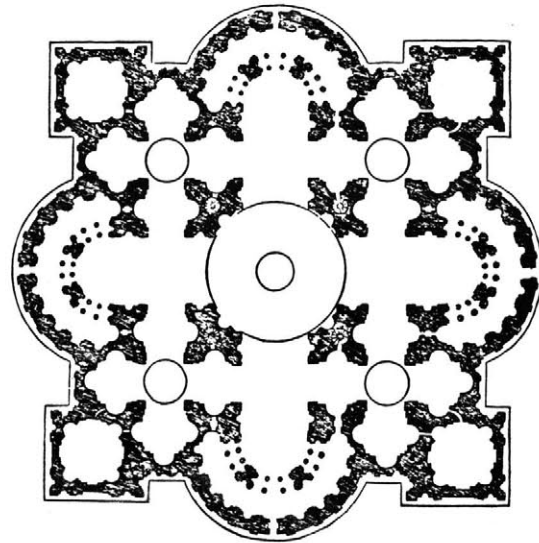
the actual execution of the craft. The finished forms and surfaces evolved in the work itself and thus they bore the imprint of the natural diversity of the materials and the human rythm of the craftsman.

In contrast, things produced by "industrial" means require extensive and specific preliminary design so the form and finish is completely determined before production begins.

This allows efficient mass-production and a high degree of uniformity, but it sacrifices the natural and human diversity inherent in work produced by craftsmanship since a re-determined design is mechanically imposed on the raw material.



Symmetry and precision had a different meaning before the industrial revolution.



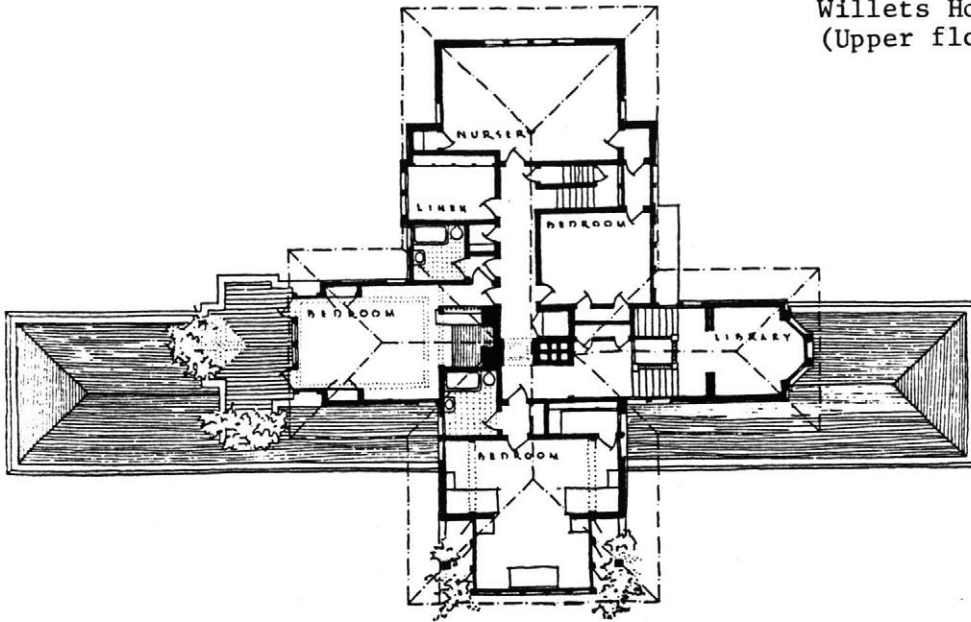
Above right: Bramante's plan for St. Peters, Rome

When people lived at the mercy of the elements and the whims of nature, technology was the physical guarantee of freedom and security, providing tools, weapons and shelter. Work that was precise and highly ordered was admired because it was rare, difficult to achieve and clearly showed the hand of man. When living was a constant fight against nature, precision and order signified that man stood apart from it and had a power of his own.

Today the situation is completely reversed, with so much of the natural world displaced by industrial regularity. The technology which originally freed and comforted man, now threatens to become the factor that most enslaves his spirit.

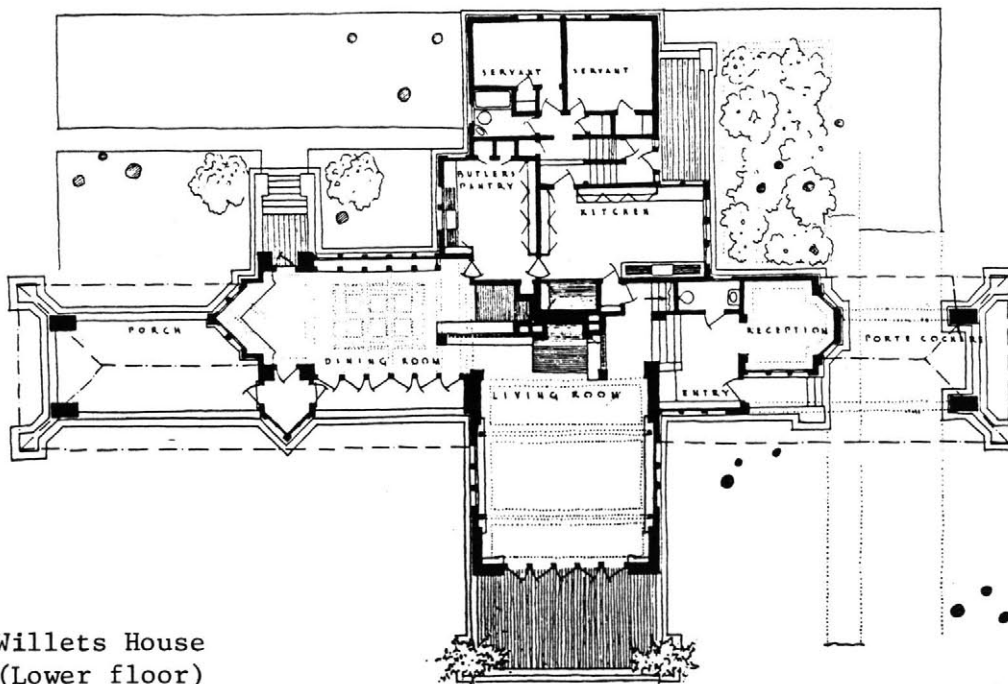
The "likeness tempered with difference" of the disappearing natural and pre-industrial environment, so important to human emotions must somehow be provided in our industrialized world.

Willets House
(Upper floor)

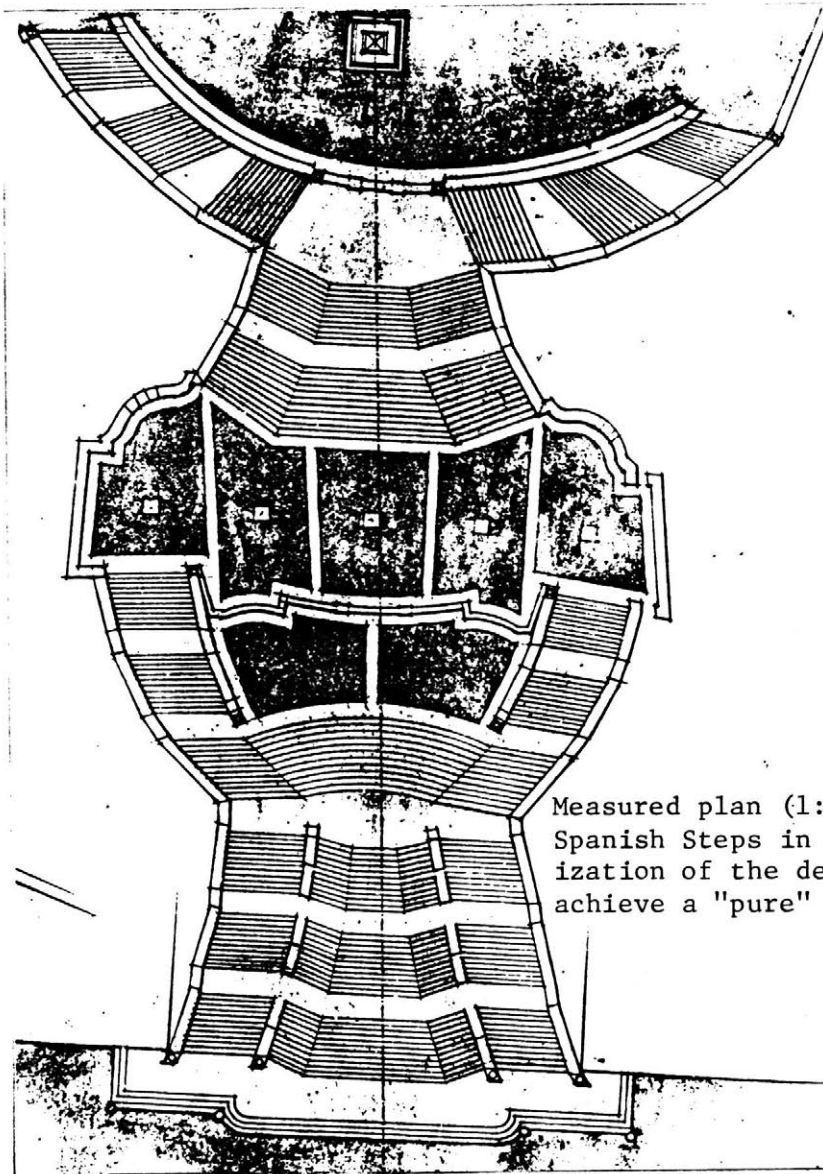


Wright provided spatial diversity within order by hinting at symmetry but breaking it. His architecture is based on the growth pattern of nature such as that of a leaf which is not quite symmetrical.

Above and Below: Plan, Willets House. The rectangle enclosing the floor plan approximates the golden mean.



Willets House
(Lower floor)

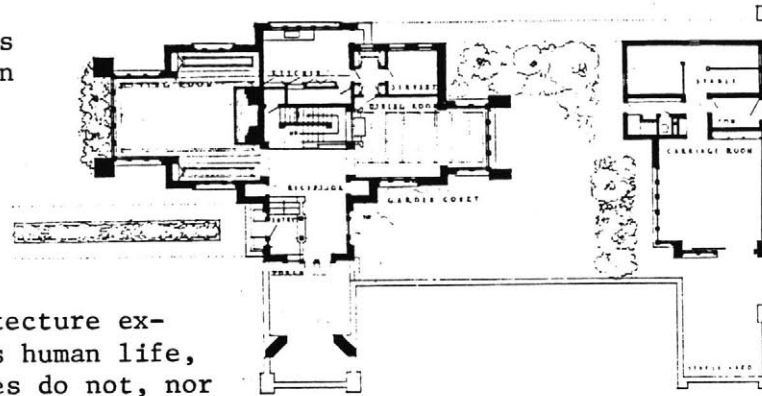


Measured plan (1:500) of the Spanish Steps in Rome. The actualization of the design does not achieve a "pure" symmetry.

The attempted symmetry of the Spanish Steps is never reached, and they are better for having fallen short of their mark.

The building techniques of the day were unable to completely impose order on the natural terrain. As a result the order of the symmetrical stairs is tempered with a slight irregularity that reflects the natural contours of the hill and the work of the mason's hand.

Another example of Frank Lloyd Wright's intentionally broken symmetry. Francis Little House 1903.

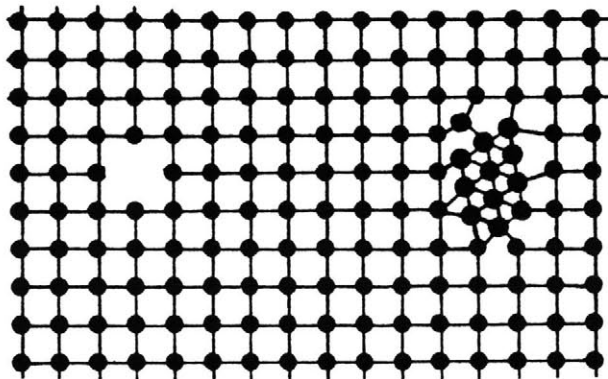


"Architecture expresses human life, machines do not, nor does any appliance whatsoever. Appliances only serve life."

-Frank Lloyd Wright

Today's building techniques could easily apply a precise symmetry and order in the same situation, but the exacting results would not include the human and natural diversity that give the Spanish Stairs their life. The craft process not only affects the regularity of the larger spatial order, but it also issues a tempering diversity at the closest range by the textures and patterns left in the material surfaces.

The following section will explore craftsmanship and its role in providing natural variation in the ordered creations of man.

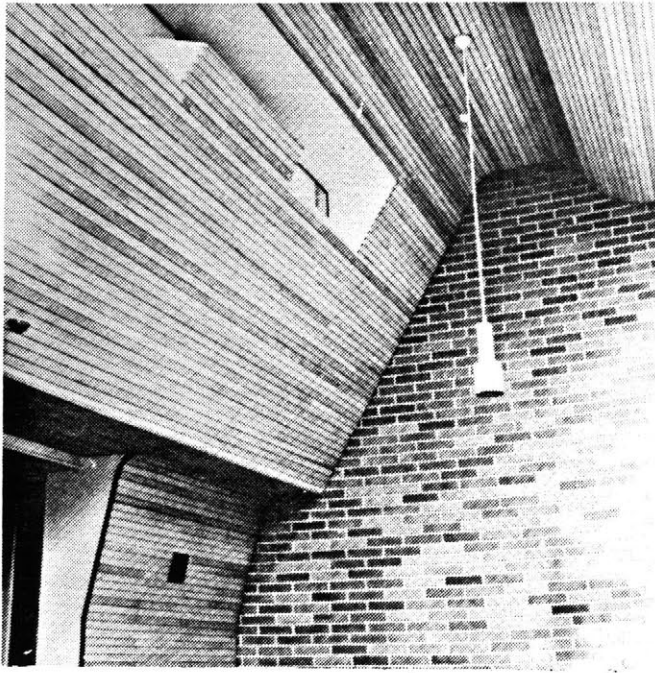


Left: The square lattice of atoms with its obvious irregularities exemplifies how nature departs from "pure" order.

QUALITIES OF CRAFTSMANSHIP

"The question of handcrafts is not simply technological or economic, but basically a spiritual question."

-Soetsu Yanagi



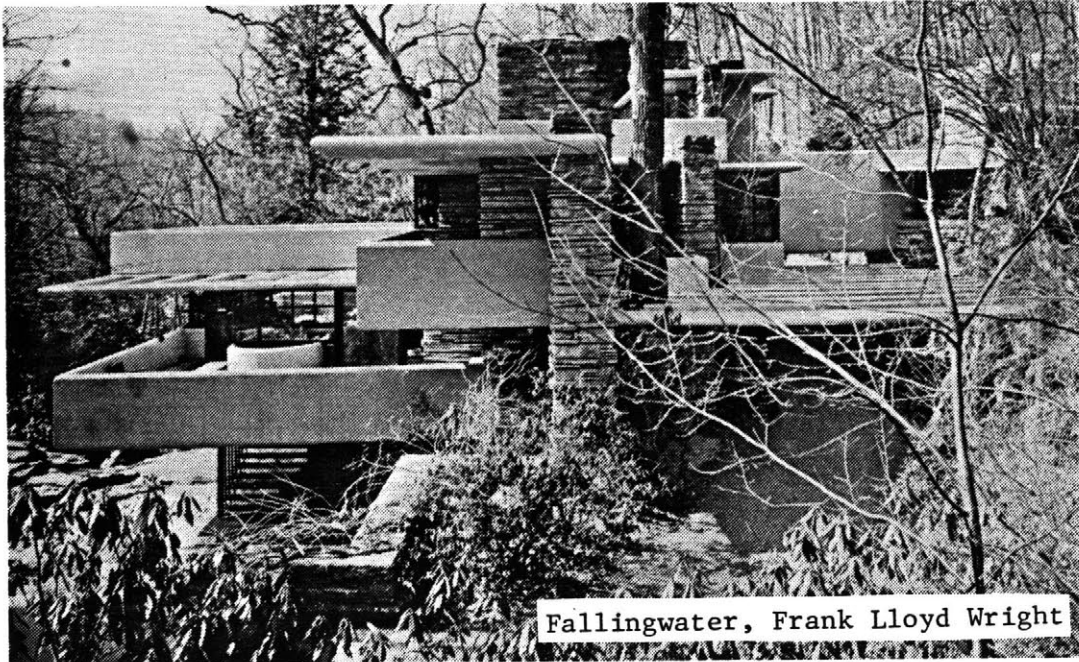
Insinööriäitalo Office
Building, Alvar Aalto

"...without the ingredient of sensuous enjoyment the practice of architecture must inevitably degenerate into little more than a sordid routine, or at the most the exercise of mere intellectual cleverness. In this light, the examples of texture can be gladly accepted as a stimulation to be found in the ordinary scene."

-Gorden Cullen

SURFACE AND TEXTURE

In a previous section "likeness tempered with difference" was presented as an important ingredient in aesthetic experience. In architecture designers can provide this at long and medium ranges by complexity in massing and organization of visual elements, but at close range diversity results as much from the visual and tactile qualities of textured surfaces and the play of contrasts between them, as from the forms themselves. In the Far East this has long been recognized, and in Japan especially, the treatment of forms and surface



Fallingwater, Frank Lloyd Wright

textures perceived close at hand reached a very high level of refinement. In Western architecture, especially as currently practiced, this aspect of design is less of a concern, although there have been Western architects who understood the importance of texture to the human psyche. The contrasting stucco-surfaced balconies and the coarse stone walls at Frank Lloyd Wright's Fallingwater or the undulating wooden ceiling in Aalto's Insinorital Office Building attest to this. Unfortunately these cases are more an exception than the rule, and much modern architecture is devoid of life at close quarters, the range at which people usually experience their built environment. Even the "Post-Modernists" who address this issue usually concentrate on color rather than surface texture in their attempts to enrich the close-range experience of architecture.

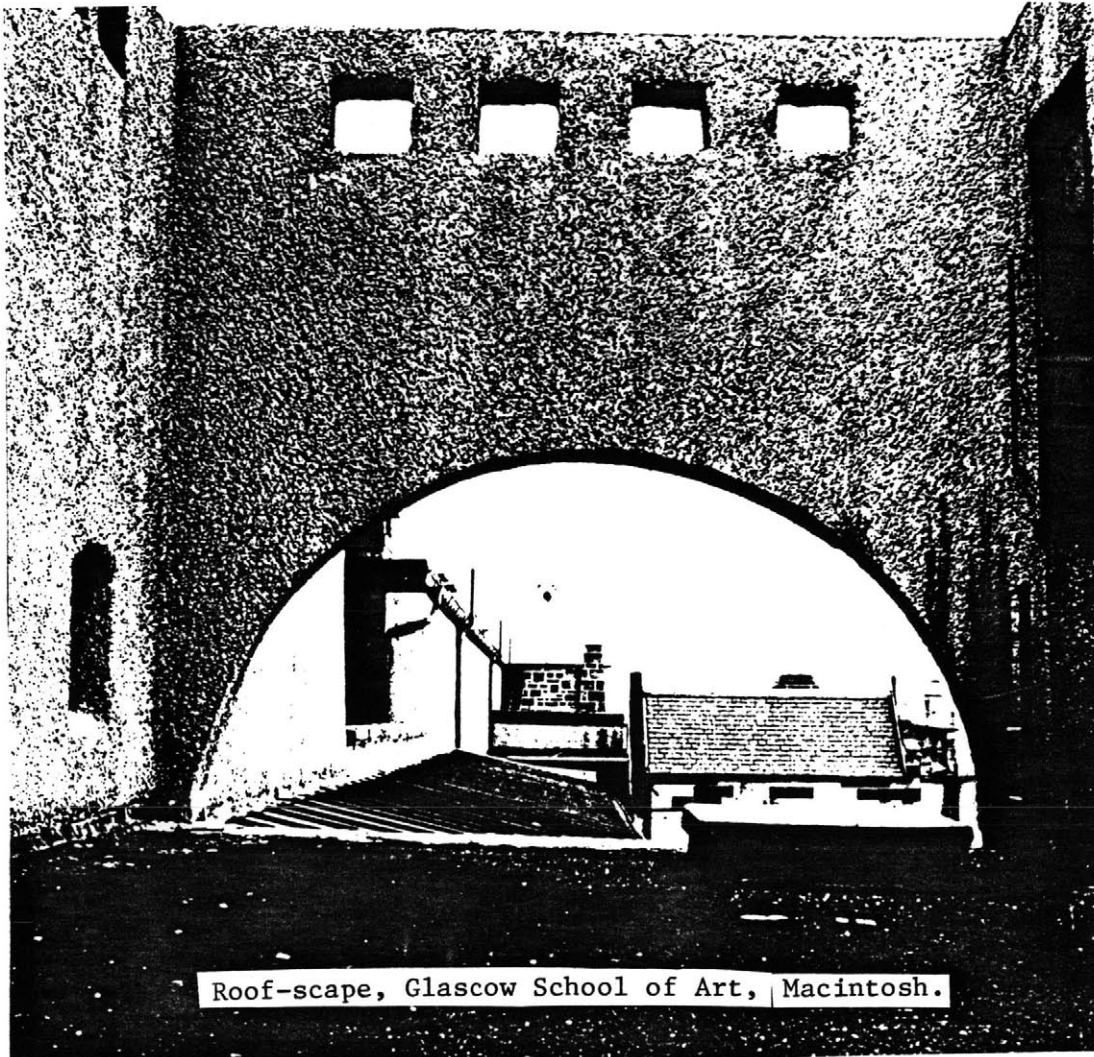


"The extreme paucity of names for surface qualities has quite probably had the effect of preventing any general understanding that they exist as a complete domain of aesthetics, a third estate in its own right, standing independent of form and color."

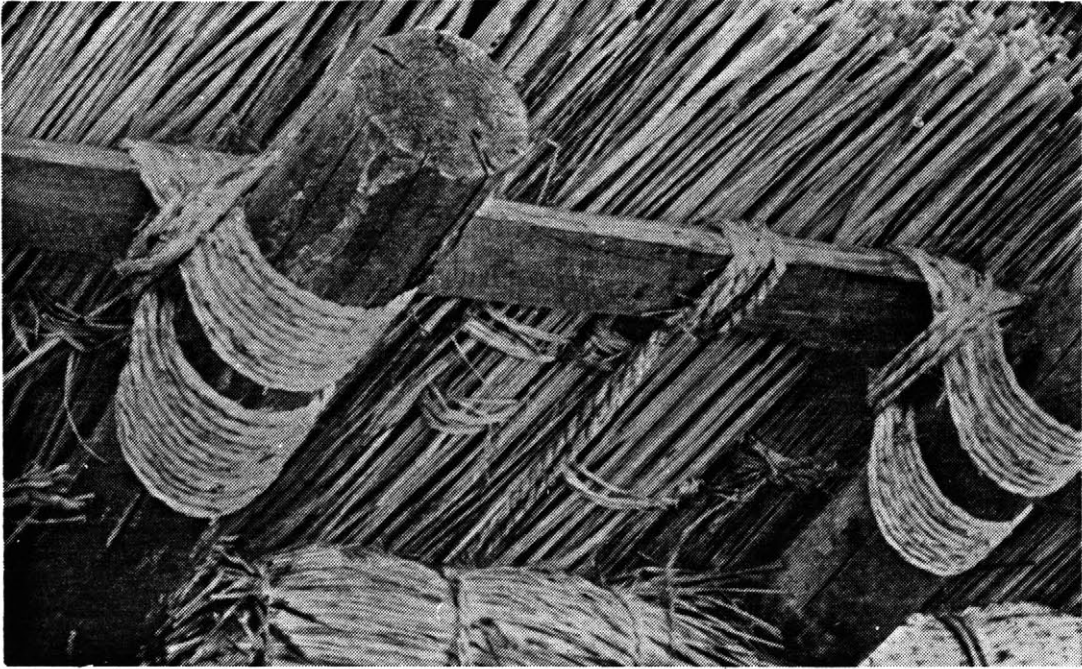
"Surface quality in man-made things comes of workmanship. The third estate belongs to workmanship."

-David Pye

The shortcoming of current architectural practice results not only from the effects of industrial standardization and the decline of individual craftsmanship, but also from the nature of the medium used to disseminate architectural information. Most current architecture is designed with its presentation in mind; in photographs, models and drawings made for publication, publicity, or (during the last several years at least) for sale in art galleries. Even the most sophisticated reproduction techniques are incapable of capturing the subtle nuances of surface texture that can contribute so much to the experience of built form. These nuances emerge from the materials and craft techniques, in the work itself. They cannot be designed on paper or by any secondary process removed from the material form. With



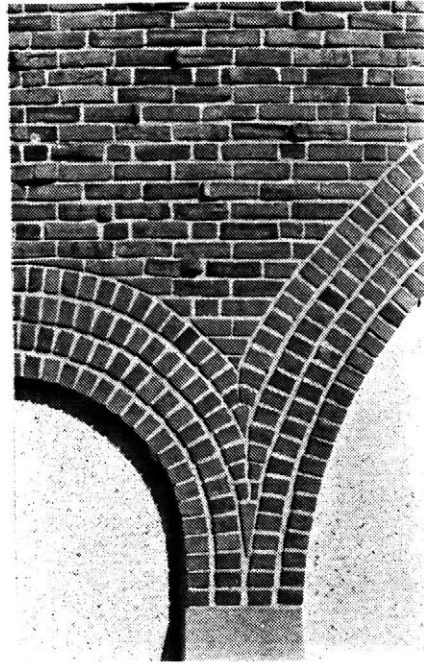
the emphasis on the photographic reproduction of architectural work, it is not surprising that the qualities gained through the subtle play of textures are largely ignored. Many modern designers think only in terms of shiny and coarse, when there is a wide range of textures between these two extremes to choose from. The inability of the reproduction medium to effectively communicate the subtle range of textural qualities makes it difficult to convey their meaning in this thesis.



The reader must use his/her imagination to see textures, represented unsatisfactorily here by photographic and electrostatic reproduction, as they might appear in their actual built, material form. And architects must realize the value of these subtle traits of surface texture, even if it is impossible to include them in their drawings and photographs, and attempt to impart these qualities into their built work for the benefit of the future inhabitants. At Fallingwater Frank Lloyd Wright specified the type of stone and coursing for the walls, but the textural qualities and patterns evolved when the walls were being constructed by the masons. Wright understood the qualities attainable through that type of stonework by his comprehension of that craft process. If one calls stone a good building material, he is actually referring to the qualities that

Opposite page - Eave of thatched roof; texture contributes to the impact of architectural form.

Right - Eero Saarinen understood the qualities attainable through the mason's craft in the chapel at M.I.T.



have resulted from the tradition of the mason's working of that material. David Pye, in The Nature and Art of Workmanship, explains, "No architect could specify ashlar until a mason had perfected it and shown him that it could be done. Designers have only been able to exist by exploiting what workmen have evolved or invented." It is the architect who had a deep understanding of the building crafts who can most effectively employ the qualities that result from the skilled working of raw materials.

The word architect comes from the Greek word *arkhitekton*, meaning master builder (*tektion* meaning carpenter or craftsman). Architecture is the craft of building. In light of the current division between design and craft it is important for architects to design with the craftsman's understanding of surface



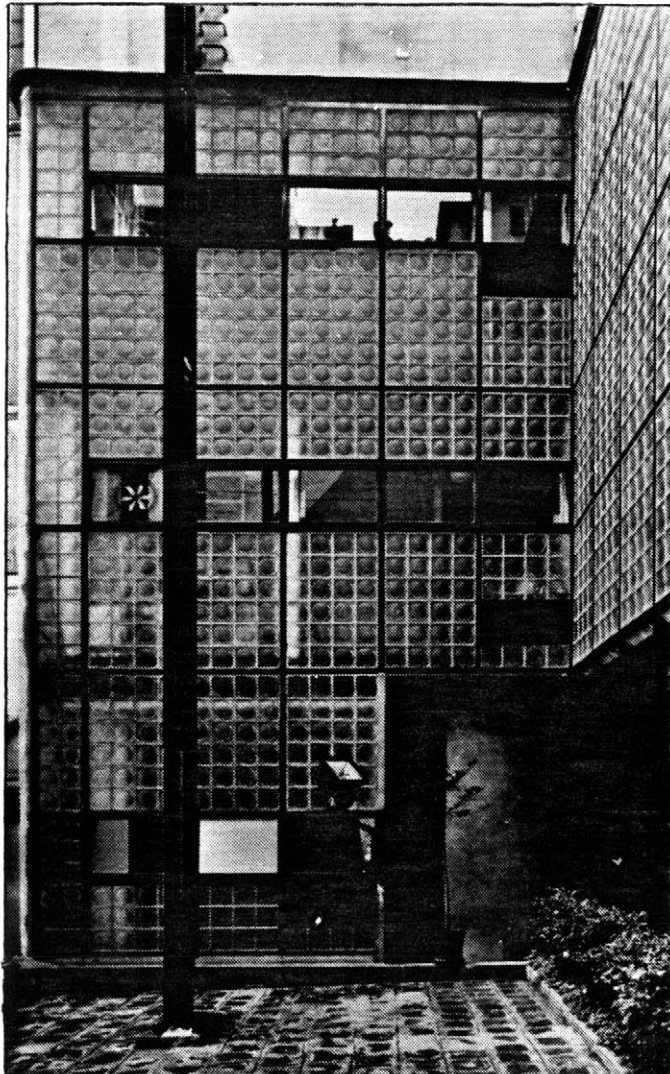
Ames Memorial Gate Lodge
H.H. Richardson, 1880-1 - his
favorite massive stonework.

and texture, for the craftsman's work has a tremendous impact on the quality of the built environment at the closest (the user's) range.

SURFACE AND THE PERCEPTION OF FORM

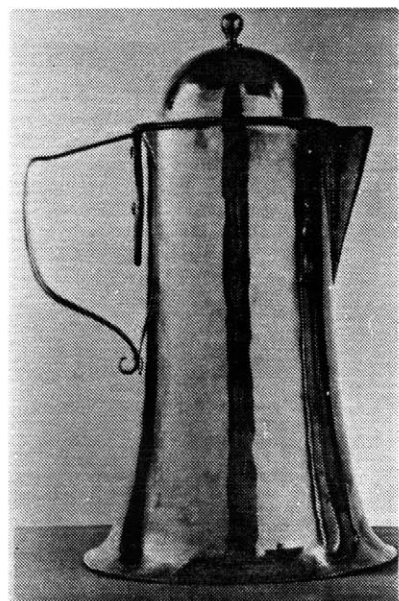
Surface texture is extremely important because the light reflected off it is what is actually seen. Diversity results from texture if the object appears to change when viewed from various angles and distances, as the light is reflected differently. One possible criterion for judging a good surface finish is one that conveys a sense of the object and allows a reliable judgement of it to be made. A surface with a mirror polish shows a reflection of something that lies beyond that surface. It is impossible to focus on both the reflection and the actual surface at the same time. This has an equivocal effect, preventing a unified perception of the form of the object. An example of this effect occurs in brass with a newly polished surface. While it remains shiny and reflective the form of the piece cannot be solidly grasped. After the brass is worn a screen of minute scratches establishes the position of the surface, permitting a more satisfactory perception of the form. Wood finished so its grain is filled and its surface is covered with a high gloss varnish is perceived more equivocally than wood where the pits of the grain (like the scratches on the brass) are left unfilled, allowing the surface to be visually fixed.

The characteristic of a highly polished surface can be controlled by proper scaling. The boundaries of a small object are immediately perceived, establishing the form of the object as does the patina on the surface of brass. The plane of an expanse of glass is visually fixed more easily if it has been broken down into smaller pieces (their size being appropriate to the scale of the building or surface), since the edges, corners, and mullions act to define the form. Lacquer-work trays often have their large surfaces carved with a



Left: Chareau's Maison de Verre in Paris. Large expanses of glass built-up from small units of glass block.

Below: Successful interplay of surface, form, and scale in jug of copper and brass, by Arthur Dixon, 1895.





Chestnut cabinets, designed and constructed by author.
Wood grain framed by regulation of the work.

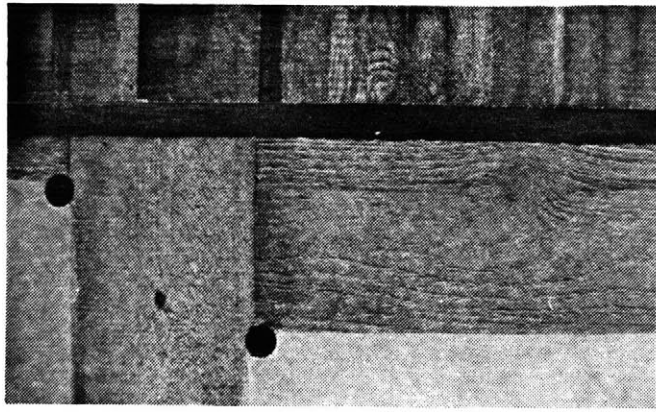
design to break the effect of a large reflective plane, whereas smaller pieces often have glossy, uncarved surfaces, yet they successfully convey the form and the depth of the finish.

Wood is chosen as a material for the intrinsic diversity of its grain. If an entire wall was covered with walnut veneer paneling the effect would not be as powerful as some simple, well executed wood cabinets, where the beauty of the wood grain is set off by the precise, orthogonal construction of the cabinet. It is the regulation of the work the "frames" the diversity of the wood grain by showing the human involvement and providing order to balance wood's randomness.

While there is a range of possible textures a craftsman can impart to the surface of any given material, the nature of the material itself suggests certain treatment. In marble hewn so it has a sugar-like texture one sees light reflect off both the surface and a little below it, causing another situation where it is difficult to get a strong visual idea of the form. Since the nature of the marble implies a solid and tangible appearance, a smoother finish is more appropriate. There is a range within which the marble would effectively show its natural pattern and remain smooth and definite in form. If it is too highly polished the reflective surface causes the form to become less precise again. Wood, wanting to show its grain pattern to the best advantage, would benefit from a finish that would leave the small surface pits of the grain, in order to maintain the visual integrity of the form, yet

allow some penetration of light that would exaggerate the contrast between the hard summer rings and the softer growth.

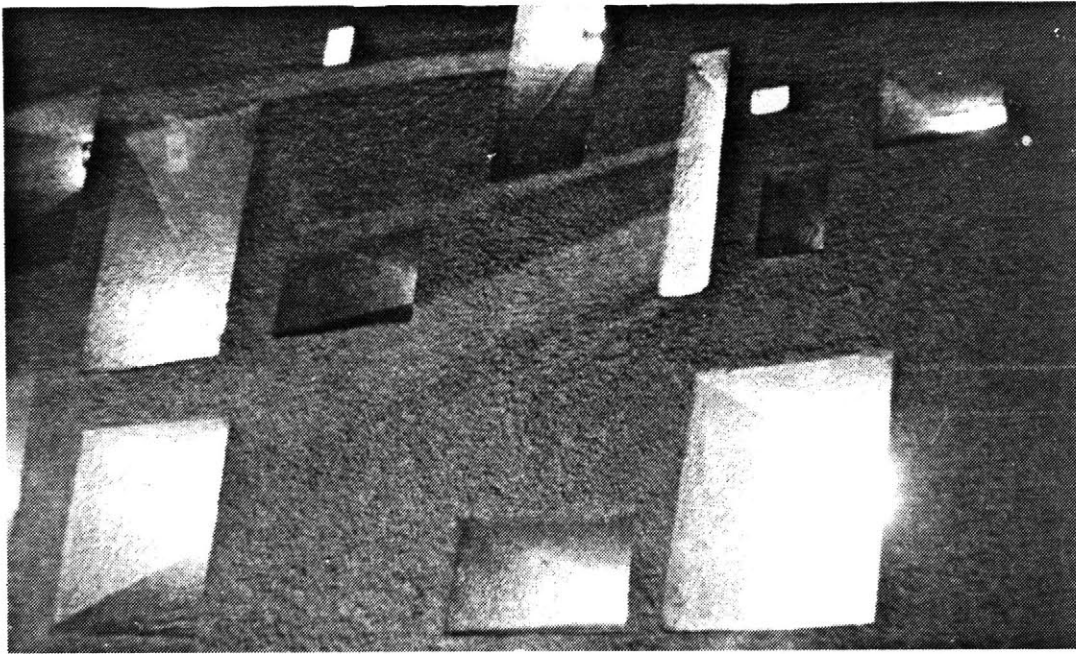
The late 19th and 20th century movements that called for the "honest" use of materials were a reaction against the use of new materials in forms that developed from other materials and techniques. For example, pre-cast plaster started to be used for facade details that had originally developed in stone. The forms were the same, but the textures were disappointing. Just as a sensitive ear can differentiate between the quality of a Stradivarius violin and of a cheap new one, people can see and feel the quality of textures in built form. One of the concerns of the Bauhaus was to try to find and employ our new building materials in appropriate ways. The search for the "right" surface treatment for new materials still presents a challenge today.



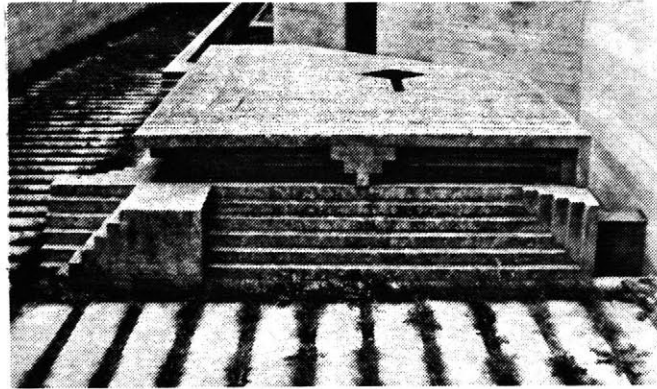
Above: Scarpa Concrete Detail

Left: Le Corbusier's Chapel at Ronchamps; board-formed concrete roof and stuccoed wall separated with a thin band of glass.

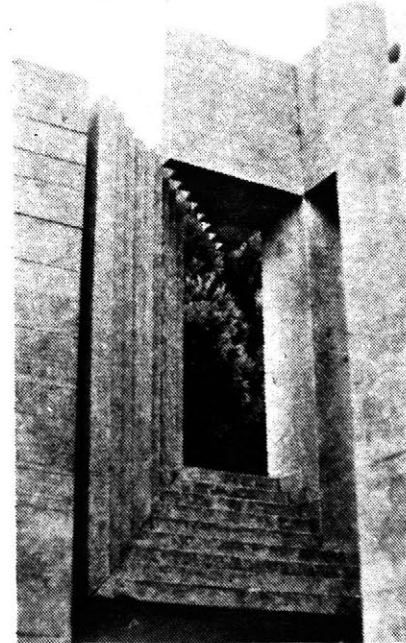
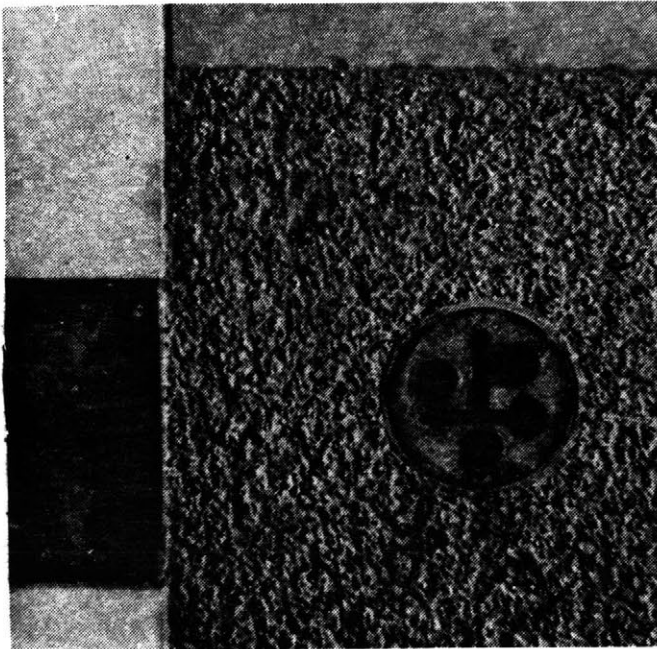
Concrete is a modern building material that can assume a wide range of textures. The design of the early houses of Le Corbusier suffered from the poor treatment of their concrete surfaces, whereas the surfaces of the concrete in his later work, such as the Unite d'Habitation in Marseille or the Chapel at Ronchamps, give this cold and amorphous material more warmth and interest. Frank Lloyd Wright gave some of his concrete elements deep relief patterns to provide a more interesting texture. More recently the late Italian architect Carlo Scarpa has executed work with an extremely refined treatment of concrete surface and texture, adding a great deal to the impact of his architecture.

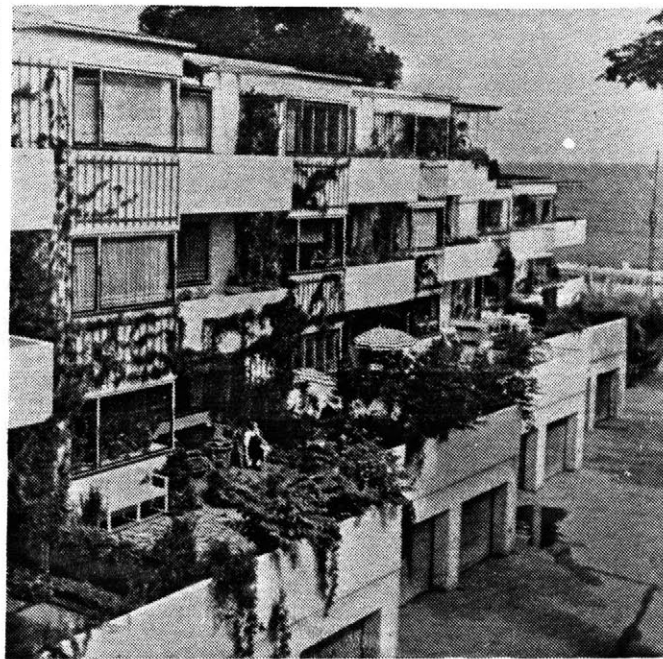
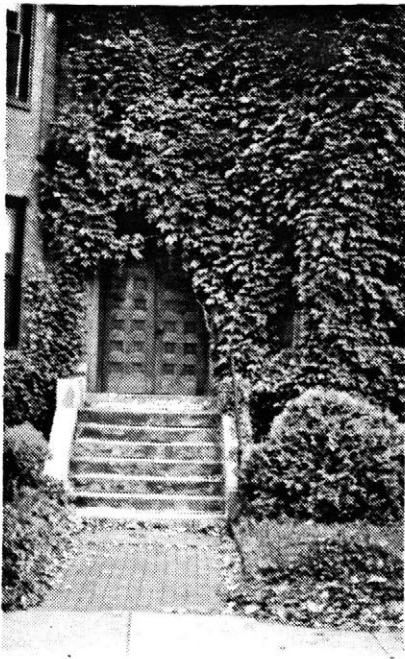


Above: Light enhances the rough interior wall surfaces at Ronchamps.



Right and below: Details of concrete work in Carlo Scarpa's Cemetery for the Brion-Vega family, near Treviso, Italy.





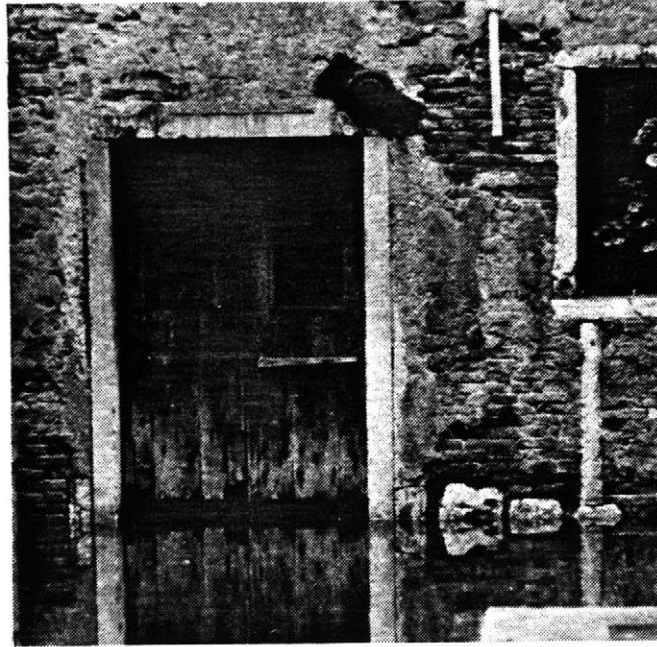
AGE AND WEAR

The diversity borne of texture may not be of primary importance to modern architectural practice, but that is not because people do not notice or respond to it. Almost everyone recognizes the positive characteristics that age and wear can impart to surfaces. Weathered barn boards, the patina on the surface of antiques, or an ivy-covered building are greatly valued for their age-acquired diversity. People prefer their denim blue jeans worn, washed and faded. Architects and craftsmen should not only consider the feelings their newly-constructed surfaces project, but also what they might potentially project in 5, 25, or 100 years. Age and wear can aid the design by adding elements of diversity that were originally lacking. Newly cast plaster does not have a very nice surface, but an ancient plaster statue whose

Far left: Ivy covered wall, Boston

Left: Arne Jacobsen's Bellavista Housing has balconies and trellises to provide a place for the inhabitants to individualize their units over time.

Right: Age acquired diversity is Venice. The surfaces are enriched and remind one of the temporality of all material form.



pores have filled in with dirt and whose surface has been worn to an ivory-like finish through much wear and handling has grown more beautiful with age. Wear can also be destructive. The early houses of Le Corbusier, mentioned earlier as having poor quality surface treatment when new, look even worse after aging, with chipped and cracked stucco and concrete, and the originally brilliant white surfaces covered with a layer of soot and grime. Age and wear benefit a design only when they enhance it, so the type of wear that will occur over time should be considered at the outset.



Left: Footpath.
Stones worn smooth over
the years.

"Like architecture in America, you
build it and let it stand for ten
years, then call it shabby and rip
it down to put up something else.

Joni Mitchell

Below: A wall in
Venice shows the
imprint of many
years of wear, use
and change.

It is better to build it and let it
age and change.



"The methods of architecture are sometimes reminiscent of those of science, the kind of research that natural science uses can also be applied to architecture. Architectural research may well be more methodical than before, but its essence can never be purely analytical. Architectural research must always be more of an art and an instinct."

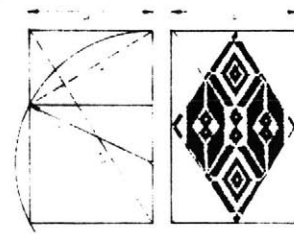
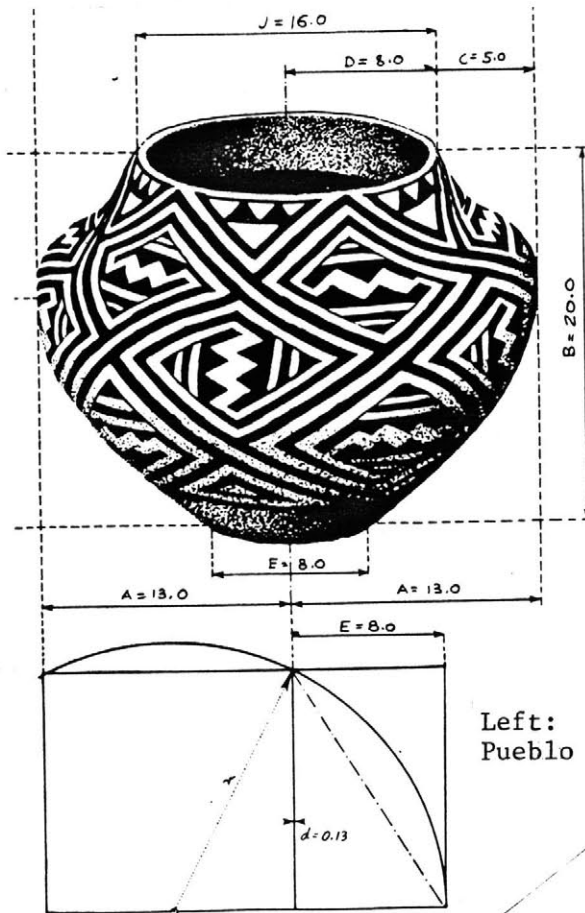
Alvar Aalto

"...all good designing work was felt in the stomach."

Lethaby in Morris
as Work-Master

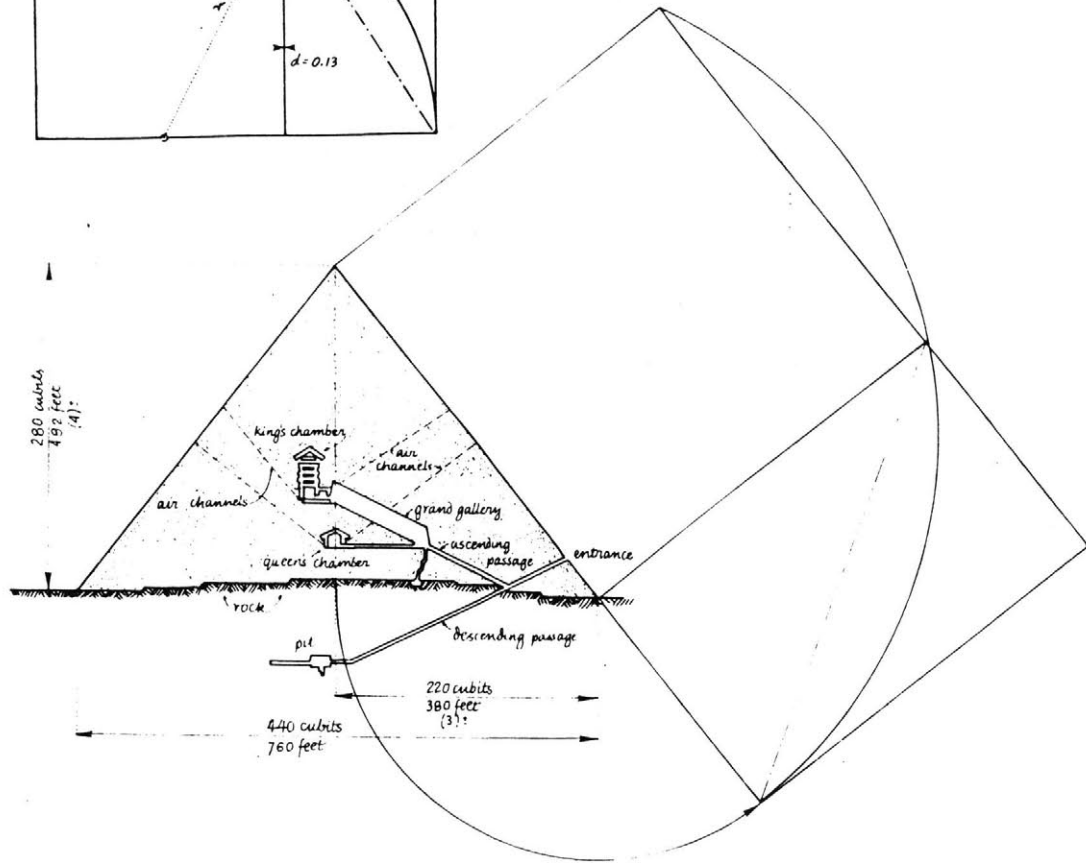
CRAFTSMAN'S INTUITION

While a mastery of technique is essential, craftsmanship is much more than a technical skill. The true craftsman develops an innate understanding of the behavior and properties of his materials and an intuitive sense of proportion, use, and form. In the previous section I mentioned several conscious applications of the golden section in art and architecture. It is interesting to note that the ratios corresponding to the golden section and the root harmonies in music occur with startling frequency in the traditional crafts, including basketmaking, weaving, and ceramics. Certainly in these cases the pleasing proportions were recognized subconsciously rather than through any rational process. Soetsu Yanagi, the father of the Japanese folk-craft revival, calls the intuitive ability to recognize beauty "seeing," in keeping with the Zen philosophy of transcending rational

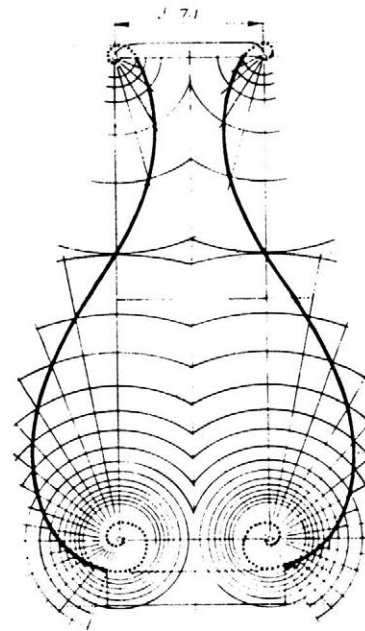
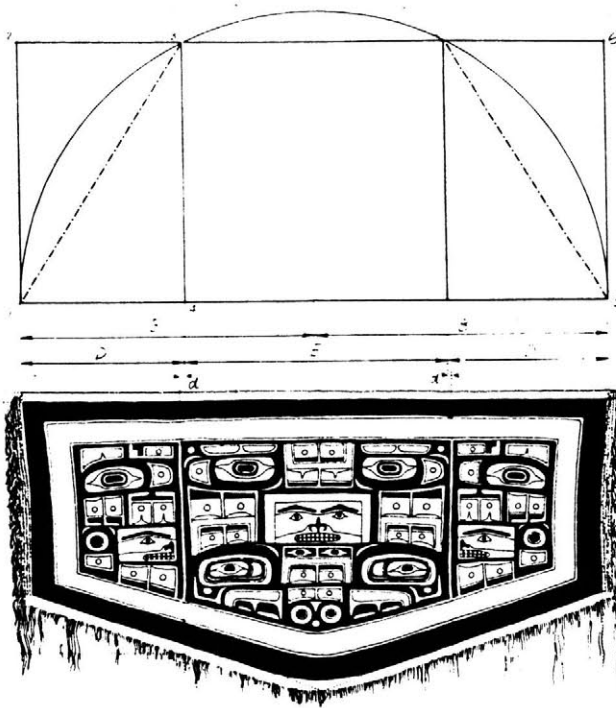


Above: Woven Mexican Pattern

Left: Earthenware Pot,
Pueblo Indian



Golden Section and musical root harmonies are prevalent in much primitive architecture.

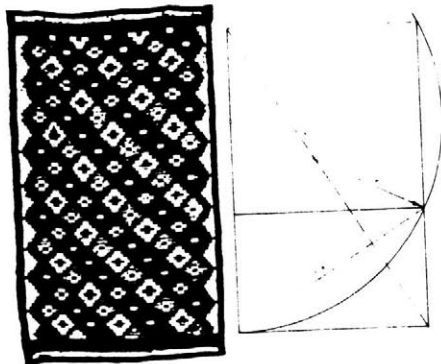
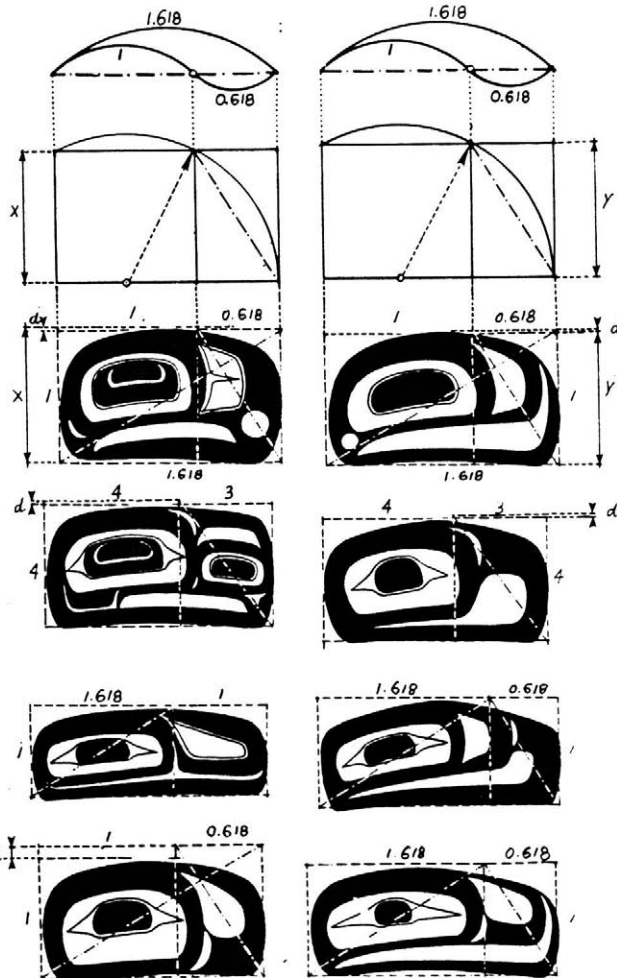


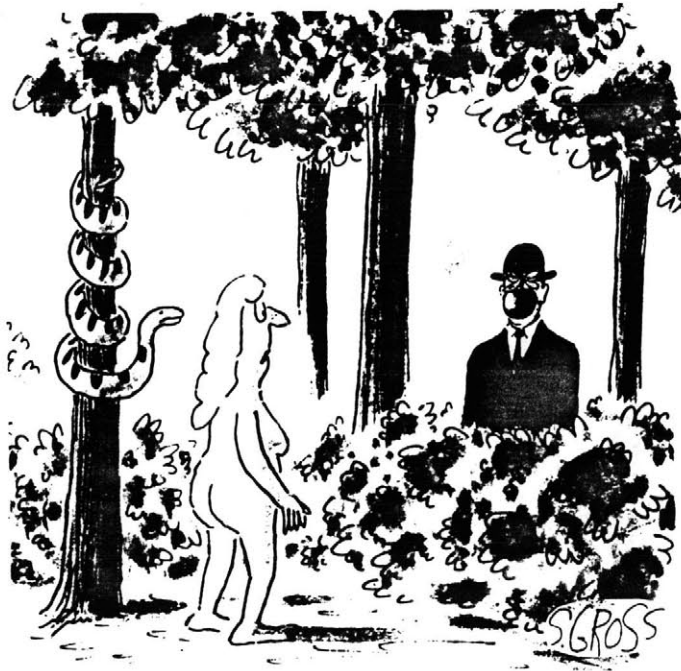
Above: Woven Chilkat Blanket

Below right: Details of ovoids in Chilkat art

Upper right: Sung Dynasty Celedon Vase, Spirals generated by Golden Section

Below: Prussian Carpet, Golden Section and musical harmony ratios prevalent in patterns in craftwork from all over the world.





"Interpretation is the revenge of the intellect upon art. Even more. It is the revenge of the intellect upon the world."

-Susan Sontag

logic for a truer and more essential perception of reality. For him, "Beauty is a kind of mystery which is why it cannot be grasped adequately through the intellect." D. T. Suzuki, the Zen Buddhist teacher explains, "Knowing is impossible without seeing, all knowledge has its origin in seeing." To know facts or to intellectualize about an object of beauty does not get to the core of its beauty.

The flash when one suddenly grasps the humor of a joke is an example of intuitive insight that everyone is familiar with. Although a joke can be analyzed or rationally explained, the life of the humor transcends the intellectual process.

In Western Art the perception of beauty is approached more intellectually. Art critics categorize work by its date, school, who made it, and rational ex-

planations of technique and composition. Although the Western rationalization of beauty has a long tradition, there have been philosophers more in agreement with the non-rational approach to aesthetics. The word aesthetics comes from the Greek *aethetikos*, meaning "of sense perception" implying a more direct comprehension of beauty than through reasoning. In 18th century France the philosopher Denis Diderot believed that the aesthetic experience is dependent on associative memory and analogy rather than on any logical process. In England David Hume proposed that feelings about an object express a direct relationship between the object and an organ of the mind independent of reason, thus genius might be seen as being particularly powerful, creative, and intuitive in sensing truth.² In 1872 Robert Vischer discussed "empathy" with things -- an association people



"Pattern is born
when one produces
the intuitively
perceived essence."

-Soetsu Yanagi

Left: Five leaf
bamboo crest

might feel with objects, places or events (a sunset, a play, art, etc.) by projecting their own emotions into them.³

If a designer and craftsman are sensitive and skilled enough to uncover an intuitively perceived essence in their work it possesses a profound beauty. People see something in the object that they can identify with. They empathize with something that lies beneath the surface of the work, a pattern that the craftsman interprets and instills into the work. In his book The Unknown Craftsman Yanagai discusses pattern in this sense. As an example he considers the five-leaf bamboo grass motif frequently used in traditional Japanese clothing. The pattern suggests bamboo grass, but is obviously not a literal representation. The grass is a product of nature. The pattern is this also, plus a human viewpoint to give it content. The beauty emerges

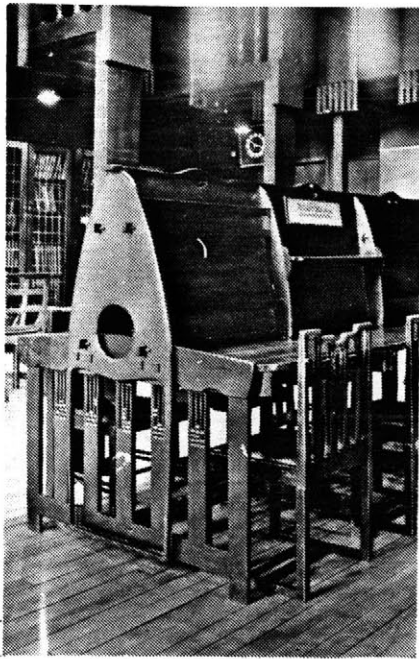
"There are only two attitudes toward nature. One confronts it or one accepts it. The former finds in nature but the rawest of materials to do with as one will - a form is imposed upon chaos. The latter discovers in chaos a new kind of naturalness - and to naturalize nature is to accept it."

-Teiji Ito in
The Japanese Garden

Left: Rhythm and Rhyme in the Japanese Garden.



in the plant only with the addition of the viewpoint that sees it as beautiful. Where the plant is raw material, the pattern is material that is worked and transformed through the filter of human perception. To see nature as beautiful it must be seen in patterns to provide ordering and human viewpoint. Since pattern is created through human perception it might be considered artificial or man-made, but rather than being a scientific rendering of nature it is an exaggeration of nature that creates something more "natural" still.⁴



"In nature utility and beauty are constitutional qualities, mutually and truthfully interdependent."

-Walter Gropius

Left: Mackintosh Library Desks
Near Opposite: Japanese Flower Shears

Far Opposite: Ceramic Teacup
Intended use imposes limits on form the objects must fulfill their function, i.e. the cup must be able to contain liquid, hold the appropriate amount, be easy to drink from and easy to hold. Beyond that there is room for human and proportional expression.

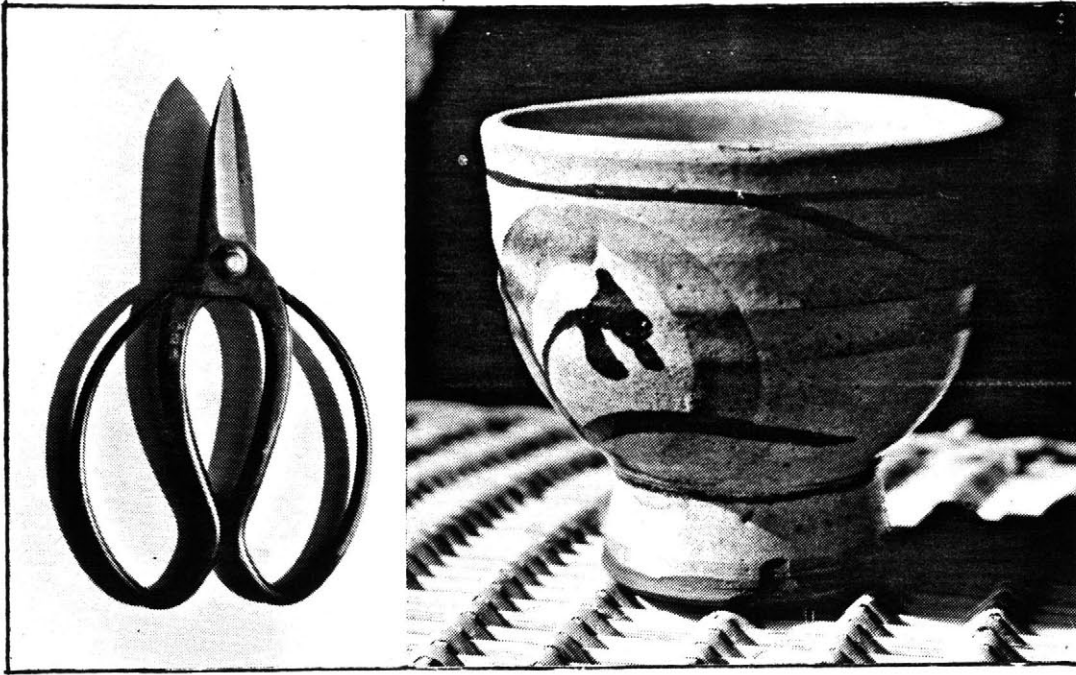
USE/MATERIALS/TECHNIQUES

The natural limitations of the crafts, being the purpose of use, the nature of the materials, and the appropriate techniques are what actually determine the nature of the pattern. Within these limitations the craftsman is free to evolve a variety of patterns.

USE/USELESS WORK

It is obvious that the intended use of an article is a major determinant of the pattern. The function of an object imposes obvious limits on its form. Within these limits there is an infinite range of pattern, the most pleasing based on the proportional and textural principles discussed previously.

The concept of the pattern resulting from use is distinct from the philosophy of "form follows function" espoused by the International Style. The designs of

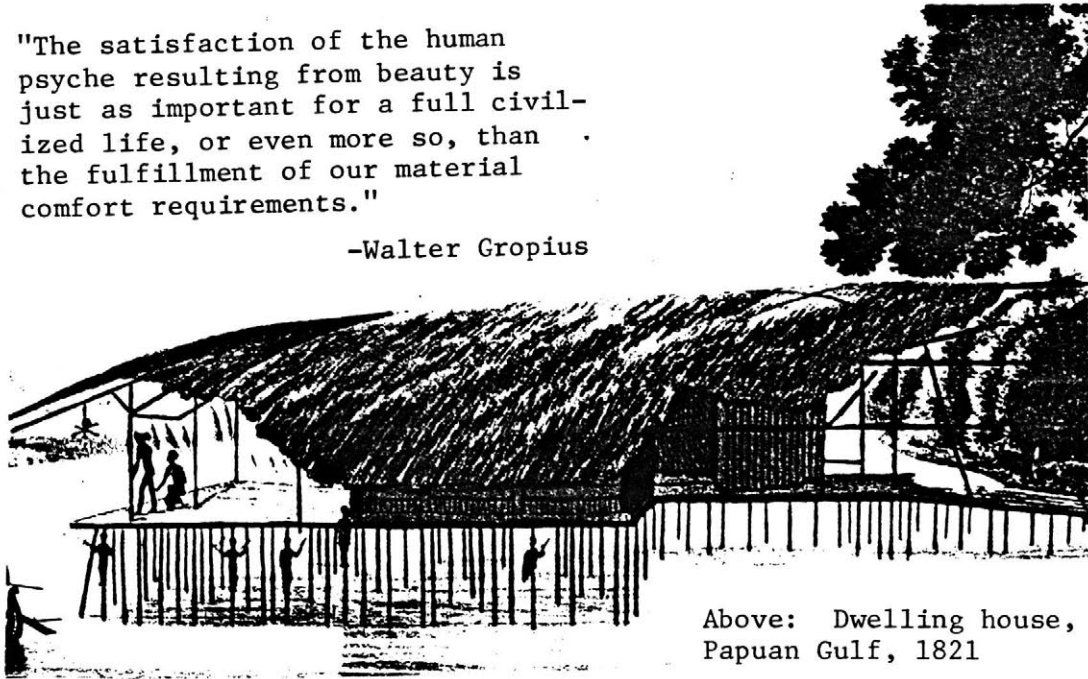


those architects were attempts to strip form down to the precise minimal definition needed to fulfill the objects' use requirements. Pattern, as the product of human intuition and volition, tends to become more of a celebration of use, rather than a stripping down to a basic, logically derived form. Even in Shaker furniture, where the craftsman's free choice was strictly limited by its link to function, a strong character emerges in the work.

The celebration of use can be seen in much vernacular architecture, where the forms are much more than would be required to meet the basic use needs. This seems to be a fundamental human tendency. Even some paleolithic tools were made with more and better workmanship than was necessary for them to fulfill their functional requirements.

"The satisfaction of the human psyche resulting from beauty is just as important for a full civilized life, or even more so, than the fulfillment of our material comfort requirements."

-Walter Gropius

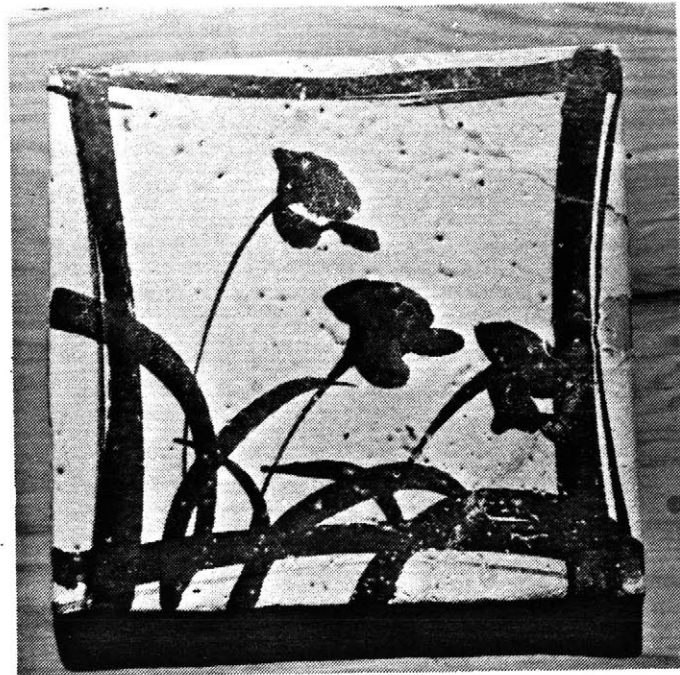


Above: Dwelling house, Papuan Gulf, 1821

Once people have satisfied their basic needs for food, shelter, and clothing they will spend energy doing extra "useless" work, expressing something more in their creations. This "useless" work is not ineffectual. It is work that can give life a turn for the better. Laughter, poetry, and play, might all be considered useless, but they certainly are not valueless. In architecture the use initially determines the form. For example, in the South Sea tropics the space enclosure necessary to protect from the elements would only need to provide shade. The way in which the craftsmen choose to make this shade is what introduces the human viewpoint, celebrating that which makes shade, giving life and art to the built form.

"Even the noblest materials lose their character when employed without skill and understanding."

-Steen Rasmussen



Right: Designs on ceramics are unique to that medium.

MATERIALS

It is apparent that the textures of the materials employed also have a direct bearing on the patterns that emerge. The painting on ceramics are very different than the painting on lacquerwork; the thickness and shape of bowls of wood, copper, and clay vary; and a column of marble would require a different treatment than a wooden post. The pattern evolves from the material rather than a preconceived pattern being imposed on any random material. The character of a raw material must be sensed and skillfully transformed for its beauty to emerge in the pattern. Raw marble or gold ore are rocks in the ground, raw wood is an undifferentiated tree in the forest, and clay is simply earth.



The Boston Craftsman "seeing" wood, metal, and stone on Beacon Hill.

Left: Wood finished to bring out the diversity of the wood grain, which is as if framed by the orthogonal form.

Below: Wrought iron expressing its perceived personality.

The beauty and spirit of the raw materials is "seen" and rendered into something that can show it to its best advantage. A good craftsman can make a better object from "poor" materials than a "poor" craftsman can make from the best materials.

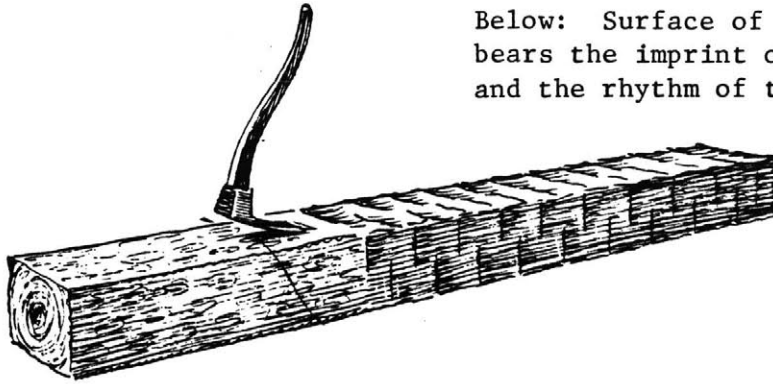


Right: Patterns in stone walk evolved during the construction within the limits of the use, materials and techniques.



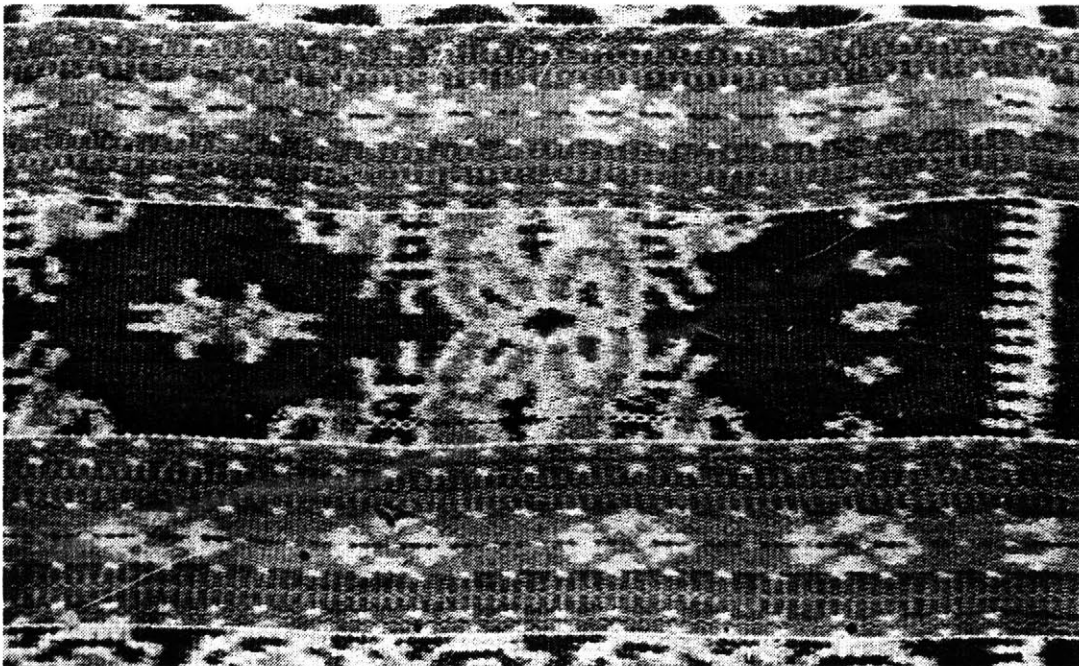
While the engineer views material in terms of measurable properties such as stiffness, density and strength, able to be expressed in mathematical formulas, the craftsman attempts to discover and express the "qualities" of his material. These qualities are subjective, the personal interpretation of the "stoniness" of stone, the grain of wood, or the metallic nature of metal. The textural characteristics and physical properties of a material that allow it to be worked in specific ways or take certain shapes easily are determinants of the patterns that might evolve, but the way in which the qualities of the materials are interpreted, the fabric worked, and the surfaces finished are again the products of the craftsman's volition and instinct.

Below: Surface of hand-hewn wood bears the imprint of the technique and the rhythm of the craft-work.



TECHNIQUE

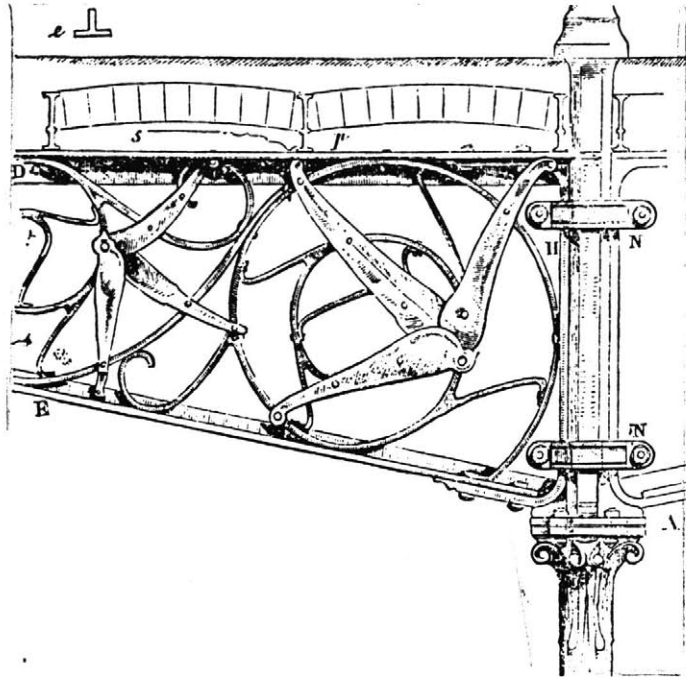
The techniques used also influence the patterns that emerge. For example, in weaving the choice of pattern is not completely free but evolves directly from the technique that creates the woven structure. The Craftsman chooses the location of the dyed threads in his design, but the resulting pattern, whether plaid, striped, or of ikat, has an obvious link to the perpendicular warp and weft threads. A modern textile that has a design printed on it does not show



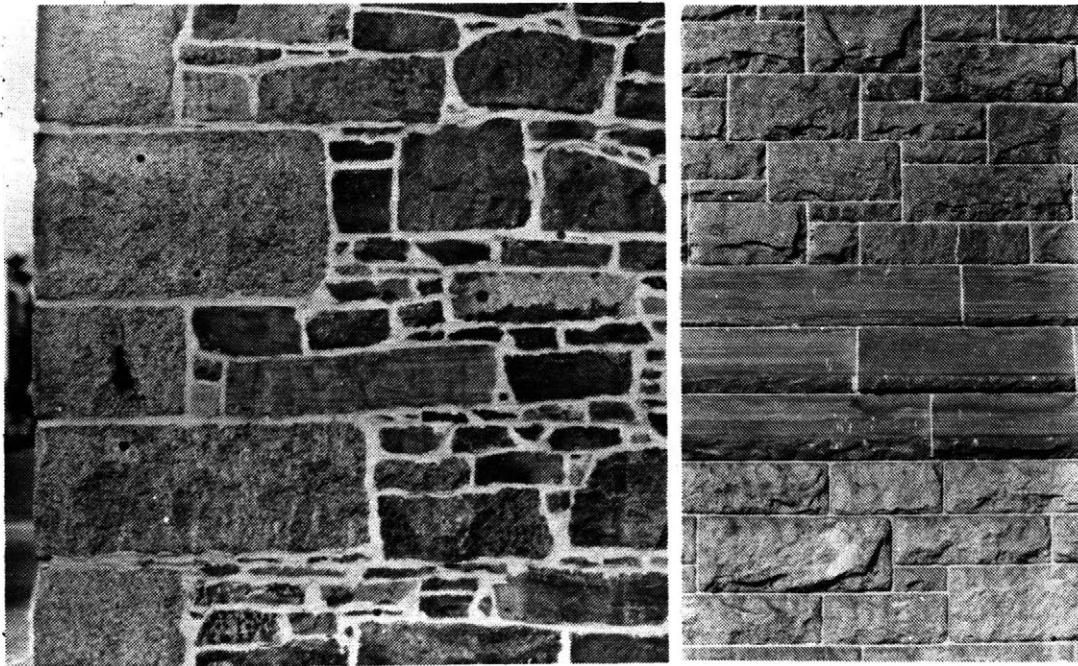
Right: Viollet-le-Duc designed cast-iron foliage for a spandrel, 1872.

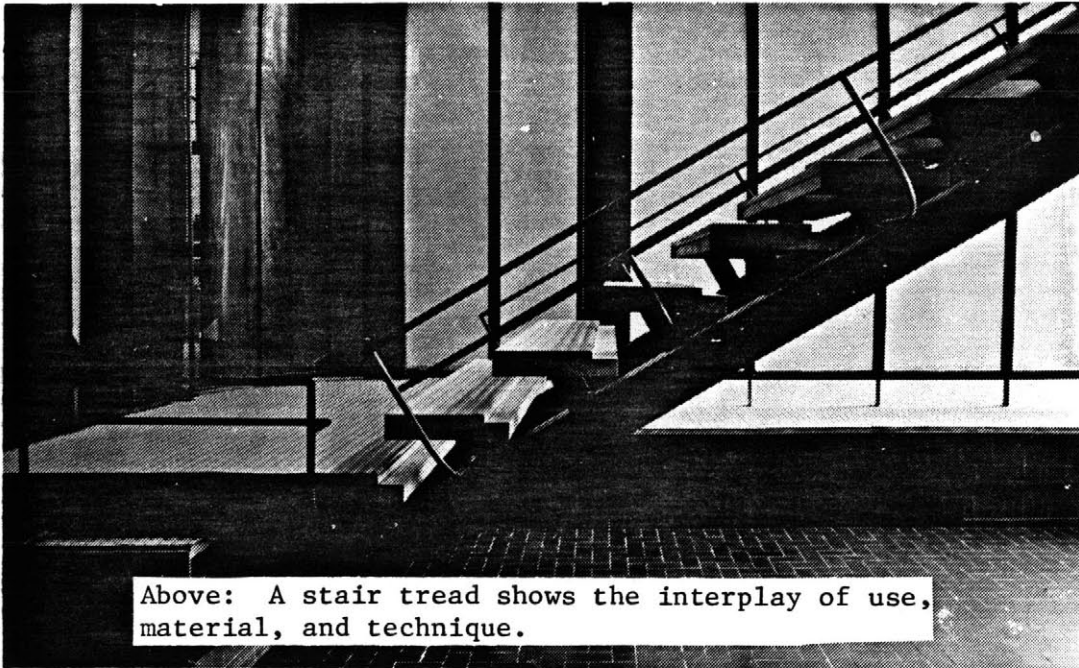
Below, left: Pattern in stonework evolves in the work, stone house, Charlestown, MA

Below, right: H.H. Richardson stonework



true pattern. Wood worked with a hand adze has a different quality than wood milled with a power planer; metal cast, stamped, or hammered will vary in character and stone laid in a natural state will create different patterns than stone dressed into blocks.

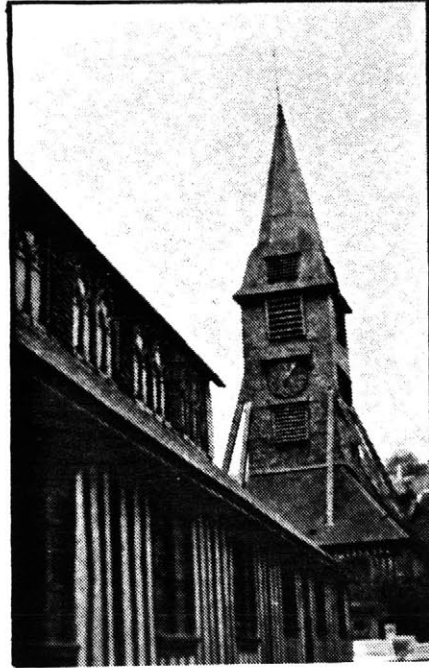




Above: A stair tread shows the interplay of use, material, and technique.

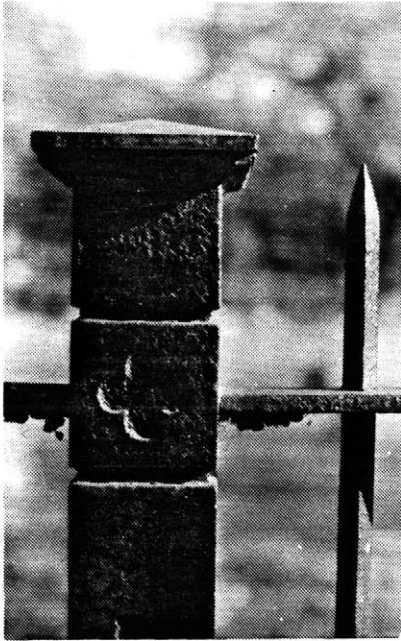
The high degree of interdependence between the three determinants of pattern is evident. In making a stair step, a material is adopted that can withstand the wear of being trod upon and can provide a non-slip surface texture. The technique chosen is one that can most effectively render the material into an appropriate shape and texture for a step. The material used partially determines the techniques employed, as a specific material's properties lends itself to certain ways of working. The inverse also occurs. A technology already developed affects the choice of materials. An example of this is in Honfleur, Normandy, where a major church was constructed to celebrate the end of a war. The local boatbuilders, rather than wait for masons to be brought in from another area, built a wooden framed and shingled church, since that was the

Right: Wooden church in Honfleur



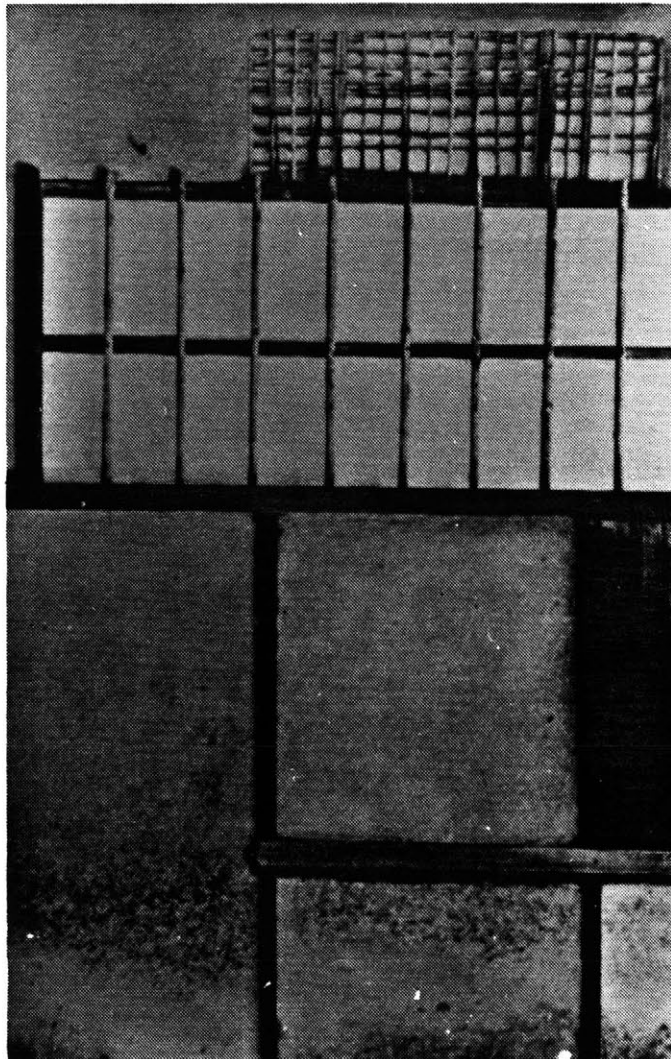
material best suited to their mastered building technology.

The forms developed by craftsmen are quite varied, the differences resulting from the various materials, techniques and uses and the cultural and personal bias of the designer-craftsman. There are characteristics of the different traditional vernacular architectures which identify them as English, Italian, or Japanese, yet there is something more universal beneath the surface. The craftsman's sense of scale, proportion, and material, and the imprint of the hand techniques give the work a natural and human feeling that transcends culture and geography.



Left: American Colonial wrought iron fence. The technique's development of the material's qualities is evident.

PATTERN IS A CELEBRATION OF
USE, MATERIAL, AND TECHNIQUE



Left: Tea Room wall. Windows, screens, panels together in harmonious expression of use, materials, and technique.

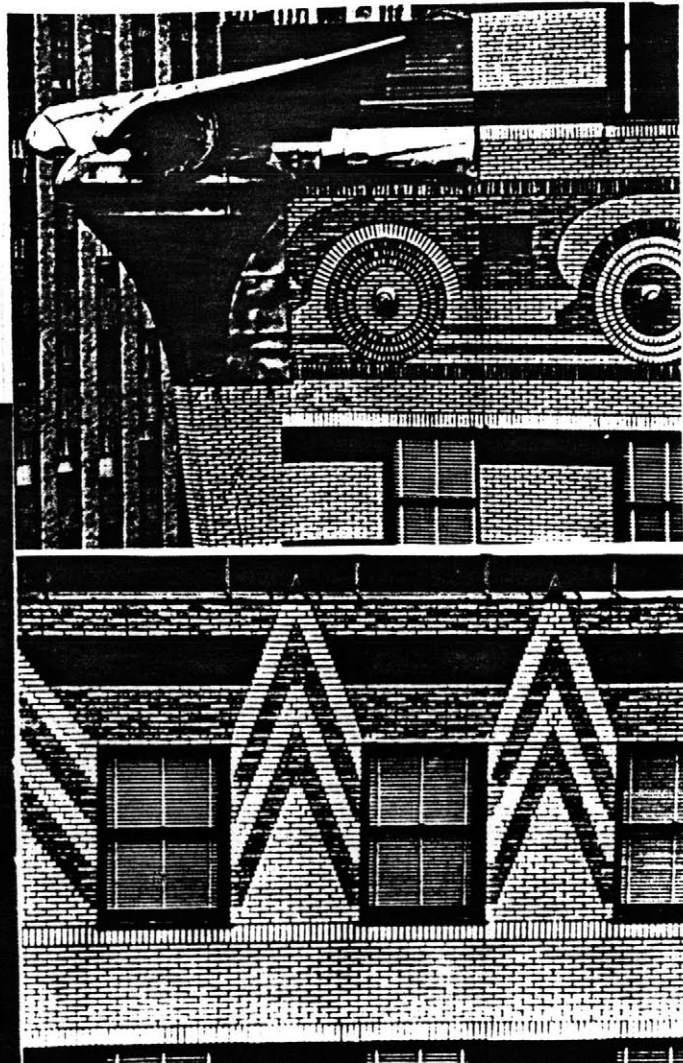
Below: Wood columns, beams, rafters, and structure create the quality of the space.





Left: Construction method in Southern Iraq. The form results from spatial use needs, the technical means available, and the natural characteristics of the river reed used as the building material.

Right and Below: The Chrysler Building. The pattern of ornamentation evolves from use, materials, and technique.



HUMANIZED STANDARDIZATION

TRADITIONAL JAPANESE ARCHITECTURE

"All materials are employed in their natural texture without any surface finish other than that which would stress the inherent structure of material. The wood shows its irregular grain and the wear of age; the clay walls shows its individual ingredients as well as the imprint of handicraft; the translucent paper panel shows the fiber of its pulp and the repeated patching of its damaged parts; and the floor mat shows the braided work of the natural grass and the wear from usage. Such natural and human irregularity within the regularity of technique is a contrast that not only attracts attention to each of the opposing elements, but also reconciles the human senses with man's own unnatural creation, technique. While rigidity of form addresses the intellect and only indirectly stimulates sympathetic response, the natural-human imperfection within this system effects direct and immediate emotional harmony."

-Heinrich Engel in
The Japanese House

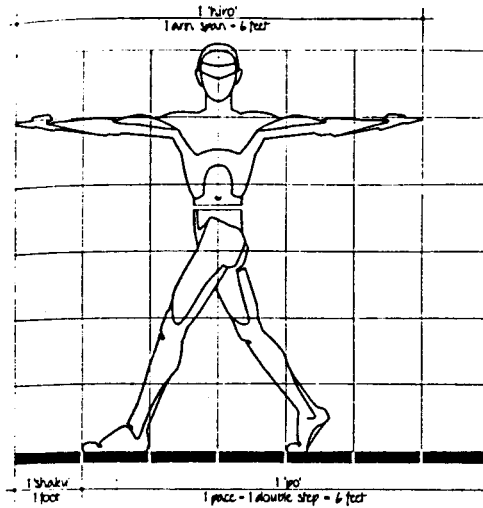
"... in the Japanese domestic architecture the results of an extraordinary consistent attempt at creating a cultural pattern so basically homogeneous, yet at the same time, so strikingly varied and rich in its elements that it stands unchallenged among history's most notable architectural achievements."

-Walter Gropius

The traditional domestic architecture of Japan is especially relevant to a discussion of the role of craft in architecture. Although it is of another time and culture there is much it can contribute here, not only because the carpenters achieved a high degree of refinement in their craft, but also because they humanized an architecture that was largely standardized and prefabricated. The carpenter was both designer and builder in this system, and he provided both the order, by means of a modular proportioning system, and the diversity, by varying the pattern of aggregation of the flexible, standardized components, by his sensitive treatment of materials and surfaces, and through the use of free detailing occurring within the controlled framework.

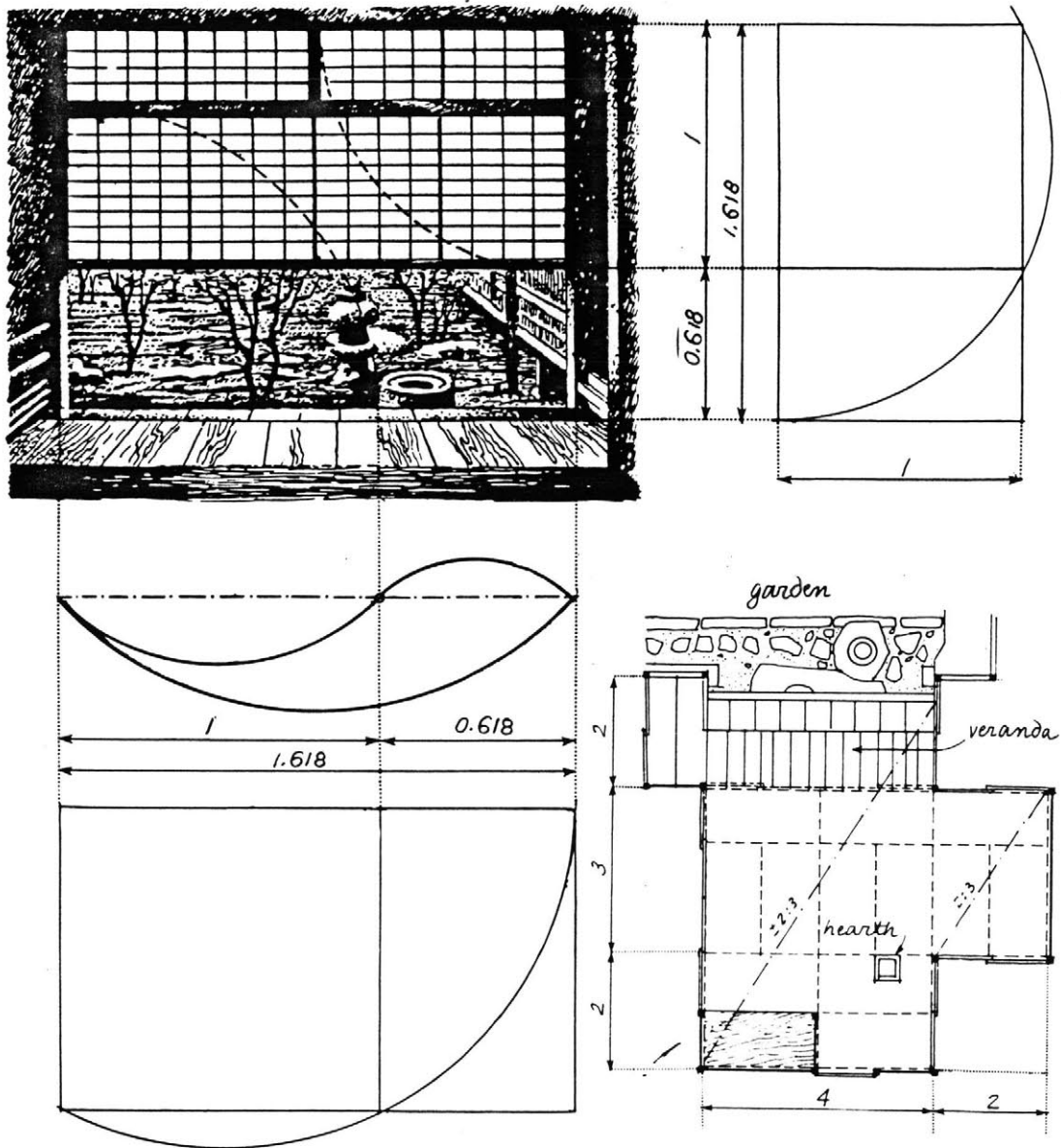
The standardization of the building system was pri-

Right: Since the module was based on the dimensions of the human body, the built environment was linked to human scale at every size from the smallest nook of a house to an entire city.



One ken equals six shaku, and one shaku equals approximately one foot.

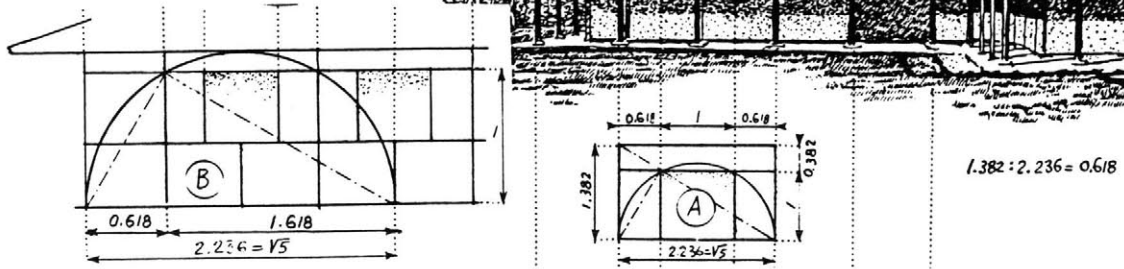
marily the carpenter's achievement. At the end of Japan's Middle Ages carpenters began designing and building temples (previously built by priests) and houses for the warrior class. Perhaps stimulated by the ancient proportional rules of Buddhist architecture from China, the carpenter developed a canon of aesthetics for the buildings he designed, with all measurements brought into a direct relationship with one unit the ken, which was the distance between two adjacent columns. Throughout most of northern Japan its length, approximately a man's arm span, became fixed officially at 6 shaku (one shaku being almost equal to one English foot). The standardization of ken as the basic building module was accompanied by the order called "kiwari," translated as "dividing wood" or "proportion of wood allotment," which gave regula-



Kiari assured harmonic spatial proportioning.
 Above: ratios of the golden section in elevation and 2/3
 in plan.

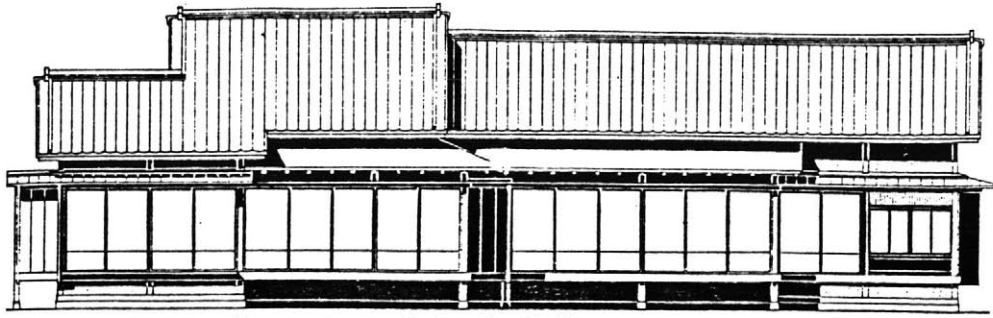
tions for measurement, proportion, construction, orientation, and ceremony in building. Kiwari's rules of proportioning, based on the fixed column spacing, determined heights of rooms and dimensions of columns, beams, rafters, and other structural elements. The ken

Right and Below:
Golden Section in
Elevation -- Katsura
Imperial Villa

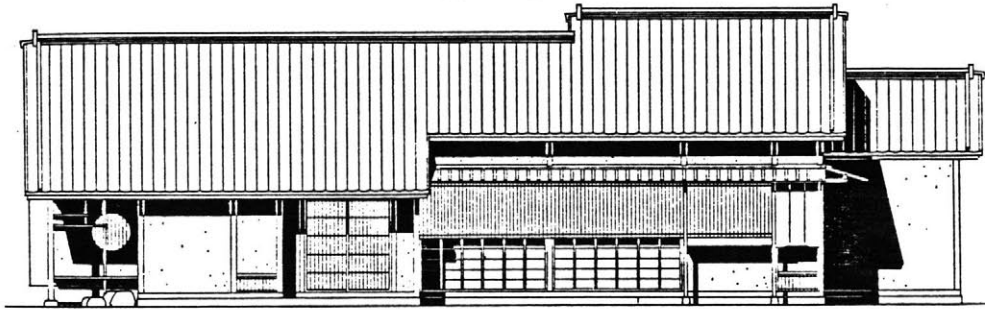


became the aesthetic module since it was the basis for proportioning and the construction measurement. Being fixed, it permitted standardization and prefabrication of many construction components and secondary infill elements such as shoji, the sliding paper panels, and tatami, the straw floor mats. The uniform column size also allowed an extensive standardization in the handling of building timber. A column measured 4 x 4 sun (10 sun = 1 shaku). This size timber could be divided into smaller pieces for other uses:

cut into two	4 x 2 sun	for lower sliding track
cut into four	2 x 2 sun	for rafters
cut into six	2 x 1.3 sun	for upper sliding track
cut into twelve	1 x 0.66 or 1 x 1.3 sun	for ceilings, doors and interior trim



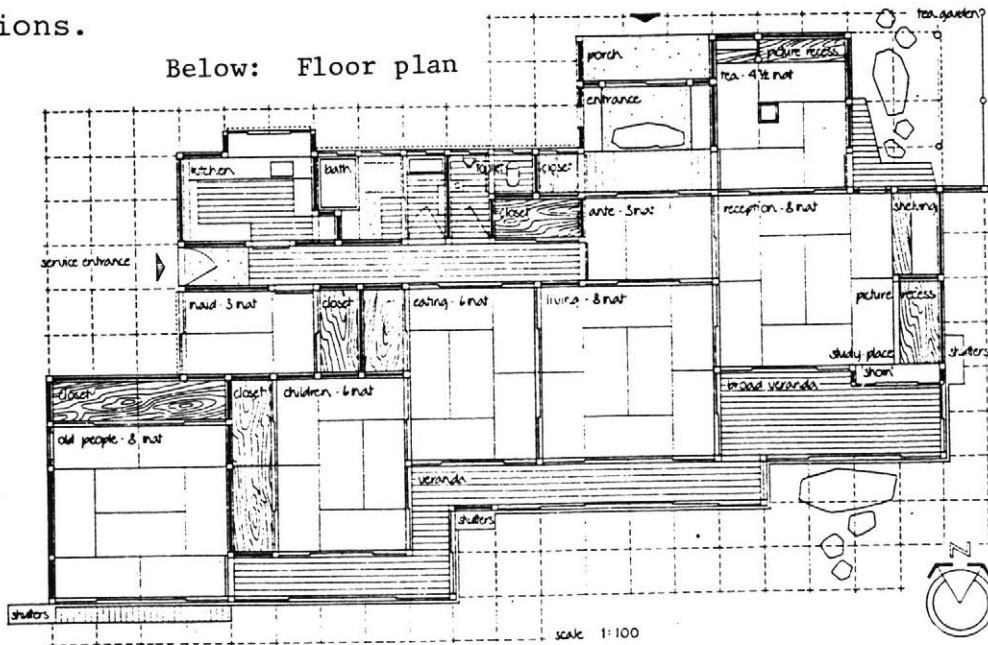
Above: South elevation of Typical House

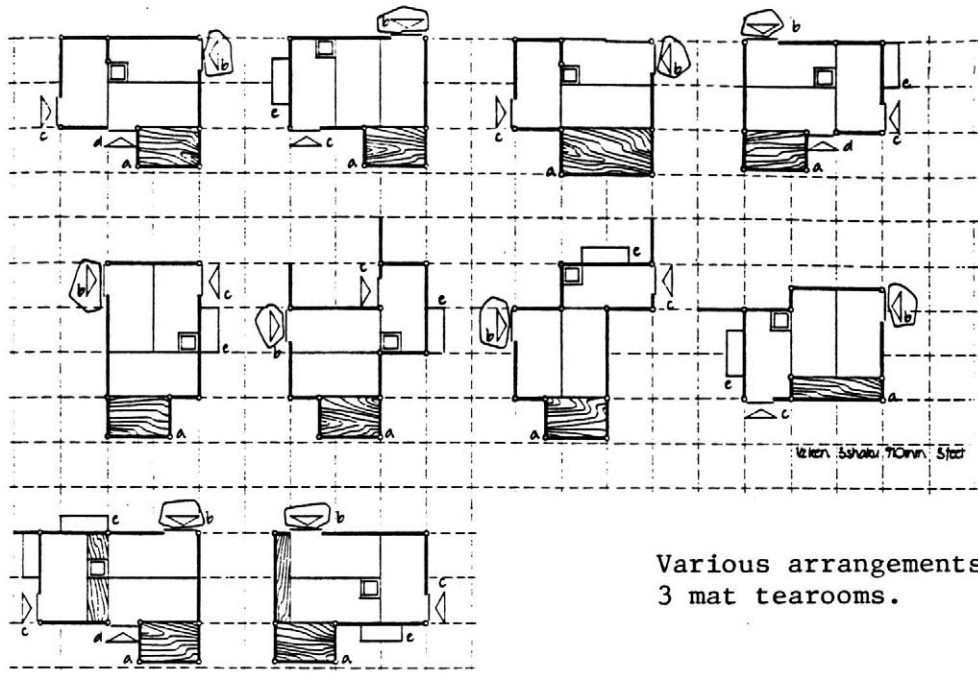


North elevation

The 3' by 6' mats are small enough to be a very flexible basic unit, allowing many variations in room sizes and arrangements. The elevations also reflect the potential for diversity and response to the climatic and privacy conditions of the different directions.

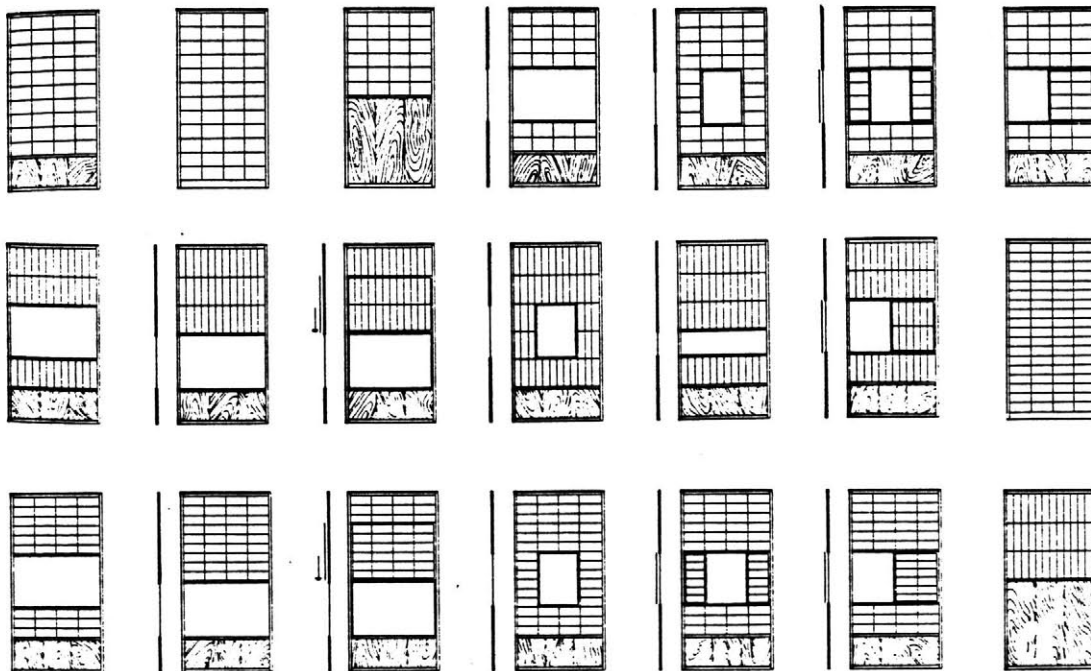
Below: Floor plan

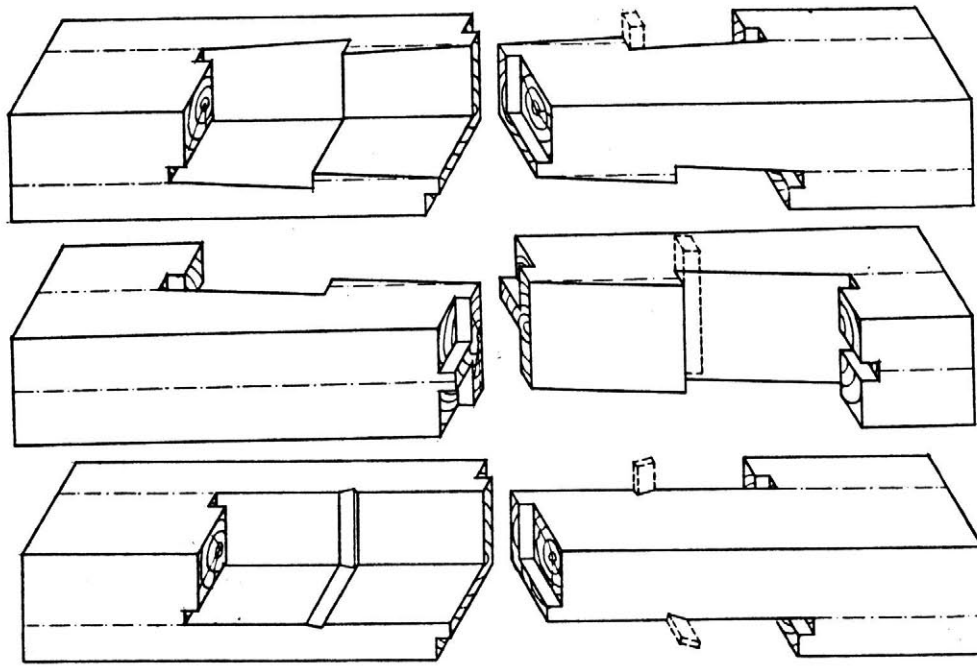




Various arrangements
3 mat tearooms.

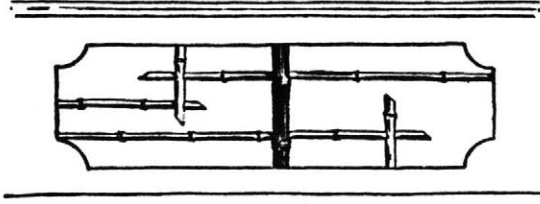
The standardized tatami mats, one ken by one-half ken (3' x 6') determine room size, i.e., 2 mat, 3 mat up to 10 mat rooms. Its small size allows great flexibility in arrangement. The infill elements are also uniformly sized, but can also vary in pattern.





Being confined to a limited range of standardized forms and methods the carpenters were able to attain a great technical proficiency in the construction of the framework, including the refinement of the wood post and lintel system and the component sliding screens, floor mats, clearstory windows panels, cabinet work, etc. The sophistication of the joinery, which efficiently considered the compressive, tensile, and moment forces, expansion and contraction of the wood, exposure to weather, and other factors pertinent in various applications, has no equal in the wooden architecture of the world.

The limitation of method which permitted the mastery and refinement of this building type also freed the carpenter to channel much of his creative energy to the design and construction of more informal



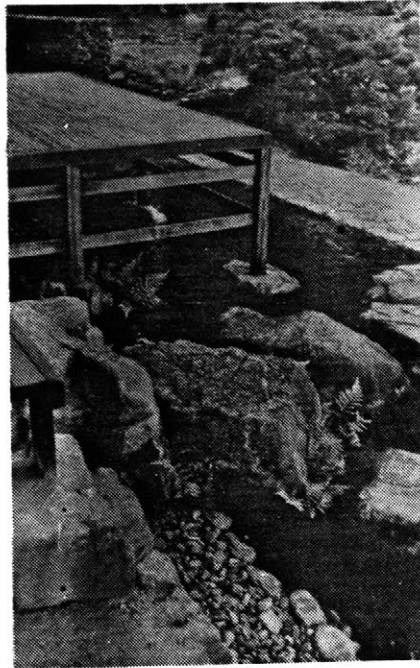
Above: Ramma, or clearstory above sliding screen.

Right: Special deck celebrates the place where house meets garden.

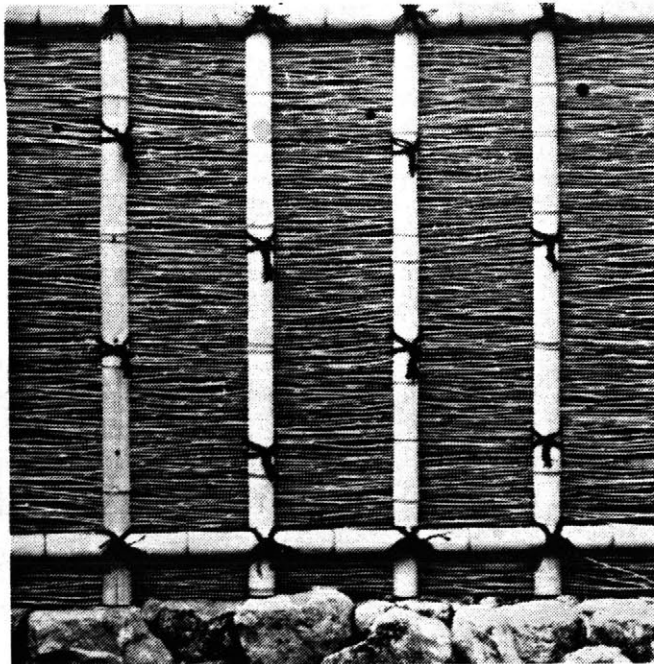
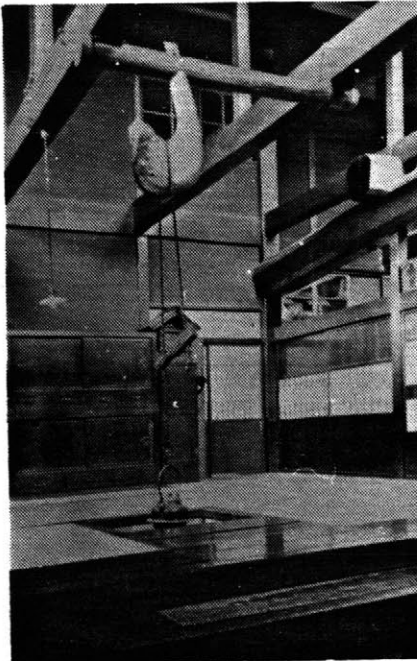
Below, left: Teapot hanger integrated into natural wood beams.

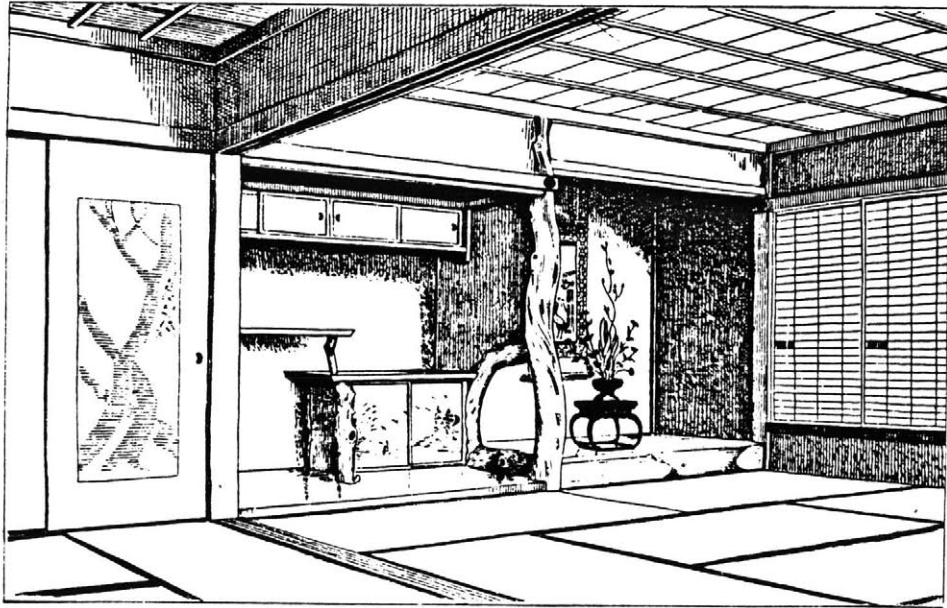
Below, right: Fence shows the diversity of natural materials and handcraft.

Opposite: Traditional wood joinery.



and spontaneous details such as special windows, benches, screens, natural wood beams, railings, stairs, decks, fences, ceilings, etc. The impact of these spontaneous "events" was exaggerated by their contrast to the controlled and ordered framework that served as their stage. The improvised and playful



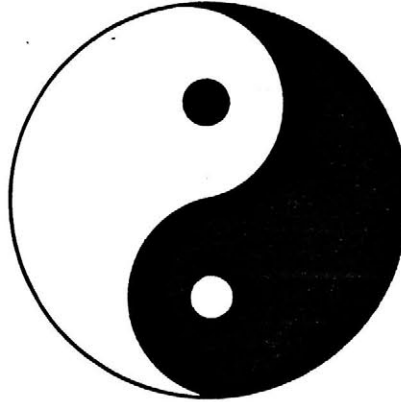


quality of this work provided the diversity within the unity of the ken/kiwari organization. The resulting architecture consistently encourages human empathy; spatially, through the human-scaled and harmonic proportioning of the structure; and in a visual and tactile manner, through the natural diversity captured in "pattern," in the forms and surfaces evolved through a refined craft process.

"When I see one of our carpenter's ponderous tool chests, made of polished woods, inlaid with brass decorations, and filled to repletion with several hundred dollars worth of highly polished and machine-made implements, and contemplate the work often done with them,..., and then recall the Japanese carpenter with his ridiculously light and flimsy toolbox containing a meager assortment of rude and primitive tools, - considering the carpentry of the two people, I am forced to the conviction that civilization and modern appliances count as nothing unless accompanied with a moiety of brains and some little taste and wit."

-Edward S. Morse
(1886)

PHILOSOPHICAL FOUNDATION OF
JAPANESE DOMESTIC ARCHITECTURE



The traditional architecture of Japan developed from the fertile ground provided by the cultural belief in the philosophies of Shinto and Zen Buddhism. Shinto conceived of all natural things as being animated by supernatural beings that controlled, or themselves were, the forces of nature: in a sense it was the worship of nature.⁵ Zen philosophy maintains that only through intuition can one grasp the true reality that lies beneath the illusory surface of rationality and intellectualization. Under these two influences the craftsmen - (carpenters, potters, weavers, papermakers, etc.) all sought to intuitively perceive and reflect the essence of nature in their work. This was particularly true in architecture and landscaping, where the patterns of nature were echoed and given a human context. This cultural appreciation of the humanly perceived patterns of nature is epitomized by the tokonoma, or picture recess, which



was a formal stage for the display of art, craft, or flower arrangement, at the heart of every house.

The carpenter's attitude towards wood is a good example of the craftsman's reverence of nature. The Japanese have a work "Kodama," literally meaning "spirit of a tree." The carpenter attempted to see and nurture this spirit in his work from start to finish, beginning with the felling of the trees and milling them into timber. Attention was paid to the orientation of the tree in the forest, which determined the sawyering that would achieve the desired grain pattern. The Japanese, perhaps in respect for "kodama," were pioneers in reforestation, replanting as they cut trees down. This care and attention was applied consistently throughout the entire working of the material; the joinery, shaping, planing, and finishing.

THE WOODCARVER

Khing, the master carver, made a bell stand
Of precious wood. When it was finished,
All who saw it were astounded. They said it must be
The work of spirits.
The Prince of Lu said to the master carver:
"What is your secret?"

Khing replied: "I am only a workman:
I have no secret. There is only this:
When I began to think about the work you commanded
I guarded my spirit, did not expend it
On trifles, that were not to the point.
I fasted in order to set
My heart at rest.
After three days fasting,
I had forgotten praise or criticism.
After seven days
I had forgotten my body
with all its limbs.

"By this time all thought of your Highness
And of the court had faded away.
All that might distract me from the work
Had vanished.
I was collected in the single thought
Of the bell stand.

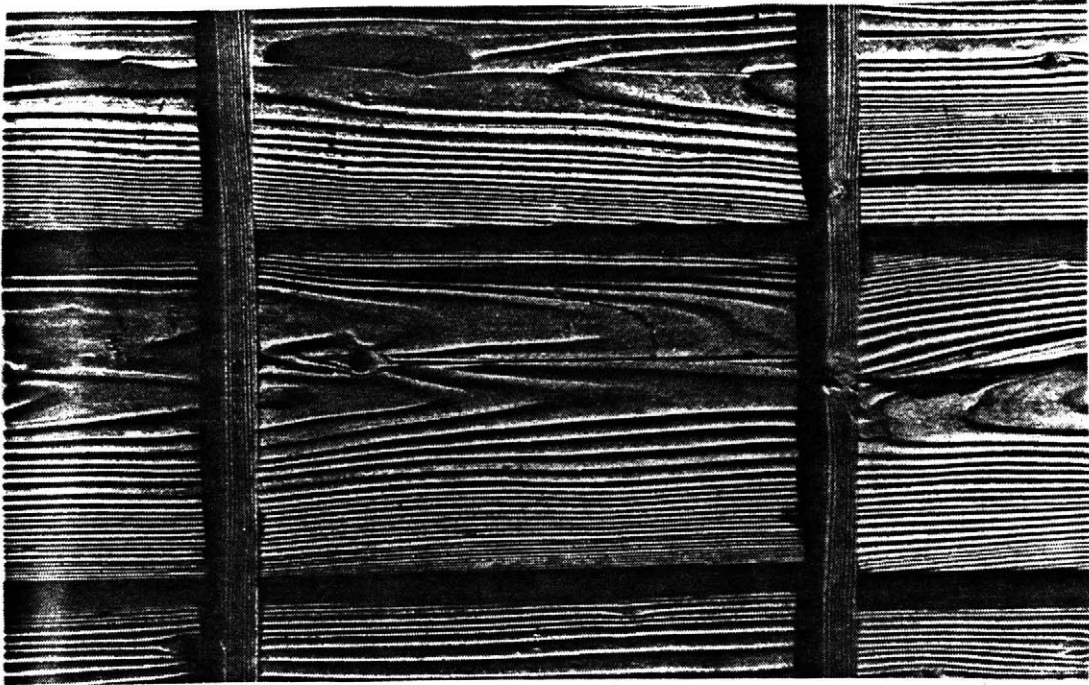
"Then I went to the forest
To see the trees in their own natural state.
When the right tree appeared before my eyes,
The bell stand also appeared in it, clearly, beyond doubt.
All I had to do was to put forth my hand.
And begin.

"If I had not met the particular tree,
There would have been
No bell stand at all.

"What happened?
My own collected thought
Encountered the hidden potential in the wood;
From this live encounter came the work
Which you ascribe to the spirits."

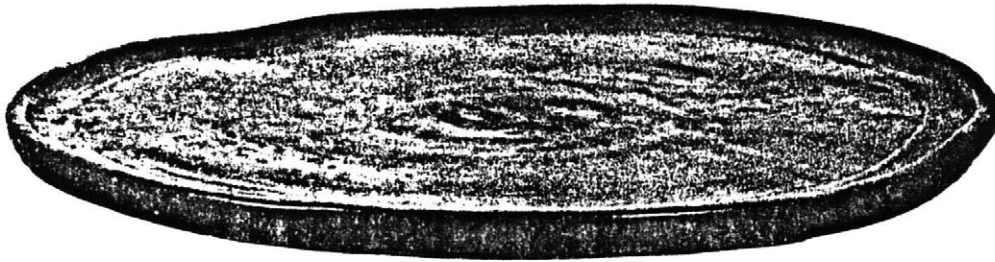
from The Way of Chang Tzu, by Thomas Merton

Chang Tzu (369?-286? B.C.) was a leading
Taoist philosopher and story teller



Above: The spirit of the wood contributes to the beauty of the architecture.

The carpenter calls his tools "dogu," which has no equivalent in another language, but means roughly, "the instruments of the Way (of carpentry)." Alluding to the Taoist concept of the Way (the natural order), the carpenter considers his saws, chisels, and planes not mere tools, but instruments that help him uncover the essence of the wood. The rich texture of the wood that nature provided was nurtured and brought to the surface, never disrespected by sanding or hidden by paint. The beauty of this architecture comes not only from the design and construction techniques but also from the spirit of the wood itself, uncovered by the master carpenters who worked with such obvious respect for the soul of the timber.



Above: Korean tray turned from green wood. A natural diversity results from the irregular shrinkage that occurs when the wood dries out.

The form-making and texturing attitudes of the carpenter was greatly affected by the Zen belief that in order to understand something it is necessary to "become one" with it. To encourage this psychological intimacy between object and beholder (much like empathy mentioned in a previous section) simplicity of design and irregularity were consciously sought. Symmetrical or completed forms were avoided, since they leave nothing for the observer to fill in. In fact assymetry proved so much more condusive for emotional association that the 'imperfect' was refined as a guiding principle of design, honing "likeness tempered with difference" to an elegant balance.

Thirty spokes will converge
In the hub of a wheel;
But the use of the cart
Will depend on the part
Of the hub that is void.

With a wall all around
A clay bowl is molded;
But the use of the bowl
Will depend on the part
Of the bowl that is void.

Cut out windows and doors
In the house as you build;
But the use of the house
Will depend on the space
In the walls that is void.

So advantage is had
From whatever is there;
But usefulness rises
From whatever is not.

from Tao Te Ching, Lao Tzu
trans. by R.B. Blakney
Taoist philosophy

Even the basing of the building module on the interval between columns is philosophically founded, coming from the emphasis on "ma," meaning space or interval. In Japanese art, music, and culture the void is not less important than the solid; the interval is as important as the event. "Ma" is not just empty space; it is the interval necessary to activate the whole. Ken is actually the pronunciation of the Sino-Japanese character "ma," when it is used to indicate column spacing.

"There was only one art in the world - architecture - and painting and sculpture in all their many forms were a harmonious part of it. Even music was like part of the construction of a vault in a Gothic cathedral."

-Alvar Aalto

Right: A village street in Chartres.



One of the major strengths of the traditional Japanese architecture is its expression of the cultural faith and philosophy, consistent in every facet of the system. There is often simplicity of design in Modern Architecture, but it is simple without ideological or spiritual content, whereas even the most insubstantial gesture made by the traditional Japanese carpenter is philosophically founded and refers to the larger natural world.

It cannot be expected that Christianity provide the spiritual basis for Western Architecture (and Art) as it did in the Middle Ages, since it no longer holds such a dominant position in our culture. Presently our cultural beliefs are more likely to be influenced by science and technology. Our architecture runs the risk of becoming mere technical problem solving, or

that with a surface layering of intellectualized artistic decoration, as Ruskin saw the 19th century split between the engineer, who would design the structure, and the architect/artist, who would design the ornament applied to it. But the radical changes in scientific thought during the last several decades and science's dominant place in our cultural consciousness may yet provide a unifying philosophy for contemporary architecture.

"The general notions about human understanding... which are illustrated by discoveries in atomic physics are not in the nature of things wholly unfamiliar, wholly unheard of, or new. Even in our own culture they have a history, and in Buddhist and Hindu thought a more considerable and central place. What we shall find is an exemplification, an encouragement, and a refinement of old wisdom."

-Julius Robert Oppenheimer

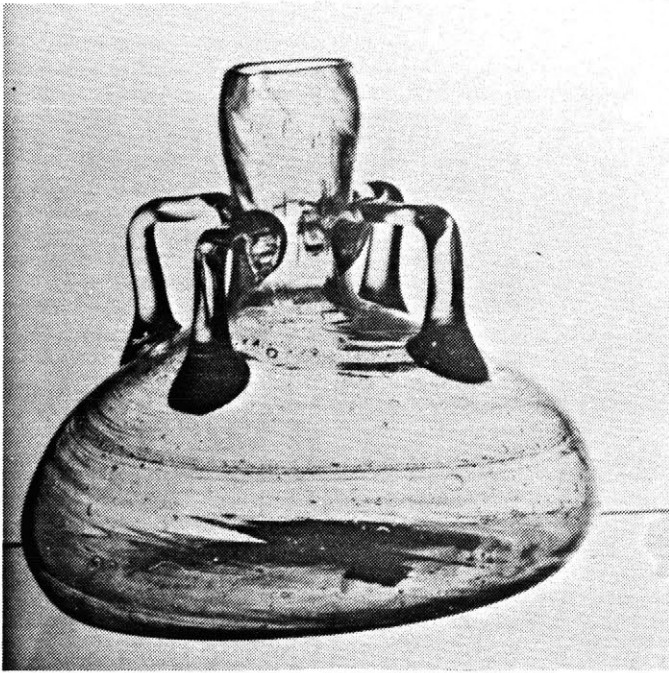
The 20th Century explorations of the atomic and sub-atomic world by modern physics has led to the revision of the basic Western conception of the universe, bringing it closer to that of the Eastern mystical traditions and Greek science before Aristotle. The word physics is from the Greek "physis," which means the "essential nature of things." The original Western science and the Eastern religious philosophies are concerned with uncovering the "essence" of nature, and both believe that matter and spirit are indifferntiable.

While it is unrealistic to think that ancient Japanese religious faith can be adopted directly to provide a spiritual foundation for our contemporary building, the revisions in Western scientific thought suggest that some of the Zen principles may be appropriate today. The traditional Japanese belief in the unity of all things and the sacredness of nature could prove especially beneficial to our present architecture.

Given the present ecological and economic situation, it is more important than ever before that we build in sympathy with nature. The forms of building must be more responsive to the forces of nature, particularly climate, and constructed with respect, or even veneration of the land not built upon.

Working this way, an architecture could evolve that has the unified character and the human and natural diversity of the traditional architecture of Japan, yet suits our modern culture and lifestyle, and employs contemporary building materials.

CONTEMPORARY ARCHITECTURE



Left: Hand-blown glass vase (1880)
The Arts and Crafts Movement felt the natural diversity and human feeling inherent in the handicrafts were not able to be achieved by industrial means.

ROOTS OF MODERN ARCHITECTURE

The most important question in the development of Modern Architecture has been "How do we adapt building that has always been based on the crafts to industrialized methods?" Since the 19th century, when the role of machine production first became substantial this issue has been hotly debated.

John Ruskin and William Morris and their disciples in the Arts and Crafts Movement rebelled against the new industrial techniques, claiming they were injurious to the spiritual and physical health of both the production workers and the general public who had to live with the machine-made results. To these designers "Art" meant individuality and the search for truth in painting, architecture and applied design.

Philip Webb thought architecture should be "a common tradition of honest building," suggesting the vena-

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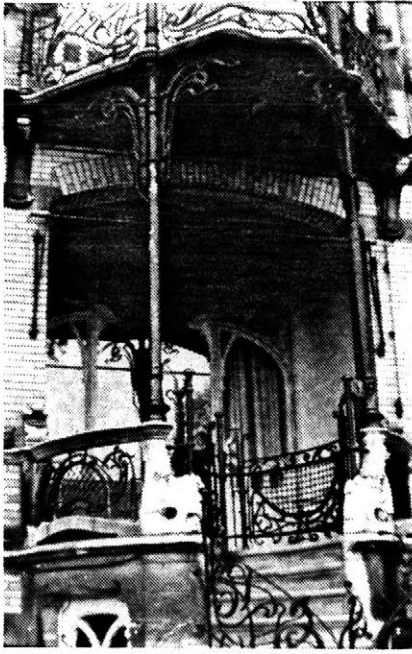
Above: Morris's "Red House,"
Philip Webb, architect



Right: House in Cambridge, Ma.
Design from "Craftsman" magazine, an
American spin-off of the Arts and
Crafts Movement.

cular as an ideal. He built Morris' Red House, with its great oak staircase, oak beams, tiled hall, and its great brick chimney pieces, in this spirit.

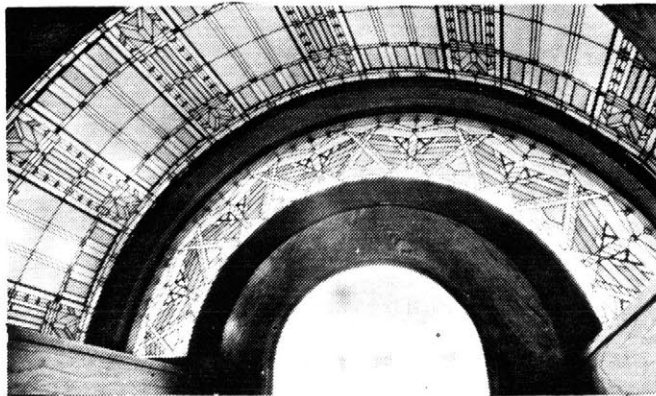
This Arts and Crafts Movement proved not economically realistic, eventually serving only a rich elite. By the mid-1880's Morris revised his complete rejection of the machine. He felt it could be used as a tool for the craftsman, an extension of the hand in processes the designer could control. He believed that the machines could be used to do the unintelligent and irksome labor, "leaving us free to raise the standard of skill of hand and energy of mind in our work men." This idea laid the groundwork for later design approaches that accepted industrial techniques, but developed decorative styles to provide diversity. This included Art Nouveau in Europe, and the work of Sullivan and Wright in the U.S.



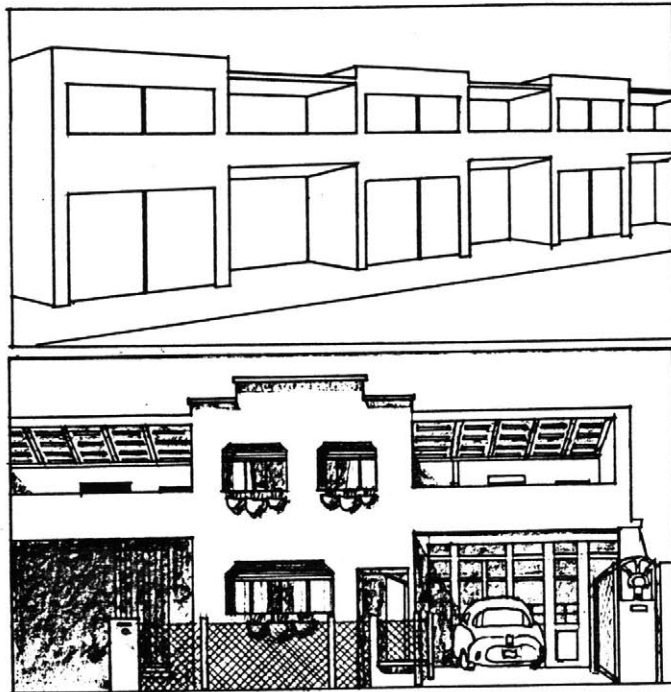
Above: Horta's Palais de Peuple
 Left: Art Nouveau Entry
 Ornamentation as an integral part
 of a structure and use.



Left: Art Nouveau
 facade
 Lower left: Frank
 Lloyd Wright stained-
 glass entry
 Below: Macintosh,
 Glasgow
 School of Art

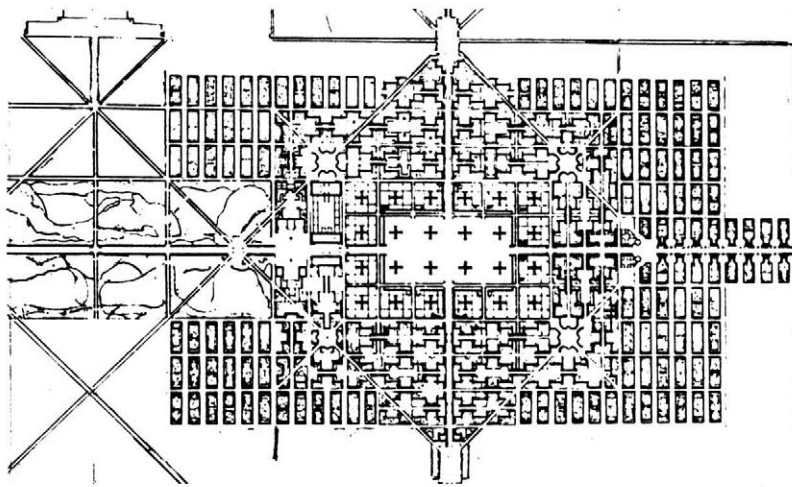


Above: Pessac Housing development 1920's. The original austerity of Le Corbusier's design proved not diverse or rich enough for the inhabitants who added their own design work over the years (Below.)



The designers of the "International Style," including Le Corbusier, Mies Van der Rohe, and Walter Gropius and the Bauhaus crew not only accepted industrialization but embraced it as something that could free man for higher pursuits. They evolved a style they believed more appropriate for the new technology, employing mass produced standardized components. While their solutions were based in a social concern to provide adequate housing for all, their architecture was more of an expression of the machine technology than the spiritual or emotional needs of its inhabitants.

Le Corbusier's housing project at Pessac, France is an interesting example. The buildings were designed with attention paid to human scale, but the repetition of unadorned forms and elements did not provide enough complexity for the people who lived there. Over

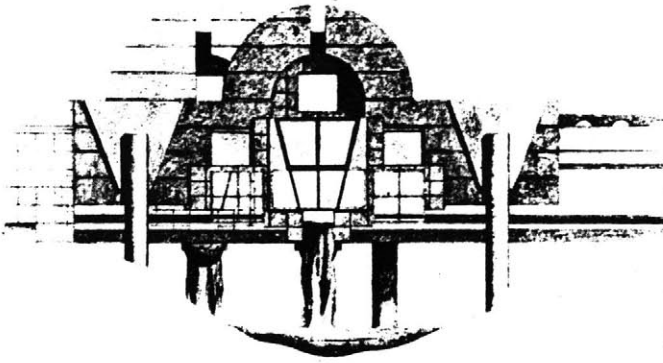


Le Corbusier's proposed highrise city for 3 million

the years the inhabitants have "remodeled" the original units, changing windows, roofs, doors, patios, etc., to personalize and enliven their houses.

Currently there is a wide spread agreement in architectural circles that the "Modern Movement" has failed. Even many architects who had been major proponents of the style have realized its shortcomings in meeting human needs. Peter Blake, chairman of the BAC and author of *The Master Builders* (which eulogized Le Corbusier, Mies van Der Rohe, and Frank Lloyd Wright), completely reversed his opinion in the 1970's, in Form Follows Fiasco, which is in his own words, "largely an indictment - of the glaring fallacies advanced by the Modern Movement, and of those who, like myself, swallowed and also promoted them whole." Philip Johnson, whose buildings had much in the spirit of Mies van Der Rohe's work has designed recent buildings, most notably the A T & T headquarters in New

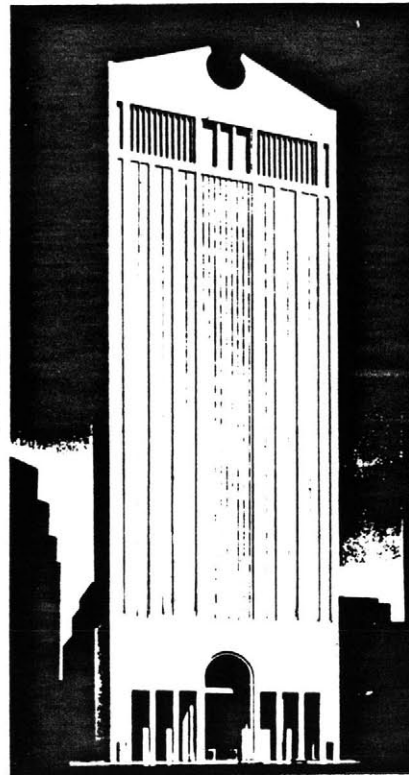
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Above: Michael Graves' proposed Cultural Center Bridge, Fargo-Moorhead, South Dakota.

Right: AT&T Building, N.Y.C.
"I have always been delighted to be called Mies van der Johnson."

-Philip Johnson



York, with ornamental facades, a departure from the stripped-down anti-ornamental Modernist philosophy. While it is true that the A T & T Building does articulate a difference between its street/entry zone, middle office floors and the pediment, it really is not much more than a Miesian building wearing a fancy hat. Other "post-modern" architects have made various attempts to create alternatives to the coldness and monotony of modern building. Designs by Charles Moore, Robert Venturi, Robert Stern, and Michael Graves solve functional issues in a modernist manner with a layer of applied decoration, often with abstracted historical reference. These "ornamental" facades, even if spatial, are primarily dressing, not an integral part of the building.



"The most ingenious way of becoming foolish is by a system."

-Earl of Shaftesbury

Left: Aldo Rossi's "rationalist" architecture in Milan.

Peter Eisenman, Richard Meier, and Charles Gwathmaey have attempted to push the limits of the Corbusian Style. While their buildings are often skillful and complex manipulation of space and form, they seem to lack a spiritual foundation, appearing to be intellectual experiments rather than texture, living buildings. In Europe Aldo Rossi and Ricardo Bofill have gone back to the Renaissance for inspiration, but have stripped those forms of ornamentation and built mega-scale complexes with a seemingly endless repetition of these abstracted and simplified elements.

Although the post-modernists recognize a deficiency in mainstream modern architecture, their concentration on color and abstracted historical forms falls short of providing what people once derived from their built surroundings.



Above: Michael Graves' Municipal Offices in Portland.

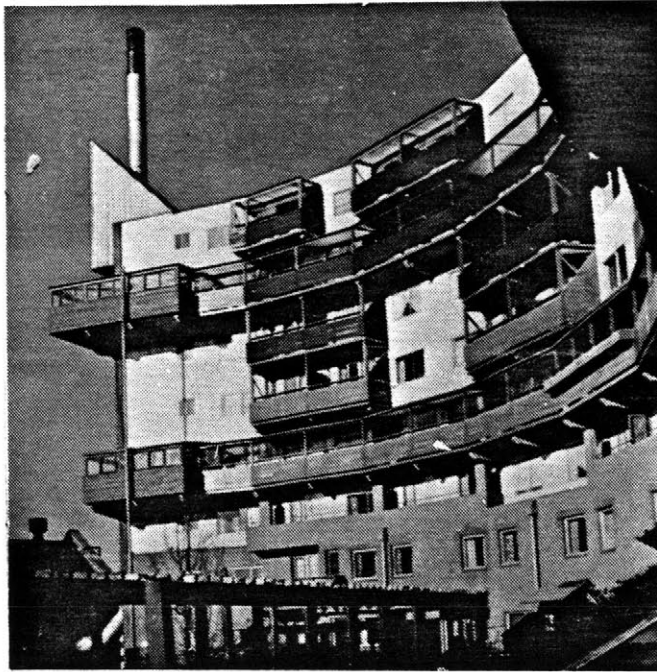
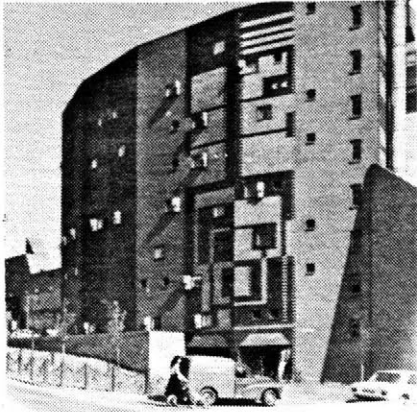


In this context it is interesting to consider one of the most controversial new buildings in the country, Michael Graves' 15-story municipal-services building in Portland, Oregon. It is a showpiece for Graves' graphic abilities that, as the Portland office of general services explained, "better met our specifications for space than the others, was cheaper to build and was more energy efficient." While its bold play of color creates a more lively composition than most new large city buildings, on closer examination it is not a much greater departure from Modernism than Johnson's A T & T building, being a box with brightly colored wrapping.

This post-modern approach recognizes the human emotional need for diversity in building but provides it in a way that has nothing to do with the use, material, and technical means of construction. It therefore remains a shallow surface application rather than being

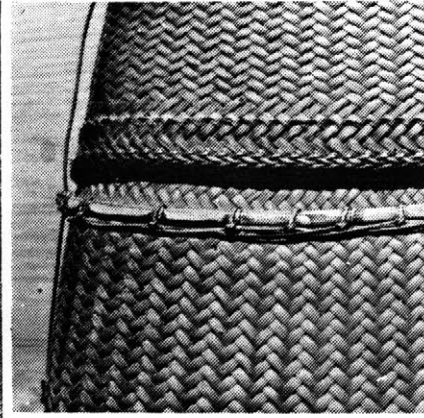
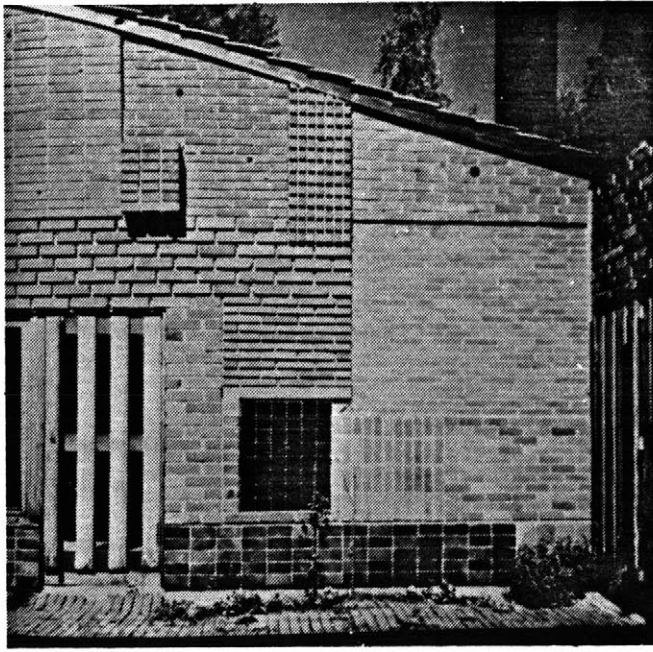
integrated into the life of the building. The design of the facades is based on a graphic composition that is completely divorced from the context. If the facade design had evolved more directly for use, such as responding differently to the views or the climatic character of the various directions, people could associate more directly with the building as they used it, subconsciously understanding that the diversity had some reason behind it. The Graves facades vary only to serve the pre-conceived composition, and the "energy-efficiency" is accomplished by uniformly shrinking the window area.

It is interesting to compare the Municipal Services building with the "Byker Wall" housing designed by Ralph Erskine. In the Erskine complex the design is grounded in context and construction considerations. The cold north side of the building is a large brick wall with only a few small window openings. To provide more interest the wall is curved against the wind and a surface pattern was evolved directly from the brick and masonry technique used for the construction. The brick pattern articulates an entry, celebrating the human use of the building. On the south side the building opens up to the sun and a series of balconies and terraced porches provide a visual diversity and pleasant places for the inhabitants.



"Pattern" as defined in the section on the "Craftsman's Intuition" is the human perception of harmonious form and texture, within the limitations of use, material, and technique. In this sense the "Byker Wall" has the pattern of good craftsmanship even if much of it was made by industrial methods. The craftsmanship is in the design as much as the construction.

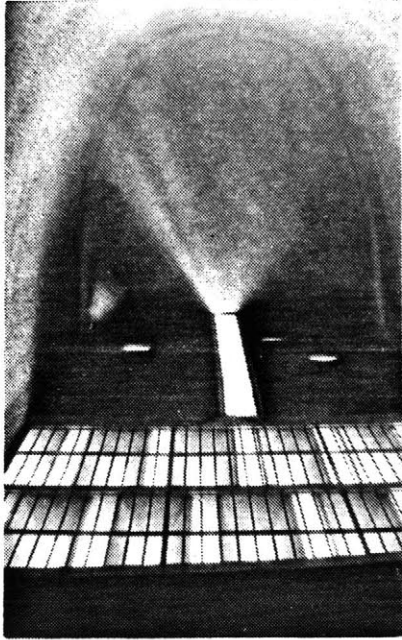
The Graves building, on the other hand, is more of a work of graphic art with its design imposed on the use, material, and techniques. As the design reflects only the whims of the artist it is in danger of becoming out of fashion. The true pattern of the "Byker Wall," evolved from and celebrating the human use, construction, and response to nature, has a more timeless appeal built in and perhaps a more profound and accessible beauty.



Above: Basket has a surface pattern that evolved from its material, as does Aalto's experimental house at Muuratsal (left).

CRAFT PATTERN IN CONTEMPORARY ARCHITECTURE

The separation of design from the actual materials and construction process, a heavy dependence on industrial production, and a prevalent design philosophy that celebrates the machine's capacity for precision and regularity have resulted in modern architecture that seems devoid of human feeling. There are, however, numerous contemporary buildings like Erskine's "Byker Wall" that are more emotionally accessible because they have the "pattern" of good craftsmanship. Evolving from the human interpretation of beauty based in utility and material, architecture that has craft-pattern has scale, proportion, and texture that encourages human empathy.



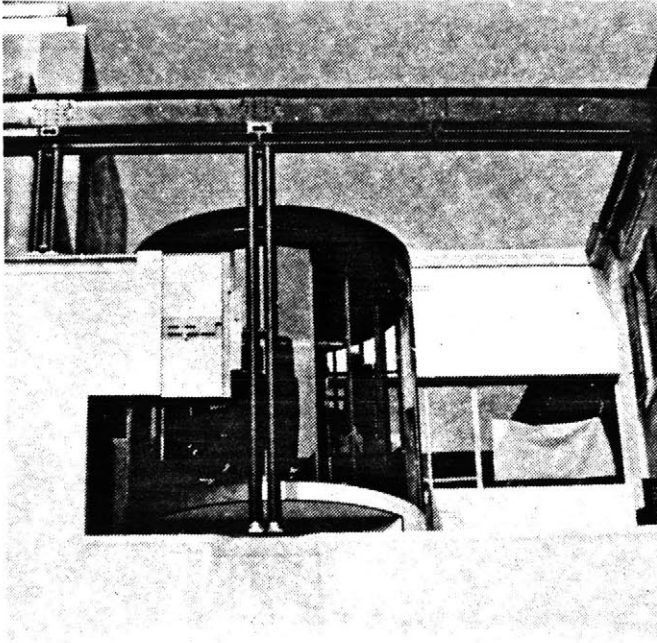
Above: Corbu's craftsmanship in concrete, glass, and light.



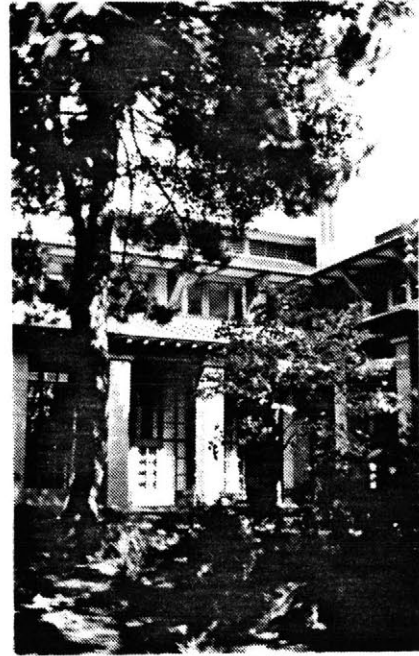
Above: Edward Cullinen's sensitive use of modern building materials adds life to this housing complex.

The economic, social, and political realities of our time prevent craftsmanship from directly playing a major role in modern construction, but even if this role is diminished the human preference for craft-borne diversity and the revival of interest in the crafts suggest that it will continue to have an influence. The future of the crafts' contribution to architecture hinges on the question of design, both in making the most effective use of less craft-work and in adapting the qualities of craftsmanship to industrial systems.

Cost is usually given as the reason for the lack of craftsmanship in modern construction, but the ab-

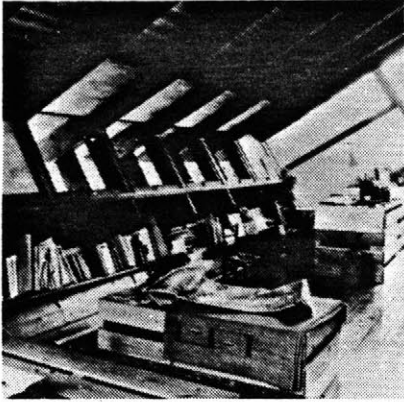


Above: Scarpa was a designer with a craftsman's sensitivity to any material he used.

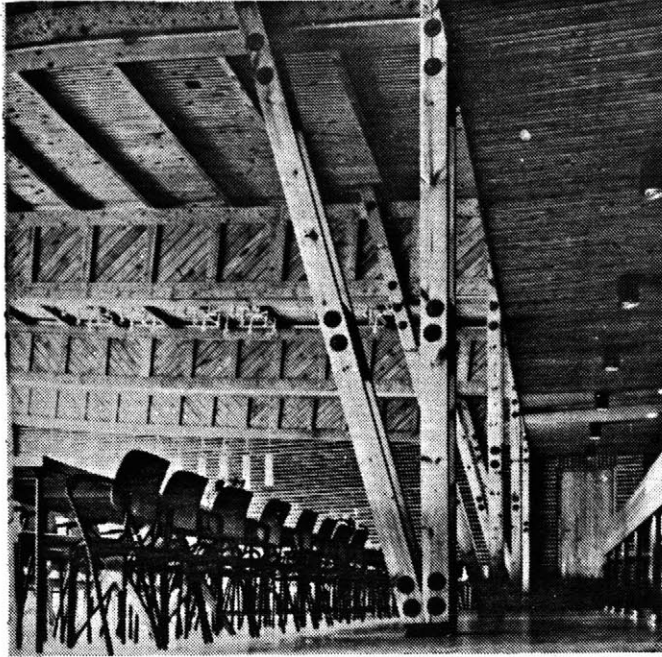


Above: Kallman and McKinnell using traditional materials in a craftsman-like manner.

sence of the human and natural diversity that is prevalent in craftwork is also a matter of choice, politics, and fashion. If this diversity were recognized and accepted as an important part of architecture there are ways architects could provide it, both spatially and texturally, by designing with the craftsman's view. If the building craft processes are understood the design can develop from them, and not only from separate geometric and intellectual considerations. This can result in architecture that has craft pattern.

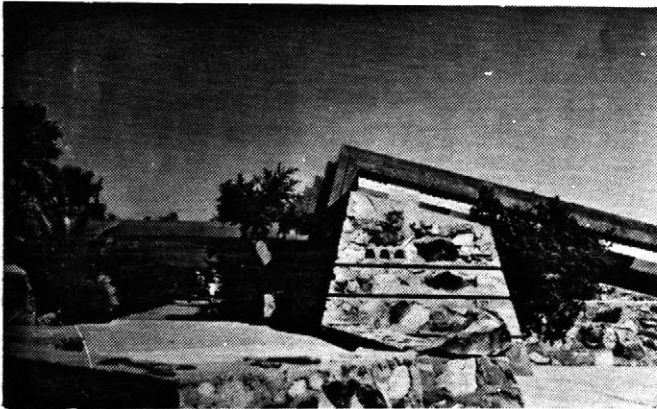
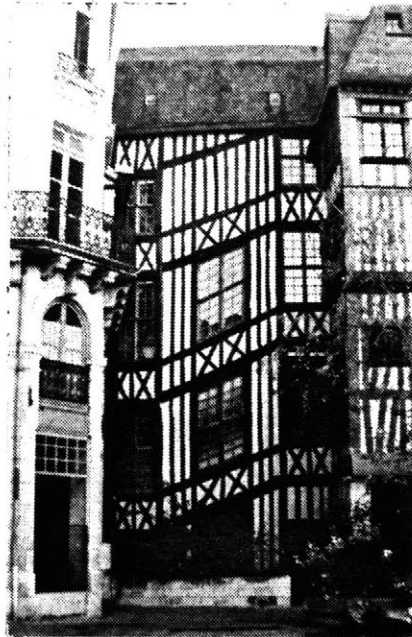


Wooden Structure
 Above: House by
 Edward Cullinen
 Right: Restaurant by
 Kaija and Heikki Siren



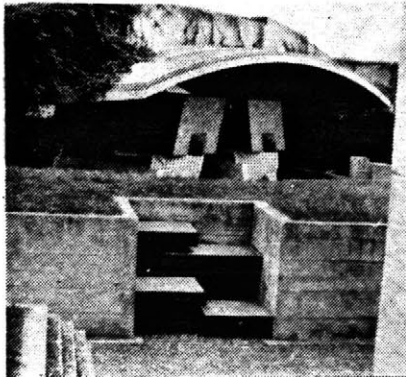
CELEBRATING USE, MAT-
 ERIAL, AND TECHNIQUE

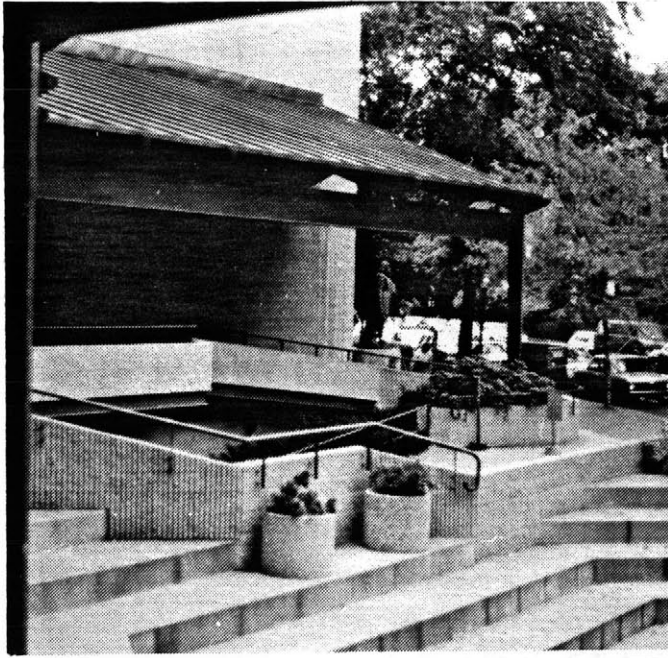
Right: Venacular half-timber technique celebrates use in France.
 Below: Wright's stone, timber and proportioning gives the feeling to Taliesin West.



Scarpa's crafted concrete

Contemporary concrete craftsmanship
 in Bergamo, Italy



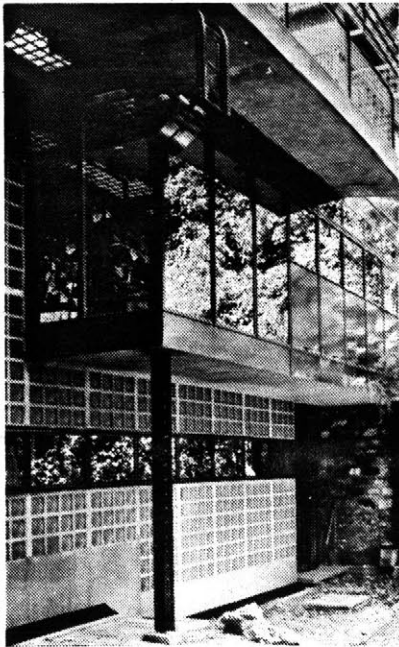
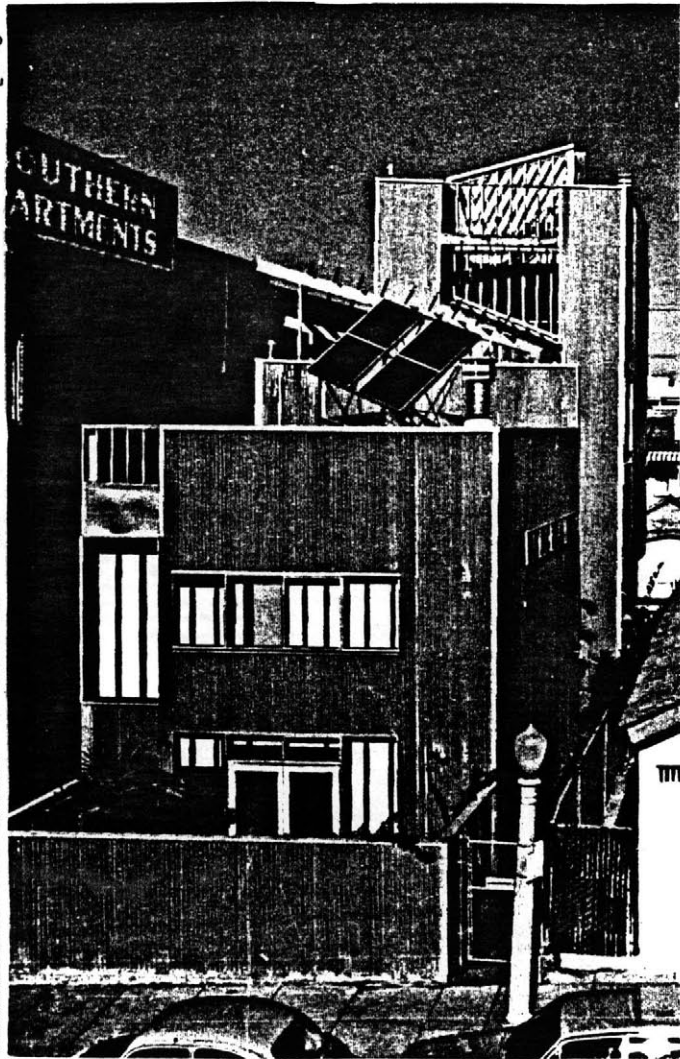


Left: Paul Rudolf's sensitive use of sheet metal, steel, and textured concrete combined with human scale creates a place that invites empathetic response.

Below: Corrugated sheet metal siding has a human appeal here, balanced by the diversity of Frank Gehry's design.

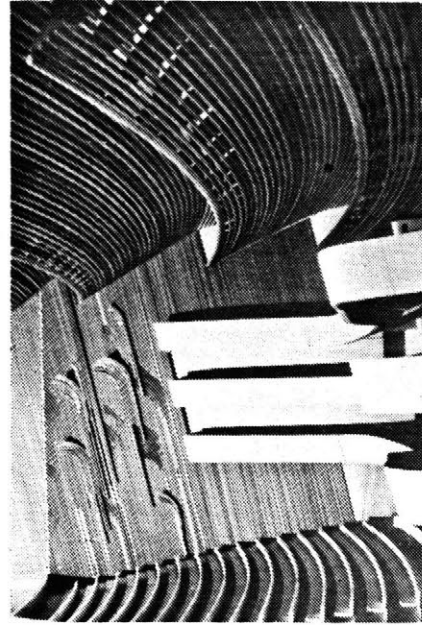
DESIGN CRAFTSMANSHIP
WITH MODERN MATERIAL

Below: Spatial proportion and scale of Chareau's design makes a human place from steel and glass.



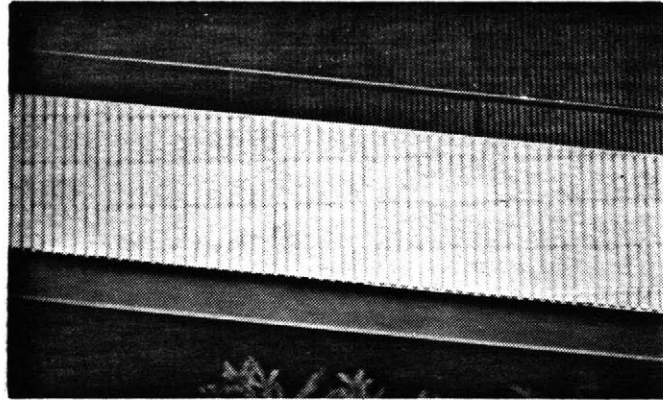


Above: Aalto's sketch for wall texture of interior of Opera House in Essen, Federal Republic of Germany
Right: Model of interior.



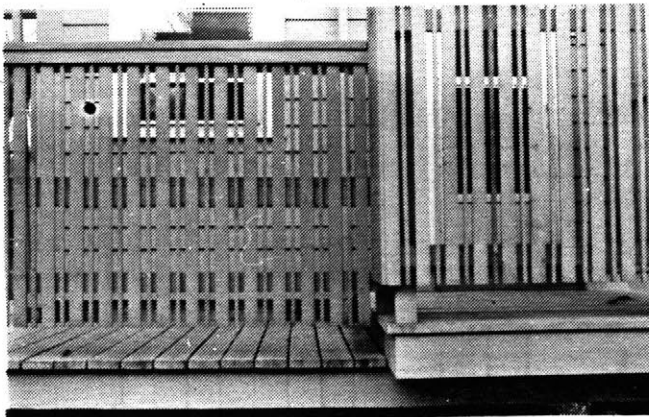
DESIGNED TEXTURE

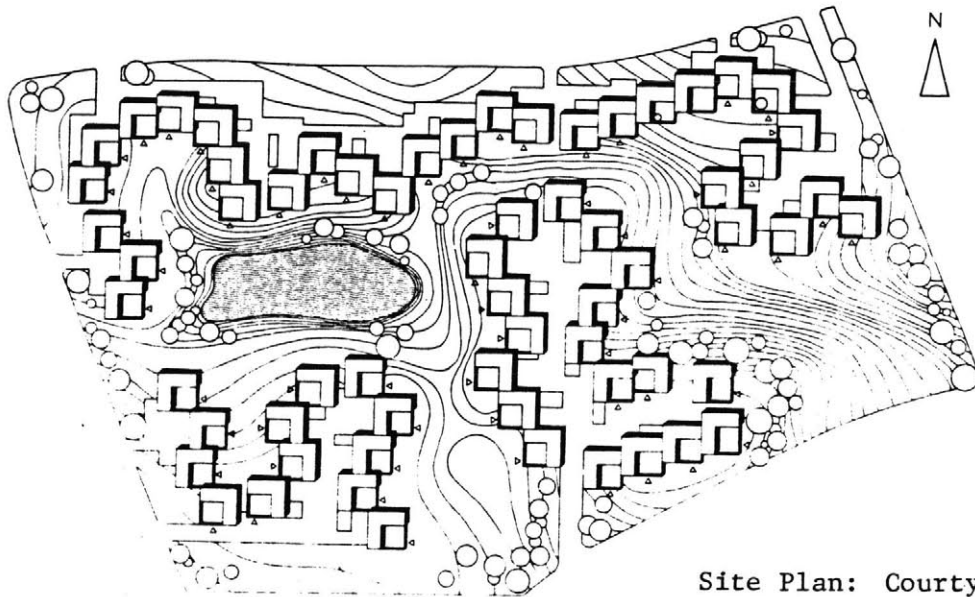
Right: Paul Rudolf's specially designed ribbed concrete block creates continuous textured surfaces.



Right: Fence designed and built by author contrasts board and screen textures within ordering regularity.

Below: Screen for deck designed and built by author provides texture as well as privacy.

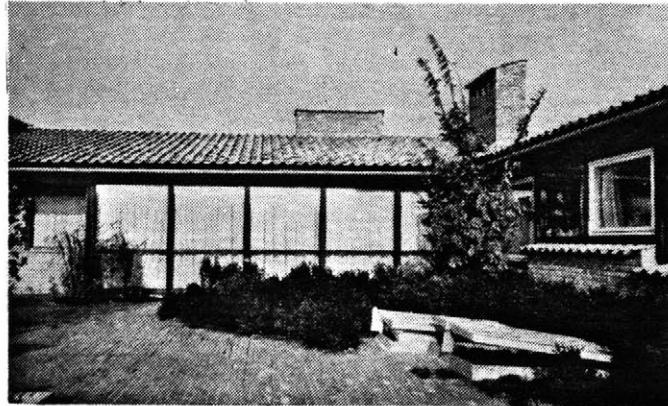




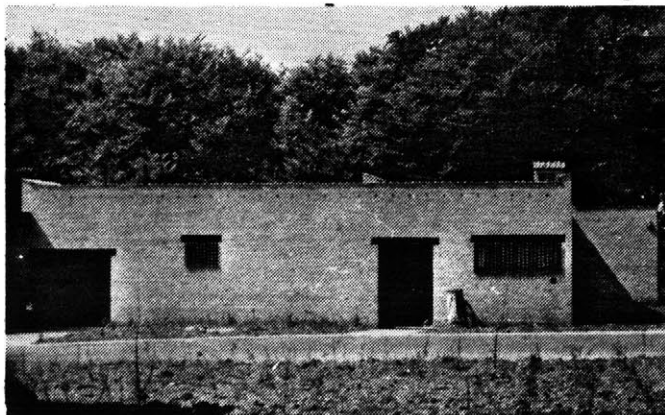
Site Plan: Courtyards located to the south

SPATIAL AND TEXTURAL DIVERSITY GROUNDED IN USE AND MATERIAL

Right: South/Courtyard elevation. Open to the sun yet private.



The Courtyard housing at Elsinore by Jørn Utzon varies for climate and privacy considerations. The yellow brick walls, pantile roofs, and wooden screens contribute the natural diversity of those materials.



Left: North/Street elevation, closed against climate and public. Windows have screens that add texture and privacy.

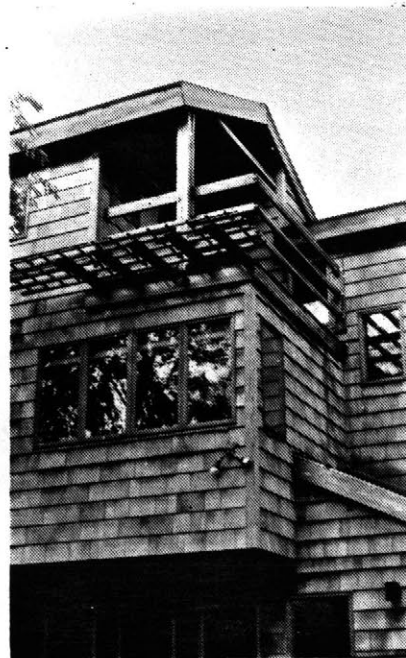


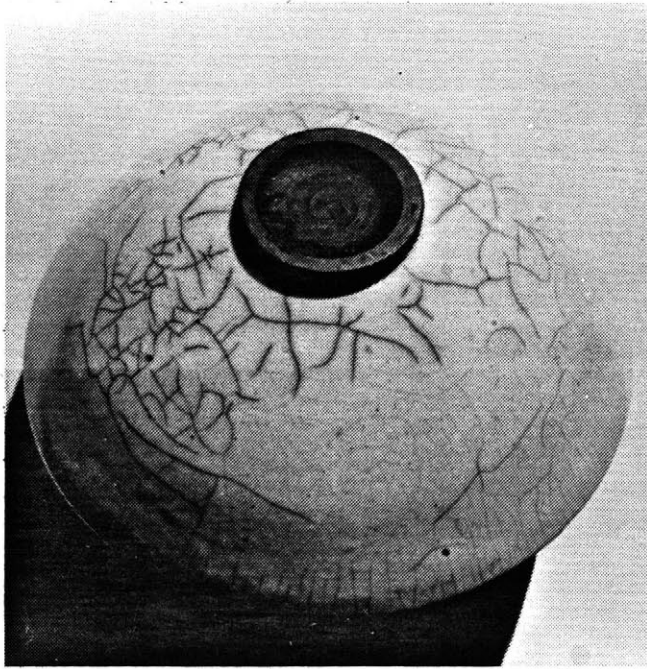
Above: Detail of south elevation

Climate, privacy, and natural diversity of materials were also fundamental to the form and texture of this house designed and built by the author. The sun and privacy at the back of the house resulted in more glazing, overhangs, a sunscreen, and roof-deck on the south side.

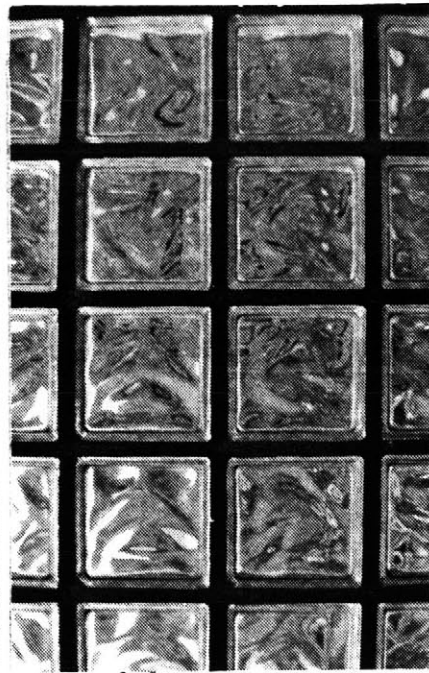
Below: South side of house

Below: North/Street side closed down and sheltered from cold





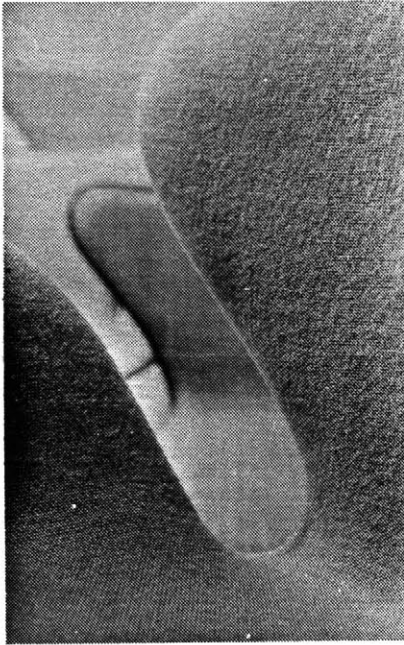
Crackle glaze on ceramics has a random and natural pattern.



Glass and other translucent materials can have inherent diversity.

MATERIAL BASED DIVERSITY IN STANDARDIZED PRODUCTS

Standardized products can still show individual character if constructed with materials that have inherent natural diversity. Wood, ceramic glazes, enamel finishes on metal, stone, certain types of glass, translucent products, and other materials that possess a visual and textural diversity that can be formed into standardized boards, blocks, sheets, panels, etc. to be used in construction. The diversity of the materials themselves can help to offset a repetition of similar forms.



Polyethylene given diversity by weaving process. Chair by Arne Jacobsen.



Concrete can be treated in ways that give it interesting texture. Leandro V. Loscin, architect.

This can also be accomplished using nondescript materials that are treated in ways that give them diversity. Processes such as sandblasting, casting, forming, weaving, moulding, scraping, and planing can instill more interesting textures in materials that lack natural surface character. Again this is a question of design since the textures chosen should be appropriate for the use, scale, and desired feeling of each specific application.



"The present functional methods of constructing a built-up environment is to remove all traces left by time, to give a homogeneous image where everything seems to have been thought out by a single man at the same time."

-Lucien Kroll

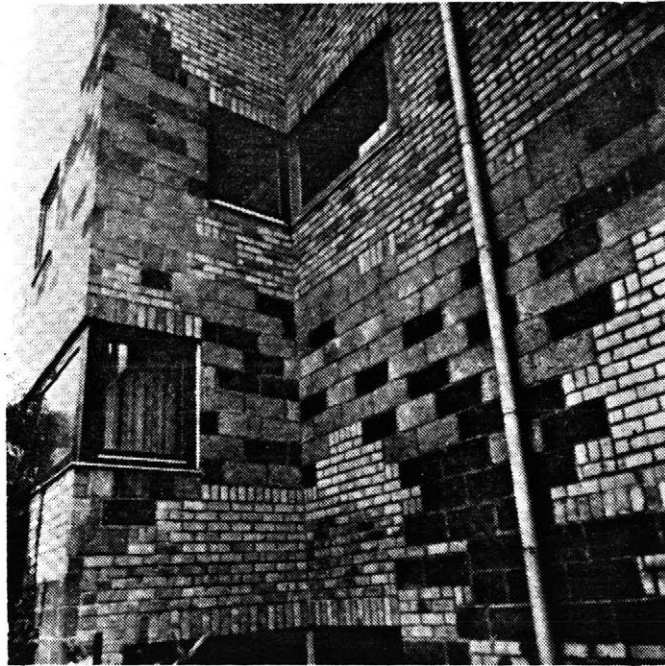
Left: What the builders created in front of the Medical Faculties in Louvain

HYBRID DESIGN-CRAFT

Hybrid approaches to construction, where the distinction between architect and craftsman is not so clearcut are capable of creating lively and human architecture. The Belgian architect Lucien Kroll has pioneered this approach on a fairly large scale at the Medical faculty at the Catholic University of Louvain where much of the design was worked out by the architects and builders during the construction. The results seem chaotic at times but certainly are not sterile. Perhaps more important than the actual building is the gesture, which is an attempt to involve the architect more directly in construction, and the craftsman more in the design. The results of that kind of interchange in a more controlled situation might be able to create a viable architecture that has more life

Right: "One day we said to the builders, 'mix with bricks as you see fit; you start here and go at least up to there'."

These bricks, blocks, windows and other building components are all standardized products, but they are small enough to be used in a flexible and varying manner.



and potential for human empathy than design that is completely removed from the actual building situation.

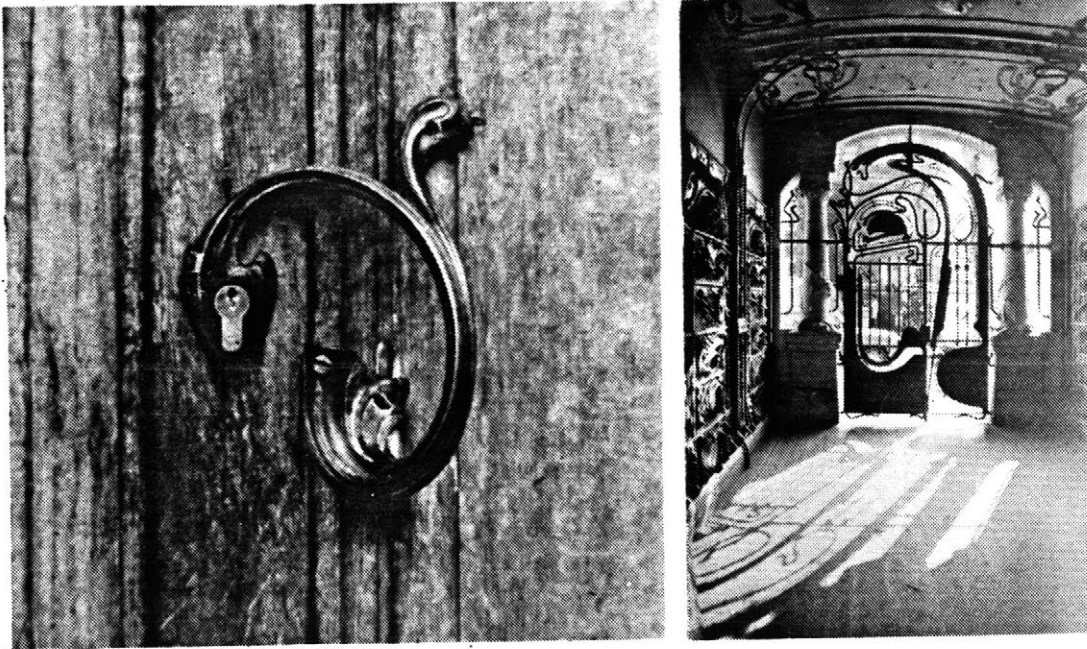
Kroll has made other attempts to provide contemporary building with a more individual character. A subway station his firm was designing had aluminum lampshades that were sand-cast. Rather than produce all of the shades identically an artist changed each casting mold slightly. The mass-produced articles gained a craft-like diversity with little extra effort. Hybrid production techniques like this which are combinations of industrial and craft processes are able to economically produce articles that have a human individuality.

CRAFT USED AS "SEASONING"

"Some single trees, wholly bright scarlet, seen against others of their kind still freshly green, or against evergreens, are more memorable than whole groves will be by and by."

-Henry David Thoreau

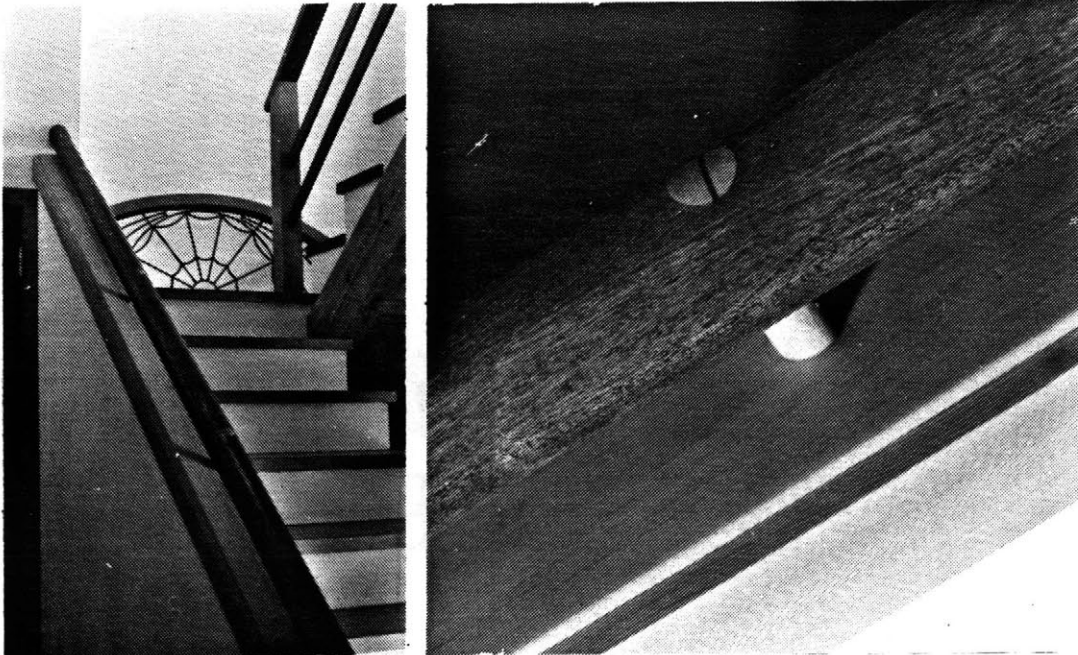
Even if it plays a more minor role in construction, craftsmanship, if used carefully, can provide the "salt and pepper" in architecture. Many building projects have funds budgeted for "dressing-up" the image. Architects often use this extra money for expensive materials, such as a large wall of marble, or for artwork to be placed in the building. Perhaps this money would be better spent constructing certain architectural elements in the spirit of craftsmanship, to act as accents in a neutral, but "friendly" larger environment. A wall of marble has less impact than a small area intensified by a skillful and sensitive craft treatment, and the diversity the craftsmanship provides is more integrated into the environment than the diversity of artwork that is not a part of the building. A well crafted stair or entry, acting as a focal point in a building, can enrich the space a great deal. The work is appreciated in a direct manner when the inhabitants use the building, which encourages empathy with the architecture.

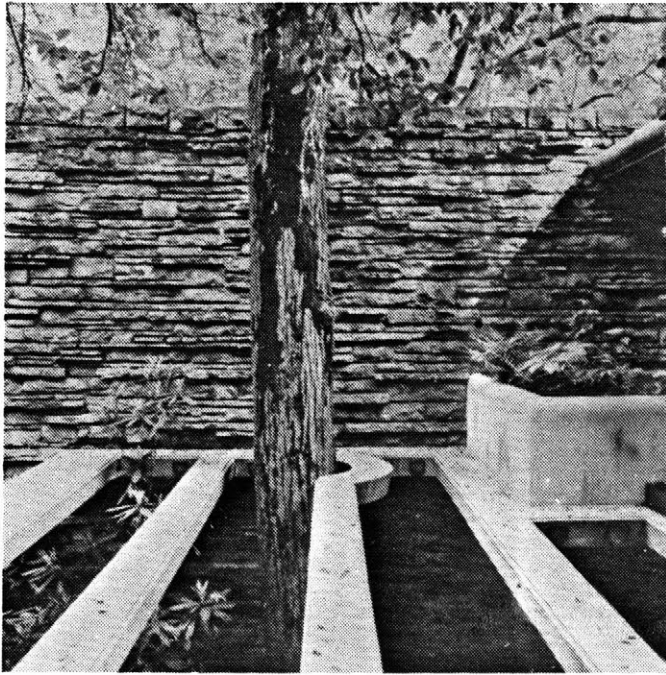


Above: Victor Horta's front door handle (left) asks to be grasped and Parisian Art Nouveau Gate (right) also greets and beckons one to enter.

Below: Stair designed and built by author is a focal point at the center of the house. The leaded glass window at the landing enriches the ascent as does the mahogany railing whose smooth texture invites touch.

Below, right: Railing detail

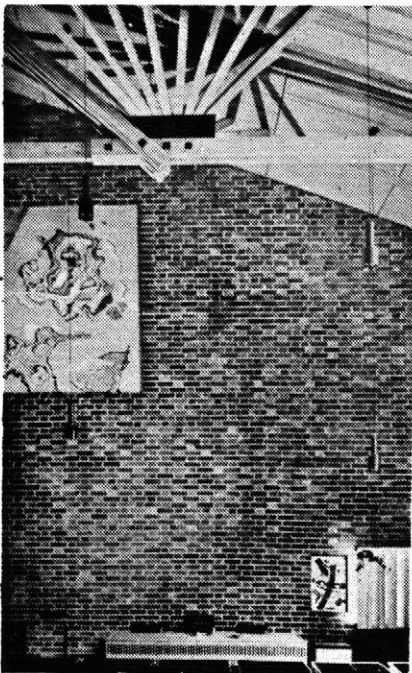




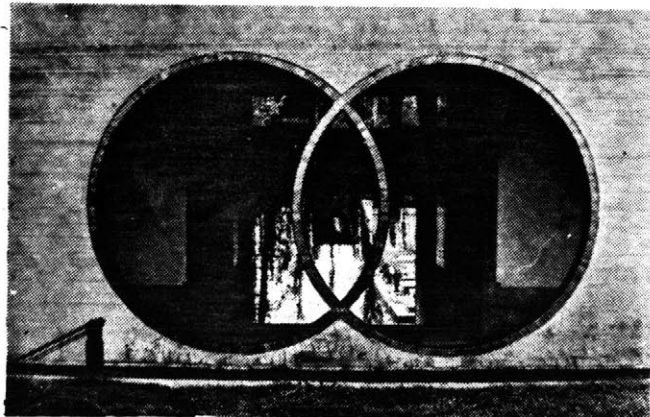
Left: At Fallingwater the regularity of a series of beams is broken, respecting the life of a tree that was there before the building.

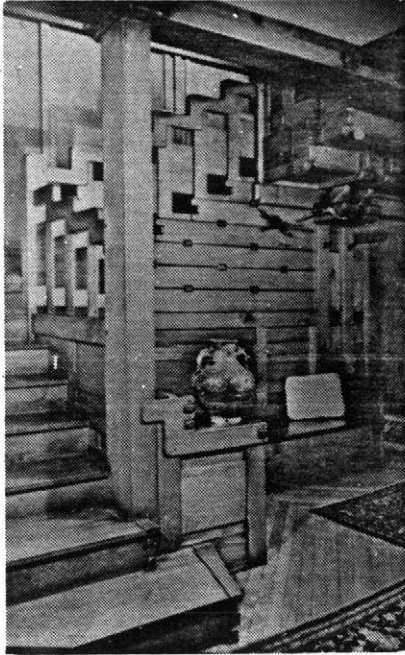
SPECIAL EVENTS, grounded in use, material, and technique, provide the seasoning in architecture.

Below: Aalto's three-dimensional ceiling support celebrates the structure and enlivens the council chamber at Saynatsalo town hall.



Below, Edge-tiled circular entry window sets the tone in Scarpa's cemetery for the Brion-Vega family.





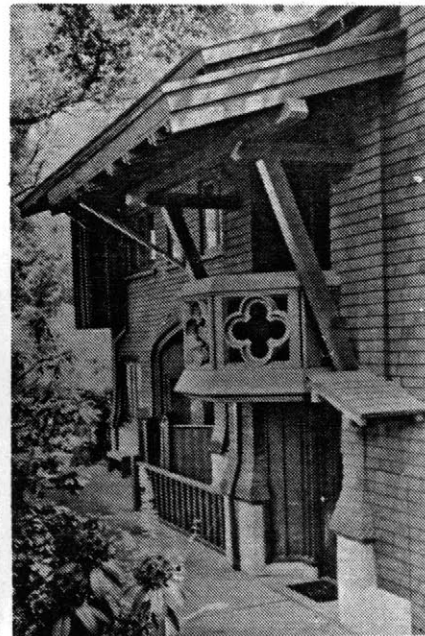
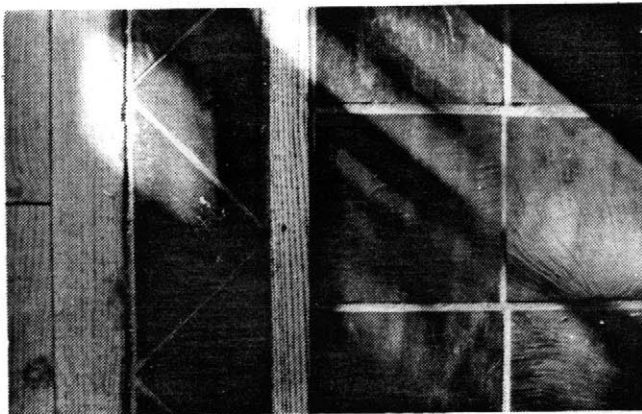
Above: A Greene and Greene stairway intensified by craft treatment.



Above: Mosaic Tile had announced the business of the shop behind it in the days of the Roman Empire, Ostia Antica.

Right: Bernard Maybeck used woodcraft to give a special character to the entry of the Chick house.

Below: Special tile treatment emphasizes a change of room and material, design/build by author.





Above: Montebello Castle re-used as a Museum, Mario Campi, architect.

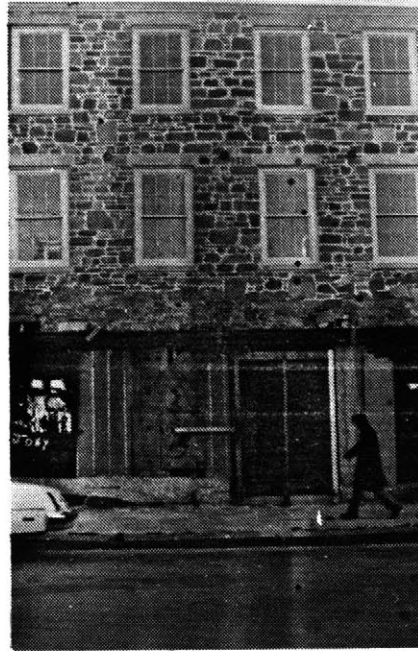


Above: Quincy Market/Faneuil Hall renovation and development, Ben Thompson, architect.

RECYCLING EXISTING CRAFTSMANSHIP

The use of craft-work to enrich new architecture extends to the preservation and recycling of older buildings. Existing craftsmanship is a resource; re-use takes advantage of the many hours of skilled labor that was invested years, sometimes centuries, ago. This can be accomplished at every scale, from preserving some woodwork in a small remodeling job, to preserving an entire urban complex such as Quincy Market in Boston or Ghirardelli Square in San Francisco. The impact of old craftsmanship can be augmented by new architecture that changes its context. Certain contemporary architects have shown great sensitivity in the re-use of older structures. Carlo Scarpa con-

There are many older buildings in disrepair that are exquisite examples of the craftsman's art. Both the character of the work and the economics of new construction make re-use sensible.



Right: Stone house,
Charlestown, Mass.

verted the fifteenth-century Palazzo Abbatellis to the National Gallery of Sicily and the fourteenth-century Castelvecchio in Verona into a modern museum. Giancarlo de Carlo has converted many medieval buildings to contemporary use in Urbino, including a convent recycled as a law school library. In Milan the architects Belgiojoso, Peressutti, and Rogers turned the Castello Sforzesco into a Museum of Antique Art. These are not cases of historic preservation but new designs which enhance the craft, age, and design acquired spirit of the original buildings.

Both the character of older work and the economics of new construction make recycling sensible and viable. The effectiveness of this re-use is also a question of design and architect's sensitivity to qualities of craftsmanship.

CONCLUSION

While the issue of craftsmanship in architecture is debated on economic, social, and political grounds it is ultimately an emotional question. Craftsmanship works human feeling and individuality directly into the building forms and fabric. Reflecting human spirit craft-produced architecture evokes an empathetic response from its users. This emotional association with the built surroundings is largely missing in modern architecture.

The previous section suggested several ways that some of the human and natural diversity of craftsmanship can be integrated into modern construction processes. The success of these approaches depend primarily on the efforts, skill, and choice of contemporary designers. With the craftsman's role in construction diminishing it is more important than ever before that architects gain an understanding of the qualities and potential of his building materials and techniques. Toward this end craft-training or at the least some direct exposure to the working of building fabrics could be included as a part of architectural design education. This is not without precedent. Craft-work was an integral part of design training for the Arts and Crafts Movement, at the Bauhaus, and more recently in Scandanavia. Architects sensitive to the qualities craftsmanship

can impart to building are more likely to include it in their work.

The way architecture is currently practiced reinforces the separation of the design from the actual construction. This limits the possible contribution of the craftsman and prevents the design from evolving directly from the materials and building craft techniques. The Japanese example shows that if some designing can occur during the construction even architecture with a high degree of standardization can be humanized and spontaneous. Our architecture would benefit if we follow their example by keeping the standardized parts small, flexible, and related to human scale, and allow local decisions to be made based on the use, materials, building techniques, and the human sense of play and celebration. The design-build approach can facilitate this on small projects. On a larger scale, one that can affect the profession, the essential issue is the attitude and sensitivity of the architect. It is his role to recognize the humanizing influence of the craftsman's work and to provide it both directly through the effective use of limited craftsmanship and indirectly through design that emulates the craft's spatial and textural diversity and human viewpoint.

Footnotes

1. Smith, Peter. "Urban Aesthetics", pg. 74, in Architecture for People.
2. Bloomer, Kent C. and Moore, Charles. Body, Memory, and Architecture, pg. 27.
3. Ibid.
4. Yanagi, Soetsu. The Unknown Craftsman, pp. 113-117.
5. Engel, Heinrich. The Japanese House, pg. 365.

Bibliography

1. Alex, William; Japanese Architecture; George Braziller; N.Y.; 1963.
2. Benevolo, Leonardo; History of Modern Architecture; M.I.T. Press; Cambridge; 1977.
3. Besset, Maurice; Le Corbusier; Editions d'Art Albert Skira; Geneva, Switzerland; 1968.
4. Bjerregaard, Kirsten, Editor; Architecture from Scandinavia; World Pictures, Copenhagen.
5. Blake, Peter; Form Follows Fiasco: Why Modern Architecture Hasn't Worked; Little, Brown and Company; Boston; 1974.
6. Blakney, R.B.; Translator; Tao Te Ching, Lao Tzu; Mentor Books; N.Y.; 1955.
7. Blaser, Werner; Struktur und Gestalt in Japan; Artemis Verlag; Zurich; 1963.
8. Bloomer, Kent C. and Moore, Charles W.; Body, Memory and Architecture; Yale University Press; New Haven; 1977.
10. Boudon, Philippe; Lived-in Architecture Le Corbusier's Pessac Revisited; M.I.T. Press; Cambridge; 1969, 1979.
11. Capra, Fritjof; The Tao of Physics; Shambhala; Boulder, Colo.; 1978.
12. Doczi, Gyorgy; The Power of Limits - Proportional Harmonies in Nature, Art, and Architecture; Shambhala; Boulder; 1981.
13. Engel, Heinrich; The Japanese House, A Tradition for Contemporary Architecture; Charles E. Tuttle; Rutland, Vt.; 1964.
14. Faber, Tobias; New Danish Architecture; Frederick A. Praeger; New York; 1968.

Bibliography, continued

15. Gebhard, David; Schindler; Peregrine Smith Inc.;
Santa Barbara; 1980.
16. GLOBAL ARCHITECTURE; A.D.A. Edita, Tokyo.
#15, 1972
#46, 1977
#49, 1979
#50, 1979
17. Gropius, Walter; Scope of Total Architecture; Collier
Books; 1937, 1943, 1955, 1974.
18. Hitchcock, Henry-Russell; In the Nature of Materials;
Elek Books; London; 1942.
19. Hoffman, Donal; Frank Lloyd Wright's Fallingwater;
Dover; New York; 1978.
20. Kinoshita, Masao; Japanese Architecture Sukiya;
Shokokusha Publishing ; Tokyo; 1964.
21. Krenov, James; A Cabinetmaker's Notebook; Van
Nostrand Reinhold Company; New York; 1976.
22. Latham, Ian, Editor; Art Nouveau; Academy Editions;
Paris; 1980.
23. Martinell, César; Gaudi , His Life, His Theories,
His Work; M.I.T. Press; Cambrigde, MA; 1967.
24. McCoy, Esther; Five California Architects; Praeger
Publishers; New York; 1975.
25. Mikellides, Byron, Editor; Architecture for People;
Holt, Rinehart, and Winston; New York; 1980.
26. Morse, Edward S.; Japanese Homes and their Surround-
ings; Dover Publications; New York; orig. 1886;
1961.
27. Nakashima, George; The Soul of a Tree -- A
Woodworker's Reflections; Kodamsha International
Ltd.; Tokyo, New York, San Francisco; 1981.
28. Naylor, Gillian; The Arts and Crafts Movement;
M.I.T. Press; Cambridge, MA; 1971, 1980.

Bibliography, continued

29. Polites, Nicolas; Architecture of Leandro V. Locsin; Weatherhill; New York, Tokyo; 1977.
30. Pye, David W.; The Nature and Art of Workmanship; Van Nostrand Reinhold, New York; 1971.
31. Pye, David W.; The Nature and Aesthetics of Design; Van Nostrand Reinhold, New York; 1978.
32. Rasmussen, Steen Eiler; Experiencing Architecture; M.I.T. Press; 1962.
33. Rempel, John; Building with Wood; U. of Toronto Press; Toronto; 1967.
34. Rossbach, Ed.; Baskets as Textile Art; Van Nostrand Reinhold Company; New York; 1973.
35. Ruusuvuori, Aarno, Editor; Alvar Aalto 1898-1976; Museum of Finnish Architecture; Helsinki; 1981.
36. Seike, Kiyosi; The Art of Japanese Joinery; Weatherhill/Tankosha; New York, Tokyo, Kyoto; 1977.
37. Sloane, Eric; A Museum of Early American Tools; Ballantine Books; New York; 1964.
38. Stickley, Gustave; Craftsman Homes; Dover Publishing; New York; 1909, 1979.
39. Tafel, Edgar; Apprentice to Genius - Years with Frank Lloyd Wright; McGraw-Hill; 1978.
40. Wechsler, Judith, Editor; On Aesthetics in Science; M.I.T. Press; Cambridge; 1978.
41. Wolfe, Tom; From Bauhaus to Our House; Harper's Magazine; New York; June, July 1981.
42. Yanagi, Soetsu; The Unknown Craftsman; Kodansha International Ltd.; Tokyo, New York, San Francisco; 1972, 1978.