EMPATHY WITH THE BUILT ENVIRONMENT:
EXPLORATION THROUGH THE DESIGN OF A MUSEUM

by Steve Lee
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Signature of the author ____________________________
Steve Lee, Department of Architecture
May 12, 1995

Certified by ____________________________
Maurice Smith
Professor Emeritus
Thesis Supervisor

Accepted by ____________________________
Ellen Dunham Jones
Chairman, Department Committee on Graduate Students

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ABSTRACT

How can we build to allow empathy with the physical
environment? The term empathy is understood primarily from
sociology referring to an association with another person. In
terms of architecture, empathy can be understood as a positive
association with the built environment. Association, whether
positive or negative, is subjective to some extant; however, this
is not the aim of the thesis. There are behaviors of the physical
environment that are positively associative to all people, in
spite of race, culture, and differences in personal experience.

The more people can associate with the built environment
the better they are able to understand the world they live in.
The aim of this thesis is to look at two ways of building this
association with the physical world. The first aspect of this topic
is to reveal the making of the buildings we live in. The second
aspect of this subject is size relationships.
The understanding of the built environment by revealing building systems may be contrary to advocates of neutral gallery spaces. Minimization of the setting in the dialogue between art and viewer results in undifferentiated and non articulated spaces and surfaces. This enhances the disassociation of the viewer from the physical environment. How can we build museums to allow association between the built space that we inhabit and the requirements for a museum?

Thesis Supervisor: Maurice Smith
Title: Professor Emeritus
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The way a building is put together, i.e. how it works, should be "legible" to its users: instead of stucco covering everything up, for instance, it is better to show the actual building bricks, the beams, columns of steel or concrete, and the lintels over the windows. It might not be such a bad idea to leave at least some of the "innards" of the building exposed to view, too.... In the nineteenth century, with its techniques firmly rooted in the craft tradition, this was obviously not as important as it is today, with the increasing alienation - also in architecture - of man from his environment.

SUBJECT

THE MAKING

There are two attitudes toward the role of construction. The first is expressed by Wagner and deals with plastic formal properties. The second is expressed by Schindler in which the constructional ideas are subservient to spatial and organizational ideas.

The "realist" or materialist basis of Wagner's teachings, first promulgated in his manifesto in 1896, Modern Architecture, was the assertion that new purposes and new materials must necessarily give rise to new methods of construction, which in turn lead to new forms that gradually acquire artistic value. The architect should not only utilize the new construction techniques, but draw artistic inspiration from them. "Well conceived construction is not only the prerequisite of every architectural work," wrote Wagner, "but it also, and this cannot be repeated enough, provides the modern creative architect with a number of positive ideas for creating new forms - in the fullest meaning of this word."

- Mallgrave. RM Schindler, ed. Lionel and Sheine pp. 15.

New forms are generated from an understanding of the properties of the material and the effect of physical forces on the material, as well as the construction. The danger is in the formalistic expression of forces acting on material and structure.
Schindler addresses Wagner’s point of view in his *Program* of 1913:

The effort to symbolize the constructional function of material mass suggested ideas for form. The final step in this development was the artistically conceived steel skeleton; in a framework the form no longer symbolizes the constructional play of forces. The construction itself becomes form. By introducing concrete construction, the twentieth century took the first step to disregard construction formally.

Schindler’s point of view that the manipulation of material mass as the main architectural idea had passed. “We no longer have plastically shaped material mass.... The only idea is space and its internal organization.” (Schindler. RM Schindler, pp. 10.) This does not deny the role of the material or construction. For example, his Pueblo Ribera apartments of 1923 and the How house of 1925 a system of movable planks were used for the form work for concrete walls. The concrete was poured one plank high, cured, and moved up the plank dimension for the next pour. The result was an impression of the plank form work that revealed the process of making - dimension and material. The revealing of the construction and process of making is of importance, not the plastic formal qualities of the concrete.

Fig. 4 How house by Schindler. Source: Ibid.
STRUCTURE / ASSEMBLAGE

It is clear how a thing works, that is because it looks like it can be taken apart.... By giving independence to the component parts these do not only gain more identity thanks to the expression of their specific function within the whole, for in addition, attention is drawn to the joins and encounters between parts. A shift of emphasis occurs from the objects themselves to what connects them, to their interrelationships.


The structure does not need to go from one horizontal to the next horizontal. This is found in Japanese traditional architecture where the roofing elements are made of three to seven horizontal moves. Light is read as a zone between the structural members: the structure is in space.

The assemblage of vertical elements also does not need to be surface to surface with the next member (stick or planar surface). In the case of columns, the doubling of the column allows light to be read as the center of gravity.

The reading of the building elements as an assemblage results in the separation of the systems by space/light. Each system is independent of every other system: each system claims its own territory. Therefore, the dimensions of each system is independent of the dimensions of the other systems. The result is a collage of the different building systems.
BUDDHIST ARCHITECTURE—
STRUCTURE AND DETAIL

45. Demon block, West Pagoda, Taimadera

46. Purlin-bearing bracket arm, West Pagoda, Taimadera

47. Boat-shaped bracket arm, Main Hall, Daisen-in, Daitokuji

48. Large block and bracket arm, Dempōdō, Hōryūji

49. Flat three block, Great Lecture Hall, Hōryūji

50. Projecting three block, Main Hall, Chōryū-ji

51. Projecting complex, Hokkedo, Tōdai-ji

52. Two-step complex, Five-story Pagoda, Kanshin-ji

53. Two-step complex, Main Hall, Daisen-ji

54. Three-step complex, West Pagoda, Taima-ji

Japanese Buddhist roofing system. Source: Nishi and Hozumi. What is Japanese Architecture?

Gate detail from Gavina store by Scarpa. Source: Albertini and Bagnoli. Carlo Scarpa.


Banca Popolare by Scarpa. Doubling of column. Center of gravity is light. Source: Albertini and Bagnoli.
FRAMES: Post and beam system at room size.

Fig. 9 Bispegaard Museum in Hamar by Sverre Fehn.
Source: Photo by author.

Fig. 10 Anthropology Museum of the Univ. of British Columbia in Vancouver by Arthur Erickson.
Source: Montaner and Oliveras. The Museums of the Last Generation.
Fig. 11 & 12 Lin Mij Amsterdam by Hertzberger. 
Wall sized beams provide some containment. 
Source: Lchinger. Herman Hertzberger.

Fig. 13 Japanese framing system. Source: Nishi and Hozumi.
SCREENS: Can be either structural or non-structural. Behavior is similar to a frame system. The main difference being the size, screens are smaller than room size. However, there is still the option to move through them.

Fig. 14 University of Ulm building by Otto Steidle. Light in structure. Source: Photo by author.

Fig. 15 Int'l Encounter Centre in Berlin by Otto Steidle, 1979-83. Screens claiming exterior territory. Source: Steidle. Structures for Living In.
CONTINUOUS SURFACE: Surface definitions that are mainly wall systems for closure.

FOLDING WALL: Continuous surface definitions have the ability to behave as large beams or “spanners”. Due to their size, they can span large distances and provide containment. This inhabitation of the structure can free the ground/landscape.

Fig. 16 Kirche in Heremence by Forderer.
Source: Bacher, Max. Forderer.
FORM OF LIGHT

Light operates at full dimension when used in organization. Light is then read as a continuity.

If there is light only at the size of the building elements there is only a container with some relief and it is impossible to read light as an assemblage. Light is read only as a discontinuity of the surface or "holes in a wall".

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Fig. 17 University of Ulm building by Otto Steidle. Source: Photo by author.
SIZE RELATIONSHIPS

There exist a range of size relationships in the environment: the relationship between the environment and the human body (human use) being of primary interest.

Sizes: detail - finger/hand
   personal
   room
   building
   site

Generating sizes can involve a modular system (tatami mat system), a proportional/geometrical system (Renaissance proportions), or both (Le Corbusier's modular). What are the attitudes toward these methods of generating form?
Wittkower references Alberti’s De re aedificatoria in describing the perfect form for a church. Alberti recommends basic geometrical figures, the most being the circle and then other geometric figures developed from the circle such as the square, hexagon, octagon, etc. for the form of a church. These geometries are all internally controlled. There is an analogy with the human body being inscribed into a circle since all biological forms are internally controlled.

Eduard F. Sekler discusses the universal role of proportions in his book *Proportion, a Measure of Order*. He differentiates the role of proportion to the “abstractions and assumptions about what is universal and general: God, the nature of the universe, the organization of society. (Sekler. pp. 6)” and on the other hand the physical effects of proportion that we can experience as rhythm visually or acoustically.

The physical effects of proportion and geometry relate to their *sub divisive* nature. Every territory and system is a subdivision of the whole. Each territorial definition is either point or line controlled by another territorial definition. This subject is further discussed in the section titled SLACK.
Sekler closes his essay with the question "Where then in the third quarter of the 20th century is the significance of a concern with proportion in the visual realm, other than as a purely academic, historical pursuit? (Sekler. pp. 22)"

Relativity and Quantum physics have drastically changed our perception of the structuring of the world. It seems that Sekler finds some promise from learning of "the proportionality present in the organization of organic and inorganic matter, (Sekler. pp. 22)" but is not sure what the translation in terms of architecture would be. There is a danger in translating biologic or organic growth forms to architecture. Biologic and organic forms are internally controlled surface tension forms.
PROPORTION

The proportional relations of the human body deal with the structure of the human body. These proportional relations are never constant: changing as the human body develops through time. There is also the factor that these proportional relations differ for different people: there is no ideal. If a proportional system is to be based on the human body, which proportional relationship should be used?

Proportions generated by natural forms relate to specific biologic, organic, and inorganic growth forms: it is the result of the change in rate of growth. The point of proportion is that it is the result of an additive process and never a subdivisional one.
LE CORBUSIER’S MODULOR

Two essays in Kepes collection addresses Le Corbusier’s use of proportion and module in his “Modulor”. Rudolf Arnheim and C.H. Waddington refute the relationships that Le Corbusier is constructing as arbitrary. The aim of the relationship between the Fibonacci series and the human body was made to create a system of sizes that would allow for standardization. Le Corbusier was interested in a system for deploying elements of relative human size. It must be taken into account that Arnheim and Waddington are speaking from a biological viewpoint. Their criticisms refute Corbusier’s Modulor as a biological theory of generation for human dimensions.

The aim of the Modulor was to standardize architectural elements to relative human sizes which could be deployed in a compositional/dimensional manner. This would result in a series of sizes that relate to use at the size of furniture. However, the range of sizes are not limited to those relative to the human body. The larger sizes of site and community are an extension of this range as well as the smaller size of details.
A collection of essays edited by Gyorgy Kepes discusses the issue of modules and proportion as a structuring of the physical environment. The structuring of the world is modular. "The world is modular, yet it never repeats, nor does it supply meaning randomly. (pp.3)"

Modular (not Corbusier’s “Modulor”) construction is an additive process (not sub divisive) in which each scale of modular structure behaves in different manners depending on the forces exerted on it. An example of this would be a statement made by Fourier who "felt... that the infinitely repeated subdivision of a pure substance, say of water would not change its intrinsic properties. This is of course the perceptual continuity we see and touch and taste in this world in which we live.... (pp.12)" Another example is "that woven cloth for example, would retain its properties in a square one millimeter on an edge. The thread is easily seen, and indeed the weaver will testify that the properties of his yarn are not the properties of the fruit of his loom, though the yarn may foreshadow some of them. (pp. 12)" Basically, the behavior of the parts affects the behavior of the whole, even though the whole has different properties than the sum of its parts: the whole is more than the sum of its parts.
GEOMETRY AND FORM

Tadao Ando states “Architecture is the art of articulating the world through geometry. (Architecture and Body.)” This is a partially correct statement. The world is articulated by form. Geometry is used to describe form and in a modern understanding form is described not by complete geometries, but by partial geometries. This attitude was articulated by Cezanne and furthered by the Cubists who took the attitude that it is not the objects (described by line and partial geometries) that are important, but the continuity of light and space.

In terms of architecture, there must always be some geometry in order to physically construct the building. However, it is not necessary to have geometry control the building and dictate size and form relationships.
What I have been trying to understand and articulate has been said much clearer than I could hope to. Louise Hara addresses the issue of geometries in her thesis under the section "Motion and Stability."

The Renaissance object and perfect image of the building evolved along principles of symmetry and axial movement systems. The building form defined the stopping place and the proportions of the square and the circle were used to demonstrate the stability of the built object. The Pantheon, St. Peter's and the Tempietto are all fine examples of these forms. By virtue of their completed form and perfect geometries, these examples build internal places without association to continuity or the path. The projected definition of these buildings is a single linear zone leading to and away from the entry. They stand as complete objects within a field and may be used as recognizable markers. They contribute to the same sense of space by their dissociative formal structure....

By breaking down the symmetry of the single form of a building into associative zones, the static nature of the building form dissolves. This produces an environment that exhibits a dynamic exchange between inside and out. In viewing the modern form of the built exchange of territories, the objectified image of the building recedes in importance to the relationship between the space and the enclosure forms.

Hara, Louise. Passage. pp. 30
SLACK TERRITORIES

In the use of geometry and proportions, it is these relations which control the deployment and sizes in plan, section, and elevation. Because it is geometric, the rooms are controlled by either points or lines. There is no physical territory created by the deployment of the rooms besides the rooms themselves. An alternative to the use of geometry is the definition of slack territories. The relative privacies of a building define slack territories which are by their nature public.

Fig. 21 point control
line control
shared territory

Fig. 22 collage of surfacing materials by author
line and point control
Fig. 23 Existing Asian Art Museum in Seattle. Line control plan.

Fig. 24 Dana house by Frank Lloyd Wright. Public area of house (slack) defined by relative privacies.

Fig. 25 Office building in Bonn by Hertzberger. Sectional slack. Source: Luchinger.
COLLAGE

The result of using such a system in which geometries and edges do not control is a collage. Its nature is to be additive and not subdivise (geometry controlled). A collage is an assemblage of systems (building and dimensional) that are each independent and relatively self-stable.

When you start out from a formal order it is important to avoid having to force all the elements into that order, because then you will inevitably make them self-servant to the whole, that is, the value that is given to the parts will be dictated by the order governing the whole, that is the value given to the parts will be dictated by the whole. Only by starting out from each individual element and making it contribute in its own right to the whole can an ordering be achieved in which each component, large or small, heavy or light, has its rightful place in accordance with the specific part it plays within the whole.

INTENSIFICATION

The built environment can be understood as either intensifications or transformations of the landscape, or objects out of context. Intensification of the landscape is the habitation of the landscape by reinforcing existing conditions. Transformation usually occurs in harsher environments in which the landscape is transformed or altered to protect from some aspect of the environment.

Intensification is a general principal that applies to the physical environment at all scales. It is basically the reinforcing of pre-existing conditions: access, surfaces, edges, etc. It is not decoration at the scale of building elements. Decoration hides or covers the form where intensification reinforces the behavior of the form.

Intensification of edge: reveals section of material and introduces smaller size.

Fig. 26 landscape intensification

Fig. 27 Brion Cemetery by Scarpa. Intensification of edge reveals section. Source: Albertini and Bagnoli. Carlo Scarpa.
DESIGN PROJECT: MUSEUM OF ART

The dialogue between artist, artwork, viewer, and setting is one in which the setting is usually chosen to be as neutral and flexible as possible. The attitude toward the galleries are large undifferentiated "warehouse" spaces in which the museum staff is able to change and build temporary definitions. Mies van der Rohe's Berlin National Gallery is an example of this type of exhibition space where partitions are used to divide the space for different exhibitions. The latest paradigm of this type of exhibition space is the Pompidou Centre in Paris.

"Today there are two opposing tendencies: on the one hand, the "modern" tendency wants to continue the paradigm of the Pompidou Centre supporting flexible, open museums, and advocating... the role of the contemporary museum as a place for the production and consumption of culture; and on the other hand, the perseverance of the traditional idea of a spatial structure based on rooms and corridors permitting an ordered presentation of the works ...."


Fig. 28 Pompidou by Piano and Rogers, Paris.  

Fig. 29 National gallery in Berlin by Mies van der Rohe.  
Flexible undifferentiated space. Source: Ibid.
A room that is too small for its purpose is inadequate, but so is a space that is too large, because although it may be big enough to hold a lot does not mean that it necessarily fits properly so as to give people in it the right feeling.... Most architects, when they are not restricted by rules and regulations make spaces too large rather than too small. Everything is kept as open and spacious as possible, thereby precluding the usual and understandable objections, but the architects fail to realize that there are possibilities that are in fact taken away by their grand gesture, that they are making more things impossible than possible. The larger the dimensions, the more difficult it is to use them to bet advantage.

How does one present art of a culture(s) to an audience of a different culture. The discourse involves the objectification of utilitarian objects. Objects that have meaning from their daily use are now preserved for posterity's sake; for educational purposes.

The display of these objects relate to the physical attributes of the art. The art can be categorized into 6 basic categories:

1. SCREENS -
   Japanese, Chinese, and Korean silk screens used to subdivide rooms. Can be used for this purpose in galleries instead of being displayed like paintings/planes.

2. CERAMICS -
   Size small enough to be in display cabinets. Can be in natural light.

3. SCULPTURE -
   Size large enough to move around and experience three dimensionally. No conservation problems unless wood or painted.

4. METALWORKS -
   Size small enough to be in display cabinets. No conservation problems.
5. WOODEN OBJECTS -
Size small enough to be in display cases. Will fade in light, but can be substantially protected against discoloration by UV filters.

6. TEXTILES/TAPESTRIES -
Fibers of cotton, linen, wool, and silk are not rapidly affected by light. In a fabric where the fibers are with dyes mordents, pigments, and dirt complex reactions can occur with the influence of light. Deterioration is inevitable with tapestries. They are best shown unglazed to avoid reflections in the glazing.

Due to the relatively small size of most of the objects, large gallery spaces will not be the norm. Fairly intimate spaces can be articulated to house these objects. There is a need for relatively dark spaces (discontinuities/relative privacy) for light sensitive objects such as tapestries.
ORGANIZATIONAL SYSTEMS
The general organizational systems used in buildings (and museums) are:

1 serial - one use territory to another use territory (room to room) a series of discontinuous spaces
example - Scarpa, Castelvechio

2 single loaded corridor - corridor/access with use territories on one side

3 double loaded corridor - corridor/access with use territories on both sides

4 open field - deployment of relative privacy where one definition does not control any other definition
example - Franco Albini, Museum of the Treasury

5 courtyard use territories distributed around an open territory
   a. with arcade around perimeter of open territory
   b. covered open territory - an atrium is an example of this system
example - Sert, Museum of the Maeght Foundation

Fig. 30-32 Source: Brawne, Michael. Neue Museum
Fig. 33 -37 Source: Oliveras and Montaner.
These organizational systems are used to deploy relative privacies, public definitions, and access. A unique attribute of museums are that there are areas that may not have any general privacies, such as Sverre Fehn's Bispegard Museum. In other words there are areas which are all public access/circulation. “To a great extent, museums are spaces for the circulation of the public, so that the relationship of entrances, corridors, vertical and horizontal connections, ramps, etc. to the exhibited works constitutes a fundamental element of the building.” (Montaner and Oliveras. pp.15). These new museums that exhibit this relationship are exemplified by Frank Lloyd Wright's Guggenheim Museum(fig 35), Sverre Fehn's Bispegard Museum(fig. 36), and Le Corbusier’s proposal for a spiral itinerary(fig 33-34).
SITE

The Seattle Art Museum in Volunteer Park was unable to meet the requirements of housing the museum's collection due to it's limited size. This was after three previous expansions with further expansion being denied due to preservation of park land. This exercise assumes that the Art museum is not existing in order to develop a design for a museum that is able to preserve the landscape.

Fig. 38  Water tower at entrance of the park.
Figs 38, 40-47 by author
Fig. 39 Site map.
Fig. 40-41 View toward the city and space needle.
Fig. 42 Existing museum and water tower.

Fig. 43 Conservatory.
Fig. 44 Aerial view of existing museum and park.

Fig. 45 View at bottom of reservoir.
Fig. 46-47  Context surrounding Volunteer Park
PROGRAM

The proposal is to redesign the Seattle Asian Art museum. The general size of the program can be considered given.

PUBLIC:

counter - information, admission, and security..... 180 sq. ft.
collective area/lobby and entry.......................... 1,800
lecture room.................................................... 2,000
activity area.................................................... 3,200
temporary exhibition area................................. 1,600
permanent exhibition area................................. 18,000
7@912 sq. ft. Chinese Buddhist Art
Chinese Ceramics and Decorative Arts
Arts of the Qing Dynasty
Art of Mughal India
Prehistoric and Early Japanese Art
Japanese Ceramics
Japanese Buddhist Art
2@2184 Chinese Metalwork and Funerary Ceramics
Art of Korea
2@1088 Chinese Jade and Snuff Bottles and
Southeast Asian Sculpture and Ceramics
Japanese Folk Art
1@2376 South Asian Sculpture
1@2176 Japanese Screens and Paintings
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PRIVATE:
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<td>2 @ 120</td>
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fig. 46
GROUND FLOOR
auditorium and storage
fig. 47
1st FLOOR
galleries and offices
fig. 48
2nd FLOOR - REFERENCE LEVEL
  galleries and control
3rd floor in dashed lines
  galleries
fig. 50
PARTIAL BUILDING SYSTEM
verendale truss
screen
fig 51
CONTINUOUS SURFACE
fig. 52
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near ground floor entrance
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fig. 54
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SECTION PERSPECTIVE
EARLY STUDY
fig. 56-57
SITE MODEL
1/32" = 1'
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INITIAL SKETCH MODEL
1/16" = 1'
fig. 62-65
ROOF STRUCTURE STUDY MODEL
1/16" = 1'
fig. 66-69
STUCTURE MODEL
1/4" = 1'
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