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An interior analysis of the Des Moines Art Center as a means to generating a space responsive furniture form

Narayan S. Poluvan
Iowa State University

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An interior analysis of the Des Moines Art Center
as a means to generating a space responsive furniture form

by

Narayan S. Poluvan

A Thesis Submitted to the
Graduate Faculty in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF ARTS

Department: Art and Design
Major: Art and Design (Interior Design)

Signatures have been redacted for privacy

Iowa State University
Ames, Iowa
1992
DEDICATION

To Dad and Mom.

Your love, trust, and support has made me grow.
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INTRODUCTION

In architectural design, much has been said about unity, compatibility, reciprocity, or in architectural terminology, context. What is context in design, or what does it mean when a designer approaches a problem with context in mind? It means that a designer makes a conscious decision to see that a part of a design relates to the whole or vice-versa. The relationship may be with reference to principles and elements of design. A designer may choose to relate to design principles like proportion, scale, balance, or elements like space, form, color, mass. One doesn't necessarily have to relate to all the principles and elements of design but those the designer feels are most necessary that the resulting new design embodies the essence of the referred design. However, it could be a commentary, criticism, or whimsy.

As an interior designer, I have questioned the implications of context in designing an interior. By interior, I refer to all possible elements that would constitute a successful interior – form, volume, space, finishes, materials, fixtures, and interior elements. Three-dimensional forms have been my forte. The purpose of this thesis was to develop a personal philosophy for designing a free-standing, three-dimensional furniture form. The context for the furniture form was the built architecture that housed it. The architecture was studied, and its expression and meaning determined. The form was designed to respond to the expression and meaning.

The question arose as to the type of architecture for which the form would be designed. Various options were evaluated by the author and his graduate committee in the selection of a building. A building which seemed to be challenging for the proposed problem was the Des Moines Art Center (DMAC). The DMAC is a building with a
combination of three different expressions of architecture. The original was designed by
Eliel Saarinen in 1948. Two additions were later designed and built by I.M.Pei (1968) and
Richard Meier (1982). The DMAC is challenging in terms of its diversity of expressions. To
define a context here was a difficult yet rewarding task.

The next logical step was to define the context. For my thesis, I defined the context
by analyzing the building, particularly the interior space, and how it affected our emotions.
The analysis of the interior space was based on analyses of space developed by Thomas
Thiis-Evensen\(^1\) and Francis Ching\(^2\). Using Thiis-Evensen and Ching's books as my guide,
I analyzed all factors that affected the quality of an interior space. The dimensions, shape,
surface, edges, and openings, to name a few, were analyzed, studied and documented.

Also, I studied and analyzed the interior space in the context of the Modern Movement of
architecture and I saw how faithfully the basic tenets of the Modern Movement were
expressed in the different wings of the DMAC. I also studied the three designers, their
philosophies, and their individual contributions to the DMAC. Finally, my emotional
response to that space was documented. The results of all three ways of looking at the
building were used to design a free-standing furniture form for the interior of the building.
The final part of the thesis dealt with the design and the construction of the free-standing
furniture form.


CHAPTER 1. LITERATURE REVIEW

The review of literature will be dealt with under the following sections.

1. Analysis of a building's expression.
2. Designers of the DMAC.
3. The Modern Movement.

Analysis of a building's expression

Archetypes in architecture

Artists and designers have come to a conclusion that forms elicit definite responses among people. Forms are capable of establishing certain moods. Similarly, there is a certain mood and response that one apprehends in a space or building. The mood or reaction concerns the architectural expression or atmosphere. If forms elicit responses, can form be articulated to elicit specific responses? Thomas Thiis-Evensen in his thesis Archetypes in Architecture establishes that the moods and reactions associated with forms is indeed a result of how the forms are combined and varied. These basic forms can be referred to as the archetypes of architecture. Thiis-Evensen's theory of archetypes establishes that there is a common language of form which can be understood which is independent of the individual and culture. That way, a building can be analyzed on common grounds and the results can be assumed to be common for all. Thiis-Evensen's thesis is limited to those archetypes which constitute the elements of spatial delimitation: the roof, the floor, and the walls (Figure 1.1–1.3). These elements of delimitation can be studied under four levels of scale:

• Major forms
• Construction system - shows whether the main forms are massive or skeletal
• Surface treatment of major forms
• Openings in the major forms

On each of these levels, the function of the major form - the theme, and how the major form functions - the motif, are also defined. Themes tell us what the major forms do and motifs tell us how they do it.

A factor that is common to the delimiting elements, the roof, wall, and the floor, is that they separate interior space from exterior space. In other words, the delimiting elements balance the forces of inside and outside. The expression of the delimitation is visualized in the span between opening and closure. Three qualitative concepts help us describe how these delimiting elements close or open between inside and outside. They are motion, weight, and substance. Motion describes the dynamic nature of the elements, whether they expand, contract, or are in balance. Weight describes the heaviness of the elements and is related to gravity. It describes whether they stand, fall, weigh down, or lighten up. Substance is related to the material of the elements, whether they are soft, hard, coarse, fine, warm, or cold. These qualities are the existential expressions of architecture.

Finally, is one’s perception of an element’s expression dependent on that individual person and his or her background? Thiis-Evensen says that there are private and social experiences which are related to convention and based on recognition. However, there is the third level of experience called the universal level which is the focus of Thiis-Evensen’s thesis. The universal level of experience is independent of cultural factors and individuality. This level of experience is with reference to phenomenon like gravity and the forces of nature. Experiences at the universal level are common to all and is recognized on the basis of our common experiences of natural phenomena.
Architecture: form, space and order

Francis Ching in his work *Architecture: Form, Space and Order* conducts a morphological study of the essential elements of form and space and those principles that control their organization in our built environment. Form is emphasized to be the primary tool for a designer. Basic forms are classified in a typological manner and their classification provides a designer with an active vocabulary to select, test and manipulate those elements into meaningful and useful organizations of space (Figure 1.4). Forms, elements of forms, and their organizations are explained with numerous examples of buildings and spaces. These examples can be examined with reference to a broader context of the intention behind the form and its organization. This type of an analysis helps a person to better respond and understand the architecture one experiences and the architecture one imagines while designing.

The act of creating architecture is a design or a problem solving process. In any such design endeavor, it is necessary to define the problem. The definition of the problem will depend on how the problem is perceived. The depth and range of a design vocabulary will definitely aid a designer to better perceive the problem, define it, and subsequently to solve it. The matter presented in Francis Ching's work is intended to expand one's design vocabulary for the purposes described above. Also, when one is equipped with a broad design vocabulary, it can be used for the spatial analysis of architecture or to create architecture to promote endeavors, elicit responses, and communicate meaning.

While Ching, and Thiis-Evensen outline ways to understand and experience space and form, it may help to discuss the strengths and limitations of the authors' works and subsequently the relevance of their works to my thesis. Both Ching and Thiis-Evensen discuss space and forms and how they can be manipulated to elicit specific responses.
Space is formed by manipulating the base, vertical, and overhead plane as Ching lists them, and by the floor, wall, and roof as Thiis-Evensen lists them. Essentially, the two authors speak of the same space defining elements. Ching lists diagrammatically the different variations of the space defining elements and how they can be articulated to affect spatial quality. While Ching describes all these different variations, he does not elaborate on how space may effect a person either on a physical or emotional level. He leaves it to the designer to understand, test, and manipulate elements defining space and thereby spatial quality. On the other hand, Thiis-Evensen considers the delimiting elements to balance the forces of inside and outside. He moves on to describe diagrammatically and theoretically variations of the delimiting elements and how their articulation affect the balance of the inside and outside forces, hence the quality of the space. However, Thiis-Evensen deals with the issue of quality of space quite differently. He is concerned about the shared experience of space - how people experience space, and whether this experience may be common to all. The emotional experience of space is given importance in his study. Since the battle of the forces of the inside and the outside is an existential prerequisite of humans, space as a result of the delimiting elements is defined and understood experientially. As a combination, Ching and Thiis-Evensen provide an efficient vehicle to analyze space and define it spatially and experientially.

Ching and Thiis-Evensen have acknowledged certain limitations in their theses. Ching has not considered the connotative meanings of forms and spaces which are unique to individual cultures. Thiis-Evensen on the experiential level, has not considered private and social experiences that are unique to an individual and culture. Both authors consider those factors that can be assumed to be common for all. Although it may seem to be a limitation, the strength of their study lies in their establishing a common language of form. That means that the results of any study conducted using Ching or Thiis-Evensen can
be assumed to be common for everyone. This premise is important for my thesis as I would need a common language of form to communicate my intentions through the design and construction of the free standing built form.

Although Ching and Thiis-Evensen speak essentially of the floor, wall, and the roof in their studies, there is the possibility that certain other factors may contribute to spatial quality. Lisa Heschong in her work *Thermal Delight in Architecture* fills that gap and opens up the possibility of looking at space in relation to other factors like its thermal qualities. Heschong explains the importance of the thermal sense in the perception and experience of a space or object. She explains that the more senses involved in an experience, the richer the experience and the deeper our perception and understanding of a space or object. Therefore, the analysis of the thermal, spatial and experiential qualities of a space will result in a deeper understanding and interpretation of the space, and subsequently a more sensitive response through the free standing built form.

However, the analysis of the thermal qualities of a space does conflict with Ching and Thiis-Evensen in that, it is difficult to define a common level of thermal experience as they have defined a common language of form. To a large extent, thermal qualities are perceived differently by individuals. That is, the degree of warmth or coolness differs from individual to individual. However, certain objects do convey a feeling of warmth or coolness and we perceive that based on our previous common experiences with natural phenomenon. For example, metal looks and feels cold while a carpet or rug conveys a feeling of physical and psychological warmth. Although Heschong's work was not be used in the building analysis, it serves as a compelling example of other factors that effect our experience of architecture.

---

Figure 1.1: Floor archetypes

5 This-Evensen, 434-436.
THE WALL
Nature's and culture's wall:
The architectural wall:
The wall's themes in breadth, height and depth

The breadth theme:

The height theme:

The depth theme:

The motifs of the breadth theme:
a) breadth, b) split, c) right, d) left

The motifs of the height theme:
a) rising, b) sinking, c) split, d) opening

The motifs of the depth theme:
a) mass, b) skeleton, c) infill, d) layer

The window:
a) hole, b) face, c) frame, d) bay

The entrance:
The door-casing (right)
a) frame, b) split, c) niche, d) shelter,
e) directional wall, f) side tower, g) path,
h) stair

Figure 1.2: Wall archetypes

6 This-Evensen, 437-439.
Figure 1.2: (continued)\textsuperscript{7}

\textsuperscript{7} Thils-Evensen, 440-442.
The frame's expression of support

The frame's expression of motion in the frame and to arcade

The frame's expression of motion in the frame and to arcade

The frame's expression of motion in the frame and to arcade

The frame's expression of motion in the frame and to arcade

The colours and the expression of weight and depth

The straight beam and its articulation

The orders

The arch and beam and the form of the openings

The pointed arch

The round arch

The flat arch

---

Figure 1.2: (continued)

8 This-Evensen, 443-444.
Figure 1.2: (continued)^9

^9 This-Evensen, 445-446.
Figure 1.3: Roof archetypes\textsuperscript{10}

\textsuperscript{10} Thors-Evensen, 447-449.
The gable roof:

- The gable and the relation to the walls underneath
- Variations of the gable roof, the hip roof
- The articulation of the gable roof
- The dynamics between shed roofs
- The shed roof and the relation between spaces

The shed roof:

- The shed roof

The flat roof:

- The flat roof
- The articulated transition between ceiling and wall
- D) opening articulation, E) uplifting articulation, F) expanding articulation, G) sinking articulation

Figure 1.3: (continued)\textsuperscript{11}

\textsuperscript{11} Thiis-Evensen, 450-452.
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- **Base plane elevated**
- **Base plane depressed**
- **Overhead plane**

Figure 1.4: Space defining elements

---

Designers of the DMAC

As the second part of the literature review, I studied the philosophies of the three architects of the Des Moines Art Center, Eliel Saarinen, I.M. Pei, and Richard Meier. The designer’s philosophies were studied as a means to gaining a better understanding of their buildings. I also reviewed literature on their particular contribution to the DMAC to see how faithfully their philosophies were expressed in the DMAC.

Eliel Saarinen

Eliel Saarinen was born in 1873 in Finland. As a boy, he grew up in an environment of forests, lakes, and nature which had a profound influence on him and his future works as an architect. He would later translate the designs he found in nature into architectural constructions. To emphasize the importance and influence of nature on his architectural designs, Saarinen expressed the need to understand life, from which all art springs, to understand art in all its comprehensiveness. And to understand both art and life, one must go down to the source of all things: to nature.13 Although his primary interest was to paint, he turned to the art of design in architecture as a way for honest self-expression.

Unfortunately, the style of architecture prevalent during his early years as a designer was contrary to his ideals. The style at that time was to crowd meaningless stylistic decoration on building surfaces. He therefore joined Louis Sullivan and Frank Lloyd Wright in their opposition of imitation architecture. Although their ideals were similar, Eliel was not influenced by their architectural designs or by the good contemporary buildings existing at that time. He looked for his own meaning and idea for the form of a building to suit modern needs.

The firm of Gessellius, Lindgren and Saarinen was formed in 1896. The fundamental purpose of the firm was to design for comfort and aesthetic satisfaction, for utility and attractiveness, a type of furniture and furnishings that would fulfill the demands made upon it by the intelligent consumer. Materials were expressed in a simple and honest way. The firm adhered to the fundamental theory that the function and the material decided the nature of the form.

A specific form of expression and composition that occurs in Saarinen's work is the arrangement of a vertical force against a contrasting and balancing horizontal volume. In his architecture, this composition can be seen in the soaring shaft or the brooding upsurging mass of tower over a substantial horizontal volume. The horizontal force of the building and the vertical surge of the tower have a happy proportion. The inspiration for these forms were derived from nature. The urge to erect the tower over a solid base made him design, again, the vertical shapes which in so many instances rise sympathetically out of the natural forms surrounding them.

In 1929, Saarinen took part in an exhibition, "The Architect and Industrial Art," sponsored by the Metropolitan Museum. The project he conceived was a complete dining and a number of pieces of silver. It was interesting to note that, in that project there was a unity in Saarinen's work even when he worked with various materials that served different functions. He believed in a unity of concept. Otherwise, the personality of the artist will seem to be fragmentary. It was his belief that the forms that an artist creates will never be convincing unless they are a true expression of the artist's life - his emotions, his thoughts, and his aspirations. The Artist's art should be a testimony of his integrity of mind and spirit, the product of his real personality.

Saarinen was commissioned to design the Des Moines Art Center. The Art Center opened in 1948. The change from "museum" to art center was significant; it indicated that
the cold monumentality so frequently associated with the museum building would be replaced by warmth and comfort. The quality of the Art Center's design reflects Saarinen's aesthetic conviction during his final decade of life: "Ornament represents the spirit of man in an abstract form. It transposes the rhythmic characteristics of time into a significant pattern of line, form, and color. It evolves from the simple toward the rich, from directness toward symbol. . . [Ornament] should be . . . a translation of emotions with inner meanings behind the forms. . . [It should be] a product of true art."

During the period when Saarinen was asked to design the art center, the stylistic norms for art museums were neo-Classical facades of pediment, post and lintel.\textsuperscript{14} Saarinen was never influenced by the existing styles and he believed in finding his own meaning and ideas for the form of a building. His design for the art center was a departure from the norm. The resulting design was a low lying horizontal building which was unobtrusive. By the low stature and modest entrance, Saarinen softened the cold and unfriendly feeling that one associates with museum buildings. Also, the entrance with its curved side walls which splay outward, signifies a welcome gesture.\textsuperscript{15}

The linear horizontal form of the building seems to have evolved from the horizontal form of the lommar stone that was used for the construction of the building. This is in accord with Saarinen's belief on a building's form, that it should be a result of the material used for the construction of that building. Also, the vertical and horizontal masses so often seen in his other buildings can be identified in the DMAC. The ceiling of the lobby is the only ceiling in the whole building to be raised considerably. When viewed from the exterior, the lobby is identified as the vertical mass against the horizontal mass of the gallery wings.

\textsuperscript{15} James T. Demetrion, 16-25.
The use of the square motif is discernible throughout the entire building. The square is Saarinen's way of expressing ornamentation. The square ornamentation is seen on the bottom of the overhang of the entrance doorway. Also, the square can be identified in the form of the window mullions and the square rift-grain oak panel of the lobby interior. The square pattern is seen again on the back rest of some chairs Saarinen designed for the art center. The repetition of the square ornament with a good consistency wherever applicable, reiterates Saarinen's belief in the unity of concept even when working with different materials.

I. M. Pei

Ieoh Ming Pei was born on April 26, 1917 in China. Coming from a privileged background, Pei had the opportunity to study architecture in the United States. He enrolled at MIT in the fall of 1935. Unfortunately, the MIT program was anchored in the Beaux-Arts tradition which relied heavily on the great monuments of Greece and Rome. The Beaux-Arts philosophy of design did not excite Pei. After completing his Bachelor's degree, Pei moved on to Harvard to do a Master's program in architecture. Walter Gropius, the German architect, who was the advocate of the Bauhaus School of Design, was invited to be the chairman of the architecture department at the Harvard's Graduate School of Design. Gropius' influence was strong and the philosophy of design at Harvard was closer to what Pei understood architecture to be. Both Gropius and Marcel Breuer (another Bauhaus advocate) were responsible in shaping the Harvard Graduate School in becoming the most forward-looking architecture school in the United States. Gropius represented a rather rigid approach to the curriculum and did not lay any emphasis on art history. Breuer on the other hand approached architecture more as an art and Pei seemed to fit best with the Breuer image of architecture as art.
Pei did not embrace totally the Bauhaus ideology but rather embarked on an independent design course. Pei was trained in the largely antihistorical form-follows-function tenets of Modernism. He survived its constrictions and also revival architectural movements like Post-Modernism. In the Modernist tradition, Pei is devoted to rigorous geometry and to the use of simple, often sculptural forms. It helps to examine Pei’s approach to architecture to establish what he stands for as an artist. He examines a project, and instead of imposing on it a rigidly formal preconception, he examines the project for what it has to offer. More important, Pei approaches the intended use of the building as a guide to its formal expression. Beyond that, he focuses on how people will experience a building as they pass through and around it. That process, then, coupled with a reverence for high-quality materials and the way they are assembled, is what defines and unifies Pei’s body of work.\textsuperscript{16}

Pei was commissioned to design a sculpture wing for the Des Moines Art Center and the design became a reality in 1968. Sympathy to the existing Saarinen building was an important requirement for the design. The trustees envisioned the new wing to be a slavish imitation of Saarinen’s design. Pei thought otherwise. To imitate styles would mean imposing on the new project a formal preconception. Pei realized that the project had much more to offer and a mere copying of styles would be an injustice to both the old and the new.\textsuperscript{17} Pei’s resulting design sharply contrasts Saarinen’s linear design. And, it is the contrasting of ceiling heights, light sources, materials and formation of space which make the entire structure more interesting as a whole.\textsuperscript{18}


\textsuperscript{17} James Bailey, "Concrete Frames for Works of Art," \textit{Architectural Forum} 130, 5 (June 1969): 62-66.

\textsuperscript{18} James T. Demetrion, 16-25.
However, Pei and Saarinen coincide in their philosophy of considering the use of the building as a guide to its formal expression. Pei used a simple rectangular form for the sculpture wing. However, the use of such simple geometry does not in any way lessen the impact of the form. Pei's volumetric carving of the interior space and the use of natural light has resulted in a dramatic sculptural form quite appropriate for the sculpture that it houses. The shorter ends of the building face the sculpture court at one end and a wooded park at the other. The shorter end walls have large expanses of glass and the side walls are blank. A good deal of light enters through the shorter north and south walls. Additional light floods the space through skylights on a V-shaped monitor on top of the building. Pei uses concrete extensively in most of his projects as a building material. He exhibits a sensitivity in its use in that, he varies the color and aggregate of concrete to satisfy structural concerns and of most importance, the contextual concerns. The limestone aggregate used in the concrete for the DMAC is exposed and was chosen to match the reddish-brown lannon stone of Saarinen's building.

Another area where Pei exhibits unique skillfulness is on how people will experience the building as they pass through it. In the DMAC, Pei has articulated the experiential quality using three means - by using space, building material and, natural light. The entrance corridors leading to the sculpture court are volumetrically compressed. When one enters the spacious sculpture wing with high ceilings through the relatively narrow corridors, the scale of the sculpture wing is immediately perceived as being dramatic and distinctively experienced. The use of bush hammered concrete with its vertical striations further enhances the scale of the space.

Finally, natural light is also used as a means to enhance the quality of the space and one's experience through it. The space interacts with the light that flows through it with a continuous change of shadows as the quality of light changes. The energy and
dynamism of the space is experienced as a result of the interplay of light and shadow and enhances ones experience of the space. Pei's skillful approach for the sculpture wing has resulted in more than just another addition, but the intricate interweaving of two generations of architecture.

**Richard Meier**

Whiteness is one of the characteristic qualities of Richard Meier's work. White is used with a good reason. Meier's fundamental concerns are space, form, and light and his extensive use of white helps to accentuate his concerns. Meier uses white to heighten the power of visual form, and it aids him in the molding of space and light. Meier uses as raw materials for his architecture volume and surface, light and form, changes of scale and view, movement and statis. Also, the physical and functional elements are important to Meier as raw materials, since he is deeply concerned with the making of a building. He believes that the art of architecture ultimately demands one's concern with the construction of the building. The history of architecture has provided Meier with inspiration for his work. However, the historical allusions are never literal but rather, the meanings are internalized in his work, and the metaphors are purely architectural. When Meier is compared with his contemporaries, he exhibits a consistency of style which he has maintained throughout his career despite of ongoing changes of architectural movements.

Meier's greatest influence has been Le Corbusier. However, Meier has been sensible in screening Corbusier's philosophy and to reject ideas which he felt were inconsistent. Corbusier was the proponent of the philosophy that the geometry of proportion is the generator of form. Meier however is ambivalent about that matter. He understands that proportional measurements do help correct or check designs but he is...

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not prepared to speculate about proportion as the generator of form. He feels proportion is about quantity and therefore distracts attention from the all important matter of quality. For Meier, the problem of quality is primary since it is more accessible to both client and critics.\(^{20}\)

Meier was commissioned in 1982 to design yet another addition for the Des Moines Art Center. Meier's task to design the third addition could be considered to be more difficult than Pei's addition (since he filled the gap between the two sections of Saarinen's wings) or Saarinen's building (since starting a new building is always easier than doing an addition). Meier envisioned the addition to be divided into three separate structures. They are; a one-story dining facility in the northwest part of the reflecting pool and courtyard, a two-story section in the west consisting of a gallery of African art above and maintainence shop areas below, and a three-story section to the north consisting of galleries and storage.\(^{21}\) The three story section is volumetrically detached from the Saarinen addition and is compacted resulting in a vertical organization of space.

Meier's use of white has been his trademark from the onset of his career and he has religiously applied it to the DMAC. Meier chose to emphasize the original Saarinen building by volumetrically and stylistically contrasting his addition to the original. However, Meier's building relates to the original and Pei's building in subtle ways by the use of less obvious elements of proportions and rooflines. The flattened pyramid roof with clerestory windows on Meier's building echoes the butterfly roof on Pei's wing and these two buildings together frame and emphasize Saarinen's building. However, the color of the granite for the central volume of Meier's north addition was chosen to blend with the exterior masonry of the Saarinen building.

\(^{21}\) James T. Demetrion, 16-25.
Proportional relationships are seen by observing the two and four foot square surface grids on the exterior of Meier's building. The size of the surface grid conveys a scale and a hierarchy of interior volumes. And, the scale of some of Meier's interior volumes bear a direct relationship to the scale of some of Saarinen's interior volumes.

Meier's fundamental concerns of space, form, and light and their manipulation is evident in the DMAC. Building planes are organized such that there is a continuity of space and it flows from one area to another. One perceives that building planes are organized with the intention of sculpting space: Corbusier's influence and a tenet of modernism expressed. A vertical continuity of space is maintained by leaving a gap between floor and wall planes and hence not closing off completely one floor from another. This continuity of space allows light from the clerestory and perimeter windows to flow through different floor levels. Light combined with the whiteness of the interior heightens the visual form of interior architectural elements.

The Modern Movement

As a concluding part of the literature review, I attempted to study the Modern Movement with which we can associate the three designers of the Des Moines Art Center. After discerning the basic tenets of the movement, I analyzed how faithfully those tenets were expressed in the different wings of the DMAC. As an in-depth study of the Modern Movement was beyond the scope of this thesis, I focussed on three highly influential designers of the Modern Movement. The designers I focussed on were, Le Corbusier, Frank Lloyd Wright, and Walter Gropius. In doing so, I hoped to understand and express the essence of the movement and draw relationships to the DMAC.
The main source on the section on the Modern Movement was Vincent Scully, Jr. Among the other books considered as a source, Scully was the appropriate choice because he takes on a philosophical approach in describing the evolution of the Modern Movement. He associates the evolution of the movement with the emotional and spiritual state of humans during that period. This approach merged with my own philosophical stance to any design project and seemed to form a reasonably strong base from which to draw inspiration for the design. Vincent Scully, Jr. in his work *Modern Architecture: The Architecture of Democracy*, traces the evolution of the Modern Movement and describes the main characteristics and influential designers associated with the movement.

Scully promoted the idea that the architecture of a period was a reflection of the state of humans during that period. Modern architecture was evolving during the later eighteenth century, during the periods of the industrial and democratic revolution. This was a time period in which previously accepted religious values were disintegrating and as a result being rejected. The old structured way of life was falling apart. As a consequence, humans found themselves alone, without the security of being able to depend on religion or something comprehensible. This period of absurdity found humans with an incessant need for security and something comprehensible to belong to yet a strong desire and a need to express his individuality as a means to progress and change. For this reason, absurdity set in and the architecture was also a representation of that absurdity.

How were the paradoxical qualities of freedom of the individual and the need for security and permanence resolved in an architectural expression? The architectural metaphor for freedom was continuity and the metaphor for permanence was order of space, surface, and structure. This idea of continuity and permanence is clearly expressed

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23 Vincent Joseph Scully, 10.
in the houses designed by Frank Lloyd Wright. Wright used the open plan and as a result, interior spaces were compulsive, expansive and flowing (continuity) yet, the masonry structures that articulated that space were monumental, heavy, solemn, and densely massed (permanence). Also, the exterior consisted of continuous interlocked masses which resulted in continuity and in a plasticity of mass. Walter Gropius, founder of the Bauhaus and an influential designer in the Modern Movement was clearly influenced by Wright's work. Gropius was influenced by Wright's continuous horizontal planes but wanted to avoid the plasticity of mass on the exterior. Also, he wished to bound and close the building's profile with plain facades. To do this, Gropius enveloped the facade with a glass skin which resulted in a continuous yet closed building profile. But how could Gropius resolve the issue of plasticity of mass on a plane facade? The paradox was resolved by integrating concepts of the de Stijl philosophy (Wright's influence on the de Stijl movement must be affirmed) of interlocking separate volumes into asymmetrical compositions. Gropius combined planes into boxes and interlocked their separate volumes into asymmetrical compositions and we saw the Bauhaus emerging. We find that Wright created a plasticity of mass on a single facade while Gropius created the same theme with a number of separate volumes.

It was during the Modern Movement that architectural space and its articulation was emphasized and architecture was seen as a volume rather than mass. The spaces were visualized as solids and the designer manipulated the space finally enclosing or enveloping the air. The International style which was considered a single, common body of ideals within the Modern Movement also promoted the idea of architecture as volume rather than mass. The other important ideas of the International style were, regularity rather than axial symmetry as the main organizing element in design. Symmetry was one of the

surest means of bringing esthetic order to a design. However, designers of the International Style avoided axial symmetry but achieved regularity by consistency in design, and balance of masses within asymmetrical compositions. Also, ornamentation was condemned.

Le Corbusier is identified as one of the most important designers of the Modern Movement. His work can be closely associated with the tenets of the International style. Corbusier’s central definition of architecture as being a masterly, correct, and magnificent play of masses brought together in light was expressed clearly in his work.25 The play of masses was possible because of the free plan in which walls can be manipulated according to the designer's whim. The free plan was possible because of the use of columns supporting slabs. The column and slab structure also allowed for a free facade with long strip windows free from the columns.26

Corbusier's most important contribution to the Modern Movement and its architecture was the need to see and perceive forms and spaces in movement. This was the cubist interpretation of architecture. Corbusier's buildings were great cubes with the interior divided into upper and lower spaces that could be seen in movement. This was the fourth dimension of space - space seen in time.27 Lastly, the antihistorical form-follows-function idea was an underlying theme of the Modern Movement.28 It propelled the designers to evaluate the function of the space and allow the function of the space to be the shaper of the form. This approach eliminated superfluous ornamentation and a rigid and formal approach to form.

25 Patrick Nuttgens, 99.
26 Patrick Nuttgens, 100.
27 Patrick Nuttgens, 99.
28 Patrick Nuttgens, 23.
DMAC and the Modern Movement

Now that the basic tenets of the Modern movement have been understood, it will be interesting to see how the tenets have found expression in the work of the designers of the DMAC. Continuity and permanence were expressed by all three designers in their individual buildings of the DMAC. However, the means chosen to express continuity and permanence varied to quite a degree. Saarinen in his building followed the Bauhaus expression to achieve continuity. Gallery spaces were separated into rectangular volumes which were interlocked and organized into an asymmetrical composition. By following this approach, incidental exterior spaces were formed. Incidental exterior spaces were the elements which gave the entire composition a spatial plasticity. The low profile of the building and its masonry structure contributed to the building's solidity and permanence. Pei and Meier's approach to continuity was quite different from Saarinen's approach. Their raw material to achieve continuity was interior space. Their spaces were expansive and flowed from one area to another therefore maintaining continuity. Also, Pei in his addition used vertical striations on concrete walls which contributed to a sense of continuity. Pei's structure by virtue of its mass expressed solidity and permanence. Meier on the other hand compacted his spaces into a vertical volume and it was the monumentality of this main volume that gave his addition a sense of permanence and stability.

The concept of architecture as space was evident in the work of all three designers. Saarinen's articulation of space was fairly simple and straightforward. Except for the entrance lobby which has a large volume and equally large openings, the other gallery spaces were homogeneous volumes with very little spatial articulation. Spatial articulation could be perceived only through the entire building's composition of interlocking volumes. Pei and Meier achieved spatial articulation within a single volume. Pei's sculpture gallery consists of a single space which was defined by a ceiling of varying heights. The varying
ceiling heights articulated the space into different spatial volumes which gave the space a quality of spatial plasticity. Window openings and the closely spaced rectangular columns also contributed to the plastic quality of the space. One almost senses that the space has been "sculpted." Meier also maintains the continuity of space and keeps it flowing between levels. Here again, the organization of the floor and wall elements gave the space its plastic character. The use of columns supporting slabs which don't meet the walls was what allowed the flow of space between one level and another. Also, the interior walls were not load bearing (made possible by columns supporting slabs) and their arrangement was flexible and was determined by function and a desire to bring about a desired articulation of interior volume. Pei and Meier also use light to articulate space. Both designers allowed natural light to flow into gallery spaces. The changing light keeps the interior space in a constant state of flux attributing to its dynamic quality. This ties in with Corbusier's central definition of architecture as the play of masses brought together in light. The only space where Saarinen uses natural light to articulate space is in his lobby area.

Space seen in movement is given importance by both Pei and Meier. They have designed their additions so that circulation traffic patterns allow for the experiencing and visualization of spaces while in motion. Circulation paths go through spaces that have been sensitively articulated by planes and natural light. Hence, the emotional impact of the space on the observer is heightened. However, this aspect of space experienced and seen in time was not easily discernible in Saarinen's gallery spaces.

Although ornament was condemned by most Modernists, Saarinen advocated its use. However, Saarinen's ornamentation was no literal or superfluous decorative element. It was abstract as seen in his use of the square motif throughout his building. The repetition of ornament gave a unity to the building. Pei's vertical striations and Meier's square grids on walls could also be interpreted as subtle ornamentation. But the subtle use of
ornamentation conveyed a sense of scale to the building's expression. The use of ornament by these Modernist designers was with a definite purpose. In conclusion, we find that the work of the three designers as seen in the DMAC comfortably fitting with the basic tenets of the Modern Movement.
CHAPTER 2. ANALYZING THE ARCHITECTURE

A building in its totality, consists of many complex elements and attributes which contribute to its expression. By elements, I refer to parts of the building like the floor, the roof, the walls, windows, doors, characteristics like the spatial qualities, moods and emotions that the piece of architecture generates. The analysis of all the elements and attributes poses an enormous task. Also, analyzing all the issues may not prove to be beneficial. The results may be broad and inconclusive. It was beneficial early on to focus on a particular aspect of the building as well as a method of analysis. The focus of the analysis was chosen such that the results would in some way determine and influence the design of the free-standing furniture form.

The analysis of this study centered on the interior of the Des Moines Art Center because it was the immediate context of the free-standing furniture form. My own emotional response to the interiors was one of the main factors influencing the design and construction of the furniture form. While my own emotional response formed the core of the analysis, it was informed in four ways by examining three larger contexts in which the interior was understood. The first was to study the interiors in the context of the Modern Movement of architecture. After discerning the basic tenets of the movement, I attempted to see how faithfully they were expressed in the different wings of the DMAC. Second, I studied the design philosophies of the architects Eliel Saarinen, I. M. Pei, and Richard Meier as well as the literature on their particular contribution to the DMAC. This bridged the gap between the general tenets of the Modern Movement and the immediate experience of the interiors today. The third context was the theory developed by Thomas Thiis-Evensen which is laid out in his book *Archetypes in Architecture*. His thesis revolves around the belief that forms and spaces elicit a definite emotional response among people and that
while many of these responses are personal, some are universal. That is, people from
different cultural backgrounds and with different world views can experience the same
emotions in a place. Thiis-Evensen then elaborates on the delimiting elements of
architecture and proposes what they do and how they do it.

My own experience is in accord with Thiis-Evensen's main thesis: I experience
places in a very emotional way. Whether my emotional response aligns with the response
that Thiis-Evensen suggests I should have, was discussed in the analysis. Thiis-Evensen's
study does provide a very useful method for analyzing the DMAC. He divides buildings into
the floor, walls, and roof. For each, he examines the major forms, construction system,
surface treatment, and openings. Finally, he proposes major themes, what the elements
do, and motifs, how they do it. This way of looking at a building was used to structure my
own observations and documentation. It also served as a foil against which to compare my
own emotional response and at the same time test Thiis-Evensen's thesis.

Finally, Francis D. K. Ching's work Architecture: Form, Space and Order formed the
fourth context, the basis for analyzing and documenting spatial characteristics of the
DMAC. He also uses the major divisions of floor, walls, and roof which are labeled base,
vertical, and overhead planes. Ching elaborates this framework of the three spatial planes
which articulate space and create enclosure. Ching's framework formed the basis for
understanding and describing the interiors spatially, Thiis-Evensen for understanding and
describing it experientially and the reading on the DMAC's architects and the Modern
Movement formed the basis for understanding and describing the interiors in a larger
cultural context. A series of annotated analytical drawings (Figure 2.3 – 2.36) synthesized
my own observations with the information gained from the four relevant contexts described
above. These, then were used as the raw material for designing and constructing the free-
standing furniture form.
Figure 2.1: Site plan of the Des Moines Art Center
Figure 2.2: Floor plan of the Des Moines Art Center
The directional theme concerns the way in which the form of the floor emphasizes certain motions, connecting one place to another. These motions may be generated either by the floor's surface, by its form, or by paths which cross the space. A typical surface pattern is the one created by the boards in a wooden floor. These indicate directions which either cross or parallel the main direction of the space.

This-Evenen

The attached floor: one with the ground. The attached floor emphasizes our conception of the ground as something firm and immovable and conveys the feeling of a solid footing. The material used in the floor's construction affects its degree of attachment to the ground. Wood is independent in a light, it yields, and thus, in essence, differs greatly from the compact ground. Stone, on the other hand, is a part of the ground itself.

This-Evenen

The tile floor in these two spaces conveys a greater degree of attachment to the ground. The degree of attachment is enhanced by:

(i) smoothness of the floor surface giving an impression of solidity and hardness.

(ii) the distinct sound of footsteps when walking on the floor conveying hardness, solidity and therefore immovability. However, the open lobby space coupled with the echo of footsteps sounds creates a feeling of openness and emptiness.

The direction of the floor is parallel to the main direction of the space. The floor gives the space a strong directional quality which urges us to move quickly through the space. Also, the direction of the boards makes the space look longer than it actually is.

The stone floor does not convey any direction. The non-direction is created by the square tiles and a different directional placement of adjacent tiles.

The wooden floor in these two spaces conveys a lesser degree of attachment to the ground. The wooden floor is hard and also generates sound. But the knowledge that it is a composite floor made up of a number of linear boards which can be dismantled tells us that there is a lesser degree of attachment to the ground.

Figure 2.3: Saarinen wing - the directional theme
SAARINEN ADDITION — FLOORS
THE LAYERED FLOOR

"a layered floor is a floor plane in which the form, material and pattern convey
a stratified effect, layer upon layer.
SURFACE AND LAYER EFFECT: In this archetypal, planes lie one upon the
other and are seen through holes and openings. "The deepest layer is understood
as the darker layer, while the layers as they rise, become lighter in color." This-Evensen

TEXTURE AND THE LAYER EFFECT.
"In this archetypal, different combinations of coarse and fine textures create the
layer effect." The deepest layer is understood as the coarsest and the roughest
zone, while the levels as they rise become increasingly geometric and delicate." This-Evensen

THE REFLECTING FLOOR

"The reflecting floor is an indistinct mirror floor. The
simply means that the reflection is not a perfect copy
of the above. The reflection creates a belowness, one
which shifts between light and dark. The ceilings and
forms, objects, and walls are transformed and converted
into diffuse forms as they are reflected downwards.
The reflecting floor enlarges a space downwards. "This-Evensen

The grey carpet and the light wooden floor indicate two
layers. However, the lighter carpet layer is darker in color
and rougher in texture than the light colored, smooth
surfaced wooden floor. The dark color and rough texture
of the carpet makes it lie below the wooden floor area.
The wooden floor, which appears to be raised, creates a
field of space around the carpet area, giving the
impression of a space within a space.

The stone floor in the lobby is a reflecting floor, and the light
flowing through the lobby openings increase the reflectivity of the
floor. The reflections open the space downwards and make the
already spacious lobby seem even more spacious.
One experiences a feeling of openness and emptiness in the space.

Figure 2.4: Saarinen wing - the layered floor
**SAARINEN ADDITION — WALLS**

**MAIN FORMS: THE HORIZONTAL WALL**

"The horizontal wall expresses weight against the ground. Its horizontality gives a compressed and compact first impression. It will therefore have a basically closed and defining character. The motion impulses aroused by this wall type will also increase its closed character. Because it stretches out horizontally, the impulse is to follow along beside it in either direction." — Thiis-Evensen

**THE MASSIVE SYSTEM**

"The massive wall and closure: The massive wall is both supporting and delimiting. This means that the massive wall lends weight to the spatial boundary itself and thereby closes the space. The closure effect of the massive wall is emphasized in buildings in which the main purpose is to isolate and protect the inside space." — Thiis-Evensen

Thickness: "If a massive wall seems thick, it conveys a heavy and therefore closed feeling. A thick wall corresponds to something inert and closed. The thickness indicates compactness and thereby inner resistance." — Thiis-Evensen

The walls enclosing the gallery spaces are basically horizontal, massive walls. The thickness of these walls is seen clearly at the openings into the gallery spaces. The horizontality, massiveness, and thickness of the walls give it a stable appearance and creates a secure and enclosed space. The absence of window openings on the walls also help to enclose the space completely.

The massive horizontal wall without openings encourages a quick, uninterrupted movement along beside it in either direction. The field of space generated by horizontal walls is a space which is horizontal in form, and this space is also conducive to quick movement in its main direction.

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Figure 2.5: Saarinen wing - main forms
Figure 2.6: Saarinen wing - the massive system

**SAARINEN BUILDING — WALLS**

**The massive system:**

Fine texture: The finely grained wall surface seems soft. In a way it is exposed and open; it does not seem rejecting to touch. A fine texture is associated with porosity, thereby a warm and protected space.

Patterns:

Patterns, made up of horizontal compositions, have an inert and heavy character. The reference is the ground, not only because the weight seems to be heavily on it, but also because motion parallels it.

Three types of walls can be identified in the galleries. Majority of the walls are painted white, and have a fine texture. However, the fine texture doesn’t seem to affect the character of the space or elicit any emotional response.

This wall is covered completely by wooden panels. Horizontality is emphasized by the pattern on this wall. The groove, the wooden moulding strip and the trim all run uninterrupted horizontally. The patterns give the wall a stable appearance and encourage quick horizontal movement along it.

The lobby wall is covered by wooden panels almost completely, except for a small painted wall strip near the ceiling. The panels are arranged in a square pattern. However, the horizontal metal strips dominate and emphasize the horizontality. This gives the wall a stable and heavy appearance.
The rising motif: "In the rising motif, the middle field is pushed upward in relation to the walls’ centerline. In this way, the lower field becomes the largest, the upper the most narrow. The described relation between the upper and lower parts of a wall as the lighter and heavier is the canon for the experience of the wall’s vertical expression." — This - Evesen

The sinking motif: "represents the opposite of the rising motif. The middle field is now drawn below the walls’ centerline so that the section above becomes the largest, while the lower section becomes the most narrow. The result is a ‘sinking wall.’” — This - Evesen

The rising motif in the lobby accentuates the vertical spaciousness of the lobby. The walls seem to rise upward because of the larger lower field of the wooden panels. The space as a result seems to expand upward. However, the large lower field of wooden panels is overwhelming in scale and gives the space an overscaled and empty quality.

The sinking motif, as used on the walls of Saarinen’s gallery, accentuates the horizontality of the walls. The horizontal form gives the wall a stable appearance therefore protecting and enclosing the interior space.
Figure 2.8: Saarinen wing - the breadth theme

**The Split Motif**

"In the split motif, the corners dominate over the middle section and the open field is pressed together. This motif points towards an increasing closure by squeezing the middle together." — This-Evensen

**The Side Motifs**

"The middle section is located either to the right or to the left. In this way, the corners are also different. In an asymmetrical facade, we are led indirectly to the center and therefore, the placement does a more private character." — This-Evensen

The split motif opens centrally into a space. The narrow opening in relation to the wall facade is indicative of a protected interior space. The opening's central location indicates that the side spaces are to be protected equally.

The side motif is also indicative of a protected interior space. However, due to the side location of the entrance, the side to the right or left of the entrance, depending on its location, is to be protected to a greater degree.
Figure 2.9: Saarinen wing - windows

The profile. 'The impression that the motion is from the outside towards can be heightened or lessened by the openings. Profiles or reveals a cut at right angles to the wall emphasizes motion from the outside. The strength of the wall is weakened, it offers no resistance.' This-Evensen

The face. 'The face outermost in the opening. In placing the window face outermost in the opening, the interior space appears to extend right out to the wall face. This can result in two effects. In the first, the entire volume of the building seems overlaid. In the second, the wall gives the impression of being a thin skin.' This-Evensen

Door casings. 'The frame motif. The casing or frame is both the setting and an accentuation of whatever is within it. As an entrance motif, this means that it accentuates the person about to enter.' This-Evensen

The opening's profile is a cut at right angles to the wall. This-Evensen says, that such a profile suggests motion from the outside. However, the opposite is experienced. The lobby space is volumetrically large, and expands in all directions and the motion of the space seems more powerful from the inside to the outside. The face is also in line with the exterior facade and the suggests an overlaid volume that is trying to expand.

Two types of frame motifs are seen. On walls with wooden panels, openings are emphasized by a painted band which borders the opening. On painted walls, the openings are accentuated by a wooden mould. The accentuation of the opening does hint at the importance of the space beyond.
A U-shaped configuration of vertical planes defines a field of space. As the plan is unfolded, the area resembles a square, and the movement through the field is square. If one enters a long, narrow field, the space will evolve and the zone will change. When it is open, the space seems to open up. If the end of the field is square, the space will be static, and movement through it will be limited. If the end is square, the space will be open, and movement through it will be free.
Four vertical planes completely enclosing a field of space is probably the most typical, and certainly the strongest, type of spatial definition in architecture. Since "the field of space is completely enclosed," its space is introverted.

No spatial or visual continuity is possible with adjacent spaces without openings in the planes enclosing the field. At the same time these openings provide continuity with adjacent spaces, they can, depending on their size, number and location, begin to weaken the enclosure of the space.” — Chung

Although the space is introverted as a result of closure, the space is uncomfortable to be in. The proportion of the space seems to be the critical factor here. The almost linear form of the space gives it a dynamic quality. As a result, the space is always in motion and not intimate or comfortable to be in.
SAARINEN BUILDING — THE ROOF

THE FLAT ROOF

The flat roof of Saarinen's building is described with a series of observations. The flat roof, or ceiling, will direct the space equally in all directions. Motion is spread horizontally, and in the relationship of above and below, the flat roof is like a rigid lid. Consequently, the flat roof is basically unaffected by the environment and in principle without expression. —Tuija E. Evenen

A flat roof may seem raised or hovering if the roof zone appears to be detached from the walls below. —Tuija E. Evenen

The flat roof takes on a gentle curve at the corners. As the space is volumetrically horizontal and linear, the space seems to be acted on by a force from above which causes the roof to curve. As a result, the space seems compressed and uncomfortable to be in.

The curved roof conveys an impression of an overlapped volume trying to expand upwards. The volume of the space is large, overwhelming, and uncomfortable to be in.

The flat roof hovers over the space. As a result, an invisible field of space is generated which envelopes the space. There is a portion of a space within a space. The space feels secure because of the flat plane closure. The space within a space increases the feeling of closure which contributes to the intimacy of the space.

Figure 2.12: Saarinen wing - the flat roof
The attached floor is one with the ground. The attached floor emphasizes our conception of the ground as something firm and immovable and conveys the feeling of a solid footing. The material used in the floors construction affects its degree of attachment to the ground.  

"This-Evensen"

The directional theme concerns the way in which the form of the floor emphasizes certain motions connecting one place to another. These motions may be generated either by the floors surface, by its form, or by paths which cross the space.  

"This-Evensen"

The floor material used throughout the entire Pei addition is stone. The stone floor gives the impression of solidity, harshness, heaviness, and therefore immovability and attachment. The distinct sound of footsteps when walking on the floor also conveys harshness and attachment. The floors expression of solidity and attachment to the ground is tied to the buildings expression of heaviness and solidity.

The stones are arranged as seen in the sketch. Since the arrangement of the stones are staggered, the floor's expression of motion is dominant only in one direction. However, this directional aspect doesn't have any discernible impact on the quality of the space or on the emotions of a person in the space. This is because the seams between the stone tiles are not easily seen. Therefore, the floors direction isn't perceived and does not elicit any emotional response.

Figure 2.13: Pei addition - the attached floor, the directional theme
Narrow stairs: "Stairs are the connecting link between below and above. In study of architectural stair forms, there are four basic motifs which determine the motion expression: breadth, slope, attachment, and form. A narrow flight of stairs seems intended for the spectator alone or, at most, one other person. It is the visualization of a personal space—it is private. This content is further emphasized in that narrow stairs invite quick movement." — Thies-Evensen.

Shallow stairs: "Shallow stairs are secular, widely spaced steps are conducive to a calm and comfortable pace. The shallow gently sloping stairway is in a way so well arranged that it demands little exertion and is easy and natural." — Thies-Evensen.

Free-standing stairs: "A free stairway is released from the ground and stretches over and above it. The free stair flight shares the quality of the bridge. It is supreme, active and compels greater speed than the firmly fixed flight." — Thies-Evensen.

The stairs leading to the lower gallery is narrow, shallow and free-standing. Thies-Evensen suggests quick movement on a narrow and free-standing stair. However, the shallow character of the stair takes precedence and one tends to traverse the stairs slowly. The slow movement along the stairs is welcome because it allows us to consciously experience the scale of the sunken gallery space. One is forced to pause at the top landing to change direction before climbing down. This pause gives us an opportunity to experience the scale of the sunken gallery. Also, the wall on one side of the stair forces our view onto the sunken gallery.

Figure 2.14: Pei addition - the directional floor
Narrow Stairs:  
"A narrow flight of stairs seems intended for the spectator alone or, at most, one other person. It is the visualization of a personal space — it is private. The content is further emphasized in that narrow stairs invite quick movement."  
Thiss-Evensen

Steep Stairs:  
"To climb a steep flight of stairs is physically exhausting; we move against the force of gravity, which pressure us downwards. On a really steep flight, one is compelled to hurry to the top for fear of falling backwards and down. Steep stairs therefore also convey an impression of a struggle for survival."  
Thiss-Evensen

Firmly Fixed Stairs:  
"By a firmly fixed stairway, we mean one in which the whole body rests solidly on the ground. Fixed stairs are like the attached floor and share with it a character of physical unity with the ground. Thus the stairs may give an impression of the ground itself rising, either by springing up from the ground or by rising with the ground."  
Thiss-Evensen

The spiral stair is narrow, steep and firmly fixed. The entire stair can never be seen as a whole, since it is sculpted within a concrete mass and well hidden from view. This hidden characteristic gives the stair a sense of mystery and adventure. One is curious to find out what lies below the stair. Even while climbing the stair, its spiral character does not allow us to see very far beyond and this heightens the mystery and adventure. The narrowness of the stair does force us to move quickly on it.

Figure 2.14: (continued)
The base plane depressed: "The degree of spatial continuity between the depressed field and the surrounding area depends on the scale of the level change. Once the original base plane is above our eye level, the depressed field becomes, in effect, a separate and distinct room in itself." - Ching

The sunken floor: "When faced with a downward slanting floor, one feels a spontaneous sensation of accelerating speed, in contrast to the rising floor, which restrains movement. The downward sloping floor exerts its own additional pull to that which the natural force of gravity exerts on our normal movements." - This-Evensen

The directional floor: "Certain floor elements are especially designed for the sole purpose of leading us forward. The bridge is an example. On a bridge we are in a state of tension between insecurity and fear (the pull) and total dependency and surrender (the bridge). The bridge, assumes value as something strong and victorious which occupies the empty space it spans. Having crossed the bridge, the feeling of having reached the goal comes as a relief from having 'survived' a tense situation." - This-Evensen

The bridge spanning the sunken gallery space is strongly directional and leads us forward to the hidden goal (spiral stair). Our movements on the bridge is slow. One feels some tension while crossing the bridge, and this forces us to look around and below into the sunken gallery space. One experiences a sense of excitement, when viewing the gallery space from a unique vantage point - the bridge.

The scale of the level change between the base planes is large, which gives the depressed field a distinct spatial character. When walking on the original base plane, we can't see the depressed plane and there's an air of curiosity as to what lies beyond. Our curiosity propels us forward and slowly the depressed plane comes into view. The large scale of the sunken gallery space makes one consciously notice the space.
The horizontal wall: "The horizontal wall expresses weight against the ground. Its horizontality gives a compressed and compact first impression. It will therefore have a basically closed and delimiting character. The motion impulses aroused by this wall type will also increase its closed character. Because it stretches out horizontally, the impulse is to follow along beside it in either direction." - This-Evensen

The vertical wall: "The vertical wall always seems lighter because of its rising effect. It attracts our attention and like a dominating landmark, it is the focus of all attention." - This-Evensen

The majority of the walls are vertical and they contribute in giving the space a vertically expansive character. As a result, one perceives the scale of the space to be large. The large scale of the space throughout the entire gallery makes us consciously notice the space.

The walls along the entrance corridors are horizontal. As a result, the corridor space seems compressed. The horizontal walls elicit quick movement through the corridor space.

After passing through a compressed space, we enter the main gallery space where the large scale effect is distinctly felt and experienced.

Figure 2.16: Pei addition - main forms
PEI ADDITION - WALLS

THE BREADTH THEME

The Breadth Motif:

"In this motif, the middle section dominates. This domination can be accentuated in many ways. The windows in a wall can be larger and greater in number at the center than at the corners." - Thuis-Evensen

The side motifs:

"The middle section is located either to the right or to the left. In this way, the corners are also different. In an asymmetrical facade, we are led indirectly to the center and therefore, this placement elicits a more private character." - Thuis-Evensen

THE HEIGHT THEME

The height motif:

"In the rising motif, the middle field is pushed upward in relation to the wall's centerline. In this way, the lower field becomes the largest, the upper the most narrow. The described relation between the upper and lower parts of a wall as the lighter and heavier is the cannon for the experimine of the wall's vertical expression." - Thuis-Evensen

In the corridor space, the opposite walls are articulated differently. The 'breadth motif' is expressed on one wall and the middle section consists of a window. The window relieves the introverted nature of the space and one pauses to stand and look out. This punctuation of the wall is welcome. The view is pleasant and the openness takes us by surprise. The opposing wall consists of the side and rising motif. Window openings are small and the wall has a closed character. That way, the emphasis remains on the opposite wall.

The rising and side motifs keep the space introverted and give it a closed character. One of the walls has windows on its three sides, and the wall is washed with light. The wall seems detached from the main structure and space.

Figure 2.17: Pei addition - the breadth theme, the height theme
The coarse texture on the walls give it weight. The walls seem heavy, stable and firmly rooted. One moves carefully along the walls because of the danger of being scratched. Although the walls look heavy, the vertical pattern gives the wall a rising character. The two opposite effects are juxtaposed on the same element which allows us to notice each effect closely. However, due to the horizontal nature of the wall, the heavy and stable character of the wall seems dominant.

Figure 2.18: Pei addition - the massive system
The walls are made of concrete and the thickness of the walls are seen through the slab like columns. Thickness gives an impression of heaviness and permanence to the structure. The entire length of the side walls have no openings and space is delimited on the sides. A closed feeling is conveyed along the sides; space is forced to flow along the length of the gallery space. That way, our focus and movement is also along the length of the gallery space - towards the open ends of the gallery.

The massive wall and closure: The massive wall is both supporting and delimiting. This means that the massive wall lends weight to the spatial boundary itself and thereby closes the space. The closure effect of the massive wall is emphasized in buildings in which the main purpose is to isolate and protect the inside space. 

"This is the system."

Thickness:

"If a massive wall seems thick, it conveys a heavy and therefore closed feeling. A thick wall corresponds to something inert and closed. The thickness indicates compactness and thereby inner resistance."

"This is the system."

Figure 2.19: Pei addition - construction systems
The skeleton system

The framework of support:

Support expression may mean that certain skeleton systems seem heavy and overloaded so we hesitate to enter. Others may seem strong and light so that we feel no danger in entering. Support expression is particularly determined by the system's plastic character, which in turn is decided by how individual columns and beams are articulated and joined together. *Tvis-Evensen

The frame's expression of motion:

The motion expression is determined by the way in which the skeleton system impels our movements. It concerns the treatment of the columns, beams and floor. *Tvis-Evensen

Beams in the central space are deep and convey the carrying of a heavy load. The beams are directional and are arranged to form a non-directional square central space. The heaviness of the central space, because of the heavy load, forces us to pause to consciously experience the central space.

Beams along the sides are slender and convey the carrying of a light load. They are strongly directional. Along with the rectangular slab columns, they elicit movement along their length. The lightness of the space, because of the light load, also adds to easy movement.

Beams above the sunken gallery space run in a direction perpendicular to the length of the gallery space. They are slender and strongly directional. A person on the bridge tends to turn to moments himself along the direction of the beams. Once centered, the person has an opportunity to experience the scale of the sunken gallery space. And, there seems to be a tension of directional force in the gallery. Beams, floor pattern, and proportion of space enforce one direction, while the vertical support slats between windows enforce another direction.

Figure 2.20: Pei addition - the skeleton system
PEI ADDITION — VERTICAL PLANES

Parallel vertical planes:
“A set of parallel vertical planes defines a field of space between them. The open ends of the field, established by the vertical edges of the planes, give the space a strong directional quality. Its primary orientation is along the axis about which the planes are symmetrical. Since the parallel planes do not meet to form a corner and enclose a portion of the field, the space is extraverted in nature.” — Ching

U-shaped planes:
“A U-shaped configuration of vertical planes defines a field of space that has an inward focus as well as an outward orientation. At the rear of the configuration, the field is enclosed and well defined. Toward the open end of the configuration, the field becomes extraverted in nature. If the end of a long narrow field is open, the space will encourage movement and be conducive to a progression or sequence of events.” — Ching

This addition is composed of numerous parallel vertical planes. They give the space a strong directional quality and they direct, along the length of the gallery space. The two planes comprising the parallel vertical planes are in close proximity and they tend to push a person through that field of space. Also, the field of space generated by the parallel vertical planes is smaller in scale, enclosed and cozy in contrast to the rest of the gallery space.

U-shaped planes are used sparingly within the gallery and they are used as punctuation points along a predetermined path. The U-shaped planes past the entrance corridor is a definite punctuation. It is a surprise element on the otherwise linear wall surface and one tends to pause at the space defined by the U-shaped plane. Also, the U-shaped plane initiates the thrust of movement into the gallery space.

The other U-shaped plane is at the upper level, at the landing of the stair to the sunken gallery. This space is an articulate punctuation and a welcome surprise. Natural light from skylights above flood that space giving it a “beautiful” quality. We “pause to look at the space.”

Figure 2.21: Pei addition - vertical planes
Both the north and south faces have a combination of horizontal and vertical window forms. The windows at the extremes are vertical while the middle section is composed of horizontal windows.

The influence of the vertical windows on the north face is not felt because they don't go very tall. One perceives an overall horizontal impression. The horizontality makes us move along the face and the tendency is to look out into the open courtyard. An opportunity is created to experience and appreciate the exterior and interior while in motion.

On the south face, the influence of the vertical windows are strong because of their fallacy. We tend to step in front of the windows and look out. Here, the opportunity is created to experience the exterior from a stationary position. The aligning 'horizontal' composition of windows leads us to move along the face and appreciate the exterior and interior space while in motion.

Pei has skilfully combined elements to experience the space and architecture in statics and motion.

Figure 2.22: Pei addition - windows
PEI ADDITION — WALLS

WINDOWS

The profile:

"The impression that the action is from the outside, upwards can be heightened or lessened by the openings, profiles or reveals. A cut at right angles to the wall emphasizes rhythm from the outside. The strength of the wall is weakened, "it offers no resistance." — T.G. Eversen.

The face inside the opening:

"With a window face inside the opening, the wall face and window face will be perceived as parts of two independent layers extending freely alongside one another. The window face gives the effect of being part of an independent membrane, around a separate interior behind the stiff wall." — T.G. Eversen.

The face outermost in the opening:

"In placing the window face outermost in the opening, the interior space appears to extend right out to the wall face. This can result in two effects. In the first, the entire volume of the building seems overlaid. In the second, the wall gives the impression of being a thin skin." — T.G. Eversen.

Windows are located only on the north and south faces. The profile on all the windows reveals a cut at right angles to the wall. This conveys a strong impression of a flow of space from the exterior through the entire gallery.

Most windows have their faces inside the opening giving the impression of space trying to force its way into the gallery from the exterior. Also, the windows are located at the interior edge of the vertical concrete fins which further strengthens the impression of space penetrating from the exterior.

The sunken gallery has a large scale, therefore a large volume of space. This large volume of space seems to want to extend outwards through the lower windows. This impression is created by the lower windows in the sunken gallery which have window faces outside the opening and the windows are located at the exterior edge of the vertical concrete fins.

Overall, the windows indicate a strong space flow between the exterior and the interior.

Figure 2.22: (continued)
This-Evensen suggests that the flat roof is basically without expression. In Pei's addition, the flat roof is articulated by beams. This articulation gives the space enclosed by the flat roof a strong directional quality along the direction in which the beams span.

The space enclosed by the shed roof is non-directional because the space is large in scale and almost square in form. Here, our immediate reaction is to look at the form of the shed roof, look around the gallery, and appreciate the space from a stationary position. The variation of the scale of spaces caused by the shed roof in relation to the scale of spaces within the gallery, is welcome. It allows us to experience different spatial qualities within the gallery.

The shed roof suggests that the volume of space is large and wanting to expand upwards. The form of the roof suggests that "it may have originally been flat but because of the force of the expansive space, the roof has opened upwards with the central beam as a pivot."

Figure 2.23: Pei addition - the roof
Figure 2.24: Meier addition - floor plans
MEIER ADDITION - FLOORS

The attached floor:
"...is one with the ground. The attached floor emphasizes our conception of the ground as something firm and immovable and conveys the feeling of a solid lifting... The material used in the floor's construction affects its degree of attachment to the ground." - This-Elvensen

The directional theme:
"The directional theme concerns the way in which the form of the floor emphasizes certain motions: connecting one place to another. These motions may be generated by the floor's surface, by its form, or by paths which cross the space." - This-Elvensen

The sunken portion on the first level has stone flooring and the stone tiles are dark grey in color. One perceives the sunken section to be below ground level and the dark stone flooring is successful in conveying a greater degree of attachment to the ground. The color and material of the floor makes it look solid and heavy and the weight seems to have caused the floor to sink. A square pattern is present on the stone floor. The joints between tiles are also dark in color and merge with the dark tile color. As a result, the pattern is not easily perceived and the floor doesn't convey any direction.

Wood is the material used on the first level. The movement of the floor boards when one walks on them conveys a lesser degree of attachment to the ground. The light color in contrast to the dark stone floor also gives a sense of an upper level and lesser attachment to the ground. The wooden boards give a strong directional quality to the floor. In corner spaces, the direction is slightly due to the length of the wooden boards which is reinforced by the directional qualities of the walls. The direction of the floor in the square central space isn't as strong as a result of the square proportion of the space.

Figure 2.25: Meier addition - the attached floor, the directional theme
The base plane, depressed:
"The degree of spatial continuity between the depressed field and the surrounding area depends on the scale of the level change. Increasing the depth of the depressed field weakens its visual relationship with the surrounding space, and strengthens its definition as a distinct volume of space." — Ching

The reflecting floor:
"The reflecting floor is an indistinct mirror floor. This simply means that the reflection is not a perfect copy of the above. The reflection creates a belowness, one which shifts between light and dark. The ceilings and forms, objects and walls are transformed and converted into diffuse forms as they are reflected downwards. "The reflecting floor enlarges a space downwards." — This-Zeisen

Visual continuity is retained between the sunken and upper section of the first level however, the sunken section possesses a distinct spatial characteristic, designating it as a distinct volume of space. This distinct spatial character is a result of the different flooring materials and colors of floors of the two sections. The sunken section feels cold and empty, making it uncomfortable to be in. The feeling is due to the cold grey color of the stone floor. Also, the sunken gallery looks empty, because there are many objects displayed on the rather large floor space.

The wooden floors are reflecting floors. The emphasis is on the vertical enlargement of space downwards. Natural light which floods the gallery, spaces increases the reflectivity of the floors. It results in an illusion of a vertical enlargement of space downwards.

Figure 2.26: Meier addition - the base plane depressed, the reflecting floor
MEIER ADDITION — FLOORS
THE DIRECTIONAL FLOOR

Narrow Stairs:
*A narrow flight of stairs seems intended for the spectator alone or, at most, one other person. It is the visualization of a personal space — it is private. This content is further emphasized in that narrow stairs invite quick movement.*

— This-Evensen

Shallow Stairs:
*Shallow stairs are secular. Widely spaced steps are conducive to a calm and comfortable pace. The shallow gently sloping stairway is in a way so well arranged that it demands little exertion and is easy and natural.*

— This-Evensen

Free-standing Stairs:
*A free stairway is released from the ground and stretches over and above it. The free stair flight shares the quality of the bridge. It is supreme, active and compels greater speed than the firmly fixed flight.*

— This-Evensen

Firmly Fixed Stairs:
*By a firmly fixed stairway, we mean one in which the whole body rests, solidly on the ground. Fixed stairs are like the attached floor and share with it a character of physical unity with the ground. Thus the stairs may give an impression of the ground itself rising, either by springing up from the ground or by rising with the ground.*

— This-Evensen

The stair between the second and third level is free-standing, between the second and first firmly-fixed. Otherwise, both stairs are narrow and shallow. Although the stairs are narrow, their shallow characteristics is dominant and one tends to move slowly along the stairs. One gets the opportunity to appreciate the verticality of the space in the staircase core.

The lower stair is firmly-fixed expressing a strong attachment to the ground. It looks heavy visually, safe and stable. The steps are made of wood. The upper stair is free-standing and the steps are made of transparent glass blocks. The stair looks light visually and one feels anxious to climb the stair.

The transition from heavy to light, from lower to upper levels is appreciated and distinctly seen through the stairs' expression.

Figure 2.27: Meier addition - the directional floor
Two vertical walls are placed in the space in which the stairs are located. The walls extend unobstructed from the first level floor up to the third level roof. The vertical walls further strengthen the vertical emphasis of this space. The walls are the focus of our attention. While climbing the stairs, we look at the vertical walls and subsequently at the entire vertical space.

Meier has used the vertical walls to attract our attention and as a result, an opportunity to appreciate the vertical space.

When walking around a convex wall, we can never see our destination, the end of the wall, until we actually reach the end. One is intrigued to see what comes around the corner and walking along the wall is an exciting experience. The concave wall expresses security and forms a small scaled, early enclosed space. This space is a definite punctuation in the otherwise open flowing spaces in the rest of the gallery. We interact with the wall by pausing by it, and even entering the enclosed space to experience a change of scale.
Parallel vertical planes:

A set of parallel vertical planes defines a field of space between them. The open ends of the field established by the vertical edges of the planes gives the space a strong directional quality. Its primary orientation is along the axis about which the planes are symmetrical. Since the parallel planes do not meet to form a corner and enclose a portion of the field, the space is extraverted in nature.” Ching

L-shaped planes:

An "L" configuration of vertical planes defines a field of space along a diagonal from its corner outward. While this field is strongly defined and enclosed by the corner of the configuration, it dissipates rapidly as it moves away from the corner. While the field is an extraverted one at its inside corner, it becomes introverted along its outer edges.” Ching

The influence of parallel vertical planes and L-shaped planes are felt strongest in the square gallery space of the second and third levels. The planes generate a field of influence along the diagonal in the case of the L-shaped planes and in between planes in the case of parallel vertical planes. The result is a central focus in the gallery space.

The planes have a distinct influence. We unconsciously tend to move to the center of the space. We are then presented with an opportunity to experience the space from a central vantage point. Also, the ‘Square’ central ‘Space is static in nature and non-directional giving us a good opportunity to experience the space without being forced to ‘move about’.

Figure 2.29: Meier addition - vertical planes
MEIER ADDITION — WALLS
CONSTRUCTION SYSTEMS

The massive system:
“The massive wall and closure. The massive wall is both supporting and delimiting. This means that the massive wall lends weight to the spatial boundary ‘itself’ and thereby closes the space. The closure effect of the massive wall is emphasized in buildings in which the main purpose is to isolate and protect the inside space.” Thùs-Evensen

Thickness:
“If a massive wall seems thick, it conveys a heavy and therefore closed feeling. A thick wall corresponds to something inert and closed. The thickness indicates compactness and thereby ‘inner resistance.’” Thùs-Evensen

Fine texture:
The finely grained wall surface seems soft. In a way it is exposed and open, it does not seem rejecting to touch. A fine texture is associated with porosity, thereby a warm and protected space.” Thùs-Evensen

Figure 2.30: Meier addition - construction systems
MEIER ADDITION — WALLS

THE SKELETON SYSTEM

The frame's expression of support:

"Support expression may mean that certain skeleton systems seem heavy and overladen so we hesitate to enter. Others may seem strong and light so that we feel no caution in entering. Support expression is particularly determined by the system's plastic character, which in turn is decided by how individual columns and beams are articulated and joined together." — This-Evensen

The frame's expression of motion:

"The motion expression is determined by the way in which the skeleton system impels our movements. It concerns the treatment of the columns, beams and frame." — This-Evensen

The frame's expression of support and motion is best seen in the African art gallery section of Meier's addition.

There are two beams with a large space in between resting on the same columns. The space between the two beams seem to indicate that a light load is being supported. As a result, the whole structure looks light, and we don't hesitate to enter through the frame.

The frame designates three distinct gallery enclosures and an adjacent corridor space. The frame directs our movement along the corridor enclosure, and from the corridor into the individual gallery enclosures. There is a predetermined channeling of traffic through the gallery space.

Figure 2.31: Meier addition - the skeleton system
The circular columns are fairly large in diameter and appear to carry a heavy load. They are the main supports of the central gallery core. Their circular form allows free movement between them and the L-shaped planes. Freedom of movement of traffic and space is the emphasis of the central space and the circular columns help accentuate that character.

Square columns are placed on the approach to the central gallery. They are slender and appear to carry a light load. Their primary function is to direct traffic into the central gallery rather than support the above structure. Two columns are free-standing and have crisp corners. One tends to keep a safe distance from the columns when walking by them.

Figure 2.32: Meier addition - round and square columns
MEIER ADDITION - WALLS

THE SKELETON SYSTEM - ROUND AND SQUARE COLUMNS

Surrounding spaces:
The round column is released from its surroundings because nothing can be joined to it. The square on the other hand, has four sides to which walls and slabs may be added. A round column in a wall stands out because the wall is straight and the column curved. — Thus-Evensen

Surrounding spaces:
In principle, round columns lend freedom to space, both vertically and horizontally. The columns have the same diameter from top to bottom and are without base or capital. There is nothing to prevent the columns from continuing on through the slab in both directions. Nor do the slabs seem attached to the column shafts, they seem almost invisible, as if they could be slid up and down the columns. If these same columns are square instead, the overall impression would be one of adding isolated units. The slabs between the stories would appear to be whole units, unpenetrated but carried by superimposed supports. — Thus-Evensen

Free-standing walls stop just short of the circular columns. This allows movement all around and between columns and the L-shaped planes. Freedom of movement of traffic and space is emphasized in the central space. The circular columns do indeed express continuity through floor slabs in both directions. This further expresses freedom of movement in the vertical direction. The continuous aspect of the columns also strengthen the vertical emphasis of the gallery spaces.

No walls are joined to the two square columns along the approach to the central gallery. Although free-standing by nature, one doesn't move around the columns because of their crisp pointed corners. Also, these columns tend to frame the wall space which is used for display. The columns don't appear to be continuous through the floor slabs. The slabs appear as unpenetrated whole units. The aspect expresses delimitation of space veritably giving the space a strong horizontal direction. As a result, the space serves to direct traffic into the central gallery space.

Figure 2.33: Meier addition - spaces surrounding round and square columns
All windows in Meier's addition have a profile which is a cut at right angles to the wall. The profile expresses freedom of spatial movement in both directions, but especially movement from the interior to the exterior. This is because the window face is outermost in the opening, expressing an overlaid space trying to push its way out.

Figure 2.34: Meier addition - windows
The opening articulation:

"A flat roof may seem open if the walls are continued without interruption part of the way into the ceiling area. If the walls are light and the roof dark, a hole may be created which combined with the extended walls, gives the space an effect of opening upward." — They-Evensen

The shed roof:

"The shed roof is one half of a gable roof, and is pitched in one direction only. It creates, therefore, an asymmetrical space. By this a means that in moving along the length of the space or traversing it, the feeling in both cases will be of a transitional stage, between 'two conditions'. Largely the diagonality will accent the roofs' tension between rising and sinking, between vertical and horizontal. Transversely the shed roof will both open and close, both rise towards the exterior space and sink towards the ground." — They-Evensen

The clerestory openings and the skylight are the expression of the roof's opening articulation. The gallery space seems overlaid and has a strong vertical emphasis. One perceives the space moving vertically and going through the skylight and clerestory openings.

The pyramidal roof over the third level is a combination of four shed roofs arranged about a central point. The pyramidal roof defines a center in the gallery space. As a result, one feels drawn to the center and from there experience the entire gallery space.

There is a symmetry of space in the central gallery, and the pyramidal roof defines and directs towards the 'heart' of the gallery.
The flat roof: "The flat roof or ceiling will direct the space equally in all directions. Motion is spread horizontally, and in the relationship of above and below, the flat roof is like a rigid lid. Consequently, the flat roof is basically unaffected by the environment and in principle 'without expression.'" Thies-Evensen

The flat roof: Uplifting articulation

A flat roof may seem raised, or hovering; if the roof zone appears to be detached from the walls below." Thies-Evensen

The roof on all levels except the roof of the central space of the third level are flat roofs. The flat roofs are essentially without expression and are not articulated in any way. The spatial character of the gallery is dictated by other floor and wall elements.

The flat roof over the sunken section of the first level appears to be hovering in space because of the soft, the edge of the soft defines a "field of space along the perimeter wall." The expression is of an envelope of space surrounding the main sunken gallery space. The resulting effect is the impression of a space within a space.

Figure 2.36: Meier addition - the flat roof
Concluding synthesis

At the conclusion of the analysis of the DMAC, it became evident that there was a large body of data pertaining to the building's expression, a result of the analysis modeled after methods developed by Thiis-Evensen and Ching in which individual building elements are closely analyzed and their expressions determined. To use this data as a springboard for a design became increasingly difficult because of the diversity and volume of data.

My own emotional response was an important force directing the analysis and synthesis of data and the design of the free-standing furniture form. The most significant impact of the building's interiors on my emotions was space. The way spaces flowed through the entire building and the way space was sculpted resulted in strong emotional responses. Scully's statements on the "continuity and permanence of space and structure" in modern buildings was most pertinent in this context.²⁹ It became apparent that individual building elements which were analyzed, supported the theme of continuity and permanence of space. I elaborated on this idea with the help of drawings (Figure 2.37–2.46). I established a link between the individual building elements and their role in articulating space to support the theme of continuity and permanence.

Analysis of the DMAC confirmed Scully's concept of continuity and permanence of space and structure of modern buildings. Scully promoted the idea that the architecture of a period was a reflection of the state of humans during that period. Modern architecture was evolving during the later eighteenth century, during the periods of the industrial and democratic revolution. This was a time period in which previously accepted religious values were disintegrating and being rejected. Structured ways of life were falling apart.

²⁹Vincent Joseph Scully, 18.
As a consequence, man found himself alone, without the security of being able to depend on religion or something comprehensible.\textsuperscript{30} Nietzsche in \textit{Thus Spake Zarathushtra} writes that "man is alone because God is dead."\textsuperscript{31} During this period of absurdity, humans found themselves with an incessant need for security and something comprehensible to belong to. Yet they possessed a strong desire and a need to express their individuality as a means to progress and change. This conflicting desires within humans was reflected in the architecture of the period as a \textit{juxtaposition} of continuity and permanence of space which resulted in a spatial tension. It is this juxtaposition of opposites resulting in spatial tension that will be established through the final synthesis of the building analysis.

\textbf{Saarinen wing}

In the Saarinen wing, continuity and permanence is seen as a juxtaposition of dynamic gallery spaces and the static lobby space. The lobby space is static in nature as a result of the square proportions of the space. Although "U" shaped planes compose the lobby space, the space appears square and static. Also, the space seems heavy due to the relatively large scale of the lobby interior. Oak panels in the lobby interior, support a rising motif which contribute to the lobby scale appearing large and therefore, a heavy, static space within.

\textbf{Figure 2.37: Saarinen wing - square, static space}

\textsuperscript{30}Vincent Joseph Scully, 10.
Continuity and dynamism of gallery spaces can be attributed to the following. The gallery spaces have linear proportions and low ceiling heights which emphasize a strong, continuous, horizontal movement of space. The walls enclosing the gallery spaces are basically horizontal, massive walls. The thickness of these walls is seen clearly at the openings into the gallery spaces. The horizontality, massiveness, and thickness of the walls give it a stable appearance and create a secure and enclosed space. The absence of window openings on the walls also help to enclose the space completely. These massive, horizontal walls without openings, encourage quick, uninterrupted movement along beside it in either direction. The field of space generated by these walls is a space which is horizontal in nature and flowing continuously and uninterrupted through the gallery.
The wall and floor patterns in the gallery also accentuate this movement of space. The direction of the wooden floor boards are parallel to the main direction of the gallery space. They give the space a strong directional quality emphasizing a continuous, uninterrupted spatial flow. Wall patterns in this space also emphasize a flow of space along the length of the gallery.
As a result of these varying expressions, we find a spatial tension created by the static and dynamic, permanent and continuous characteristics of space is seen and experienced in the Saarinen wing.

**Pei addition**

Continuity and permanence of space is articulated by the following building elements in the Pei addition. Parallel vertical planes and massive walls allow a strong space flow along the length of the gallery. The walls are of concrete and the thickness of the walls are seen through the slab like columns. Thickness gives an impression of heaviness and permanence to the structure. The entire length of the side walls have no openings and space is delimited on the sides conveying a closed feeling. Space is forced to flow along the length of the gallery.

Figure 2.41: Pei addition - the massive system, thickness
Pei's addition is composed of numerous parallel vertical planes. The entire Pei gallery can be visualized as a space enclosed by a pair of parallel vertical planes. They give the space a strong directional quality. As a result, space flows continuously throughout the entire gallery length.

Beams above the side spaces in the Pei wing are also articulated to express a strong space flow. Beams along the sides are slender and convey the carrying of a light load. They are strongly directional. Along with the rectangular slab columns, they express a powerful movement of space along their length. The beams supporting the shed roof are articulated and arranged that they generate a field of space that is square in form. The square form results in a static space. The supporting beams for the shed roof are massive in comparison to other beams within the Pei addition. The size of these beams further strengthens the notion of a heavy, static and therefore permanent space.

Figure 2.42: Pei addition - parallel vertical planes
Figure 2.43: Pei addition - the frame's expression of motion

**Meier addition**

Continuity and permanence of space is articulated by the following building elements in the Meier addition. The central gallery space is composed of three levels. Each level consists of a central space which is square in form. This space by virtue of its form is static in nature and expresses permanency. Moreover, the planes enclosing this space are parallel vertical and "L" shaped planes. These planes are arranged around a square perimeter and thereby generate fields of square, static space. All these square spaces have a strong central focus. Also spaces adjacent to the square central space are
formed by parallel vertical planes and concave planes. The spaces formed by these planes are narrow in form and therefore induce movement. Wooden floor boards cover most gallery spaces except the sunken gallery. All boards run in one direction. In corridor and narrow spaces, boards run parallel to the length of the space. The direction of boards give the space a strong directional quality emphasizing a continuous, uninterrupted space flow. Vertical continuity of space is seen in the staircase core which is surmounted by clerestory openings. This opening is the expression of the roof's opening articulation. Space in this staircase core has a strong vertical emphasis because of a vertical proportion of space in the core. There is a continuous, uninterrupted flow of space through the clerestory openings. Yet again, it becomes apparent that Meier's wing falls comfortably within the theme of continuity and permanence of space.
The preceding synthesis of the building analysis was used as raw material, and it helped to determine the location of the three-dimensional form and to also assign a function to the form. From the synthesis, it became evident that certain gallery spaces are dynamic and elicit motion responses while some other spaces are static and non-directional. It was appropriate then to locate the form within such static spaces because it
was the ideal place to capture people's attention. People do not have to deal with being channeled through the space as they would in a dynamic space. As a result, the main focus will be the objects displayed within that space. The form would benefit by being the main focus since it was going to be used as a medium to make a statement.

It was necessary at this juncture to assign a function to the form. A gallery space best accommodated a gallery bench. The bench would allow people to sit and rest for a while. At the same time, the bench was a powerful vantage from which to appreciate gallery spaces. A bench form was designed and built for the Pei addition. The best location for the form within the Pei addition was the square static space below the shed roof. The designated space had natural light flowing into it. The interplay of light and shadow in the space and on the form helped accentuate the form's expression.
CHAPTER 3. DESIGN OF THE FORM

As with any site-specific design, a “site” analysis had to be undertaken so as to exploit the site to its maximum potential. The design process was initiated with a site analysis after which an attempt was made to develop a form for the space.

Site analysis

As discussed earlier, a non-directional space best accommodated a form. The non-directional space prevented the channeling of people through that space which allowed uninterrupted viewing and use of the seating form. With this reasoning, the space designated for the bench was a square with sides 36' long. The square was further subdivided into smaller, imaginary grids. This was done to aid in the location and possibly the evolution of the bench form. A 36' square can be subdivided into a 9' x 4' or a 6' x 6' grid. Possible dimensions for the grid were derived from dimensions of building elements around the space. These elements were assumed to be a part of a well orchestrated proportion scheme. With this premise, it is found that all rectangular, slab columns within the building are 12' long in plan. Also, the 12' module was used fairly consistently within the building and in the formation of the 36' square. Using this dimension as a framework, the grid was worked out to be smaller divisions of 12'. Smaller divisions were chosen only to accommodate a reasonably sized seating form. This reasoning dictated a 6' x 6' grid (Figure 3.1). About the longer axis, Pei's addition is almost symmetrical except for a larger volume of space to the west. This anomaly strongly suggests an anticipation of a larger volume of traffic. Also the entry into Pei's addition leading to this larger volume of space is
Figure 3.1: Grid subdivisions

Figure 3.2: The most probable entry

- Additional volume of space
- Most probable first entry
the most probable first entry point into the addition. This entry point follows a person's
natural circulation path through the Saarinen and Meier wings. A Person entering
Saarinen's wing will proceed by taking the natural route which is to his or her right
(Figure 3.2).

The square central space was further subdivided into four imaginary quarters. The
quarter closest to the first entry point was designated for the location of the bench form.
This is because, this quarter is almost invisible from the first entry, and the bench form
located here would be an element of surprise once it becomes visible. This gesture follows
Pei's extensive use of the element of surprise. Also, this quarter presents the greatest
potential of being interacted upon since it is closest to the main circulation path and the
larger volume of space (Figure 3.3). Pei's emphasis of experiencing architecture while in
motion is quite evident in his addition. He establishes goals, and a distinct circulation path
towards the goal. A good example is the spiral stair as a goal at the end of the bridge
which acts as the path. In a similar approach, I established a goal and a distinct path
towards the goal. Within the central space, the central cross-axis was designated as the
important goal. The design of the bench form will be such that it directs people toward the
goal acting as a path (Figure 3.4).

![Diagram](image)

Figure 3.3: The element of surprise
Modernism and its implications

Scully promotes the idea that the architecture of a period was a reflection of the state of humans during that period. Modern architecture was evolving during a time period when religious values were disintegrating. As a result of this disintegration, humans found themselves alone, but they needed security and stability while expressing their individuality. These conflicting desires resulted in absurdity and was reflected in the architecture of the period as a juxtaposition of continuity of space and permanence of structure. This juxtaposition of opposites caused spatial tension in buildings.\textsuperscript{32}

\textsuperscript{32}Vincent Joseph Scully, 18.
Existentialism and architecture

A relationship was derived between the expression of Pei's addition which falls within the Modern Movement and the philosophy of existentialism. Absurdity was expressed in modern buildings as a juxtaposition of continuity of space and permanence of structure. The means to overcome this absurdity was expressed through continuous evolutionary change. A similar analogy can be drawn within existentialism. The philosophy professed the non-existence of God and on the complete reliance of the individual.\textsuperscript{33} This condition resulted in an absurd universe. We overcame this absurdity only by taking action thereby healing ourselves.\textsuperscript{34} In other words, conflict which results in absurdity is beneficial because it forced humans to take action and change. Taking action helped humans to grow. Since there is such a close relationship between the architectural expression of Pei's addition and existentialist philosophy, it seemed appropriate to integrate these ideas into the bench form. The idea of conflict as a stimulus for growth and change will be represented on the bench form. This idea will be the underlying theme for the design.

Design concept and evolution of the bench form

The square central space with its imaginary grid lines dictated the basic form for the bench. A 6' x 6' square module was chosen for the bench which is also the dimensions of the imaginary grid subdivisions. As mentioned earlier, conflict was beneficial and taking action resulted in the resolution of conflict. This idea was integrated within the square

\textsuperscript{33}Jean-Paul Sartre, Existentialism and Human Emotions (New York: Philosophical Library, 1957), 18.

\textsuperscript{34}Jean-Paul Sartre, 32.
Figure 3.5: The square module
module in the following way. The center of the square represented the source of the conflict and the periphery of the module, the resolution of the conflict (Figure 3.5). I defined this expression as the "first journey," a journey that is tangible. By tangible, I meant that the resolution of module in the conflict was perceptible and results felt and experienced much like our simple day to day problems. I went a step further and defined yet another journey, the second journey which is the journey towards truth. Within the design scheme, truth is represented as the central cross-axis within the 36' square space. As mentioned earlier within the path-goal context, the central cross-axis was designated as the important goal. The central point is only imaginary signifying truth as being something not immediately perceptible or tangible (Figure 3.5). Also, the journey towards the central cross-axis will be an implied one, implied by imaginary guide lines between the bench form and the axis.

The evolution of the bench form required a close examination of building elements within the Pei addition. These elements were used to form a visual vocabulary. A building element that was most relevant to the context of a square module was the spiral stair carved within a square block of concrete. The idea of a circle within a square was adapted for the design (Figure 3.6). A hollow circle within the square was designated as the conflict source. This hollow circle was imagined to be spiralling. This action can be visualized as a tornado twirling on a prairie grid. As a result of this spiralling action (conflict), the outer square form was thrown outward in three parts and these parts represented the resolution of conflict (Figure 3.7). Hence, the first journey was perceptible through the distinct imagery of the three parts of the form. However, the second journey being intangible, is represented by implied lines between the form and the central cross-axis. Lines drawn along their longer edges will intersect at the cross-axis. The pieces act as a path to the cross-axis by
Figure 3.6: The spiral stair and square concrete block

Figure 3.7: Integration of circle and square
Figure 3.8: The path and goal
guiding people towards the cross-axis by their longer edges. Hence, the path-goal concept is achieved here (Figure 3.8). The smaller details of the individual pieces also derived some of their characteristics from existing building elements. The seat of individual pieces took on a slab-like character similar to the rectangular slab-like columns within the building. Bases for each of the pieces were similar. The base were parts of circular sections deriving their character from the spiral stair. On plan view, the bases had larger dimensions at one end, and tapering to a smaller section and dimension at the other end. This tapering section of the base was seen as a part of a spiralling movement of the base form. Also, the theme of continuity and permanence was integrated into the form in the following way. Base forms with their spiralling movement represented movement which was continuous in nature. The hard-edged, thick seats through their portrayal of massiveness, represented a character of permanence (Figure 3.9).

Materials and color for the form

Materials for the bench form were chosen by using the idea of “progress through conflict” as a framework. As mentioned earlier, conflict was beneficial in that, it forced Man to grow, and by growing, Man eliminated the conflict. Within the Modern Movement, we identify a similar growth and progress in the use of building materials. Designers in the Modern Movement looked for newer, efficient materials to meet an ever changing set of functional requirements. During the early stages of the Modern Movement, wood was the dominant material. This was because buildings were one story and fairly simple. Wood could easily meet the structural requirements for these early buildings. With the advent of high-rise buildings, newer and stronger materials had to be explored. As a result, steel and reinforced concrete started to be used extensively. The analogy we draw here was that the
Figure 3.9: The seat and base
Figure 3.10: The bench in the Art Center
problem and limitations with older materials resulted in the development of newer, stronger materials - conflict paving a path for growth and progress. With this idea, I juxtaposed wood and steel, the two materials at the opposite ends of the progression scale of building materials. Wood was used for the seat of the three pieces. The seat's form was fairly simple and the use of wood is justified for the simple form and construction. Steel was used for the bases. Steel’s strength and malleability and thereby its superiority as a material, was evidenced by its use as a support member and its ability to conform to curvilinear forms. Steel retained its shiny, metallic appearance in order not to conceal its identity. Also, the high reflectivity of its surface enhanced the entire bench form. Sunlight flowing through the shed roof into the central space is reflected of the metal base. This aspect enhanced the imagery of the entire form. A wood color was chosen for the seat to contrast with the steel base. African padauk which is reddish-brown was chosen for this purpose.

**Conclusions**

This thesis examined the possibility and feasibility of designing furniture for a specific building after analyzing the building and its various components. The entire project was an attempt at determining at whether an analysis of architecture was necessary at all in designing furniture for interiors.

The analysis of the building was done by studying it under three larger contexts. They were studied under, the similar methods of analyses developed by Thiis-Evensen and Ching, the three designers of the Art Center, and finally a study of the Modern Movement. These three contexts proved useful and resulted in valuable, meaningful data from which a design concept evolved. It was interesting to derive relationships between the building analysis data and the Modern Movement. The building analysis presented data
which was strictly of a descriptive nature of various building elements. In isolation, the data was not immediately usable. The data on the Modern Movement was more of a philosophical nature. The data on the designers and the Modern Movement gave credibility to the building analysis data and supported the building elements' expressions. It became apparent that a thorough analysis would necessarily involve studying a building under more than one context.

The thesis project presented a unique opportunity to test Thiis-Evensen's theory of a universal experience of forms and space. His work on archetypes was an invaluable source for this thesis project. His classification of building archetypes helped to systematically analyze each building element to derive the building's expression. Thiis-Evensen's classification also helps to inform people on what to look for in a building. This method of looking at a building could be utilized for purposes ranging from building analyses to building appreciation. Thiis-Evensen's description of various archetypes and people's experience to those archetypes is well documented. The data informs people who are going to visit a building for the first time, what experiences they could possibly have in the building. Thiis-Evensen's data also helps people experience buildings at a deeper level. During the building analysis, a record was made of my emotional reactions in the analysis sheets to see if they correlated with Thiis-Evensen's experience. There are definitely some experiences that are common for a large number of people but there are other building expressions that elicit unique responses from person to person. On the other hand Ching only goes to the extent of presenting organizations of space without trying to define their impacts. The feasibility of an organization of space and its effects is left to the understanding of the designer the person undergoing the experience.

Throughout the design process and eventually the design of the form, continuity and permanence of space evident in modern buildings, was a strong directive in the
design. This idea of continuity and permanence was further extended into existentialist philosophy. The larger idea expressed is the abdication of religion to embrace an individualistic approach on the path towards truth. As a designer of the form, it is my belief that the individualistic approach and the search for truth is still an ongoing process. This belief reinforces the idea that modern architecture, as a reflection of the state of humans, deals with a debate that is still current. Although a new style of architecture like Post-Modernism has emerged, it does not mean that modernism and its concerns ended with the style. The modernist debate is still current and may mean that humans have old issues to deal with before moving on to other realms of experience.
BIBLIOGRAPHY


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