INFORMATION TO USERS

The most advanced technology has been used to photograph and reproduce this manuscript from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps. Each original is also photographed in one exposure and is included in reduced form at the back of the book. These are also available as one exposure on a standard 35mm slide or as a 17" x 23" black and white photographic print for an additional charge.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.

UMI

University Microfilms International
A Bell & Howell Information Company
300 North Zeeb Road, Ann Arbor, MI 48106-1346 USA
313/761-4700  800/521-0600
An analysis of daylighting in the works of Alvar Aalto and Louis I. Kahn

Peters, Patrick A., M.Arch.
Rice University, 1989

Copyright ©1990 by Peters, Patrick A. All rights reserved.
RICE UNIVERSITY

AN ANALYSIS OF DAYLIGHTING
IN THE WORKS OF ALVAR AALTO AND LOUIS I. KAHN
by
PATRICK A. PETERS

A THESIS SUBMITTED
IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE
MASTER OF ARCHITECTURE

APPROVED, THESIS COMMITTEE:

Peter D. Waldman
Associate Professor of Architecture
Chairman

Peter C. Papademetriou
Professor of Architecture

Gordon G. Wittenberg, Jr.
Associate Professor of Architecture

Houston, Texas
May 1989
ABSTRACT

An Analysis of Daylighting in the Works of Alvar Aalto and Louis I. Kahn

Patrick A. Peters

This thesis focuses on the manner in which two contemporaries, Alvar Aalto and Louis I. Kahn, each recognized the potential for and developed techniques toward the realization of daylighting's efficacy for the clarification of the architect's spatial concept. Although the architectural responses of these two architects differed greatly, common tendencies may be found to underlie the work of both. While in Aalto's case, the architect's interest in daylighting initiated with an investigation of functional illumination, and in Kahn's case, began with an investigation of spatial characterization, the interest of each matured toward the pursuit of a compound daylighting program dependent upon both the techniques of chiaroscuro for the emphasis of texture and mass and of silhouetting for the emphasis of profile and spatial layering. In the work of both a commitment to a compound, rather than a singular manner of integrating daylighting contributed to the fragmentation of mass and the merging of the artifact with the landscape.
CONTENTS

LIST OF ILLUSTRATIONS vi

PREFACE xii

INTRODUCTION: Individual Beginnings 1

Finnish Native versus American Immigrant
Technical Background versus Artistic Background

CHAPTER I - Differing Interpretations of Functionalism 18

Humanitarian Goals versus Conceptual Goals
Regional Modernism versus Metaphysical Modernism

CHAPTER II - Developing Techniques to Mediate Daylight 49

Visual Perception
The Thick Wall
The Window

CHAPTER III - Approaching Buildings as Ruins 88

Open Forms in the Landscape and the City

CONCLUSIONS AND FURTHER PROPOSITIONS 95

Metaphorical Ruins as Keys to New Humanism

NOTES 100

APPENDICES 111

SELECTED BIBLIOGRAPHY 128
LIST OF ILLUSTRATIONS

INTRODUCTION


Fig. 2. L.I.K. Ground Plan. Student Design for a Shopping Center, University of Pennsylvania, 1924. From Kenneth Frampton, "Louis Kahn and the French Connection," Oppositions 22 (1980): 22. 12

Fig. 3. A.A. Travel Sketch. Innsbruck, 1924. From Sketches: Alvar Aalto, ed. by Göran Schildt (Cambridge, MA: The MIT Press, 1978), p. 7. 13


Fig. 6. A.A. Ground Plan, Final Scheme. Villa Mairea, Noormarkku, 1938. From Demetri Porphyrios, Sources of Modern Eclecticism (New York: St. Martin's Press, 1982), p. 39. 15

Fig. 7. A.A. Interior Courtyard Perspective. Villa Väinolä, Alajärvi, 1926. From Pearson, Sources of Modern Eclecticism, p. 43. 16

Fig. 8. L.I.K. Perspective Sketch. Design for Exhibition in Philadelphia, 1944. From Kenneth Frampton, "Louis Kahn and the French Connection," p. 32. 17

Fig. 9. L.I.K. Perspective Sketch. Comparison Between Auguste Choisy’s Analysis of Beauvais Cathedral and Kahn’s Esquisse for a Modern Cathedral of Welded Tubular Steel, Philadelphia, 1944. From Frampton, "Louis Kahn and the French Connection," p. 33. 17
CHAPTER I


Fig. 4. Paul Philippe Cret. Perspective View. American Battle Monument Memorial, Chateau Thierry, 1928. From Frampton, "Louis Kahn and the French Connection," p. 22.


Fig. 6. A.A. Wood Experiment for Chairs. Municipal Library, Viipuri, ca. 1930. From Aalto, *Synopsis*, p. 125.


Fig. 9. L.I.K. Plan. Pincus Therapy Building, Philadelphia, 1949-50. From Heinz Ronner, Sharad
LIST OF ILLUSTRATIONS


Fig. 10a. Diagram of Spatial/Structural Zoning. Yale Art Gallery, New Haven, 1951-53. 43


Fig. 11. A.A. Sections. Finnish Pavilion Competition Entry, Paris, 1936-37. From Pearson, *Alvar Aalto and the International Style*, p. 158. 44

Fig. 12. A.A. Axonometric View. Finnish Pavilion Competition Entry, Paris, 1936-37. From Pearson, *Alvar Aalto and the International Style*, p. 158. 44

Fig. 13. A.A. View of Entry. Finnish Pavilion, Paris, 1936-37. From Pearson, *Alvar Aalto and the International Style*, p. 159. 45


Fig. 15. A.A. View of Garden Colonnade. Finnish Pavilion, Paris, 1936-37. From Pearson, *Alvar Aalto and the International Style*, p. 159. 46


Fig. 18. L.I.K. View of Plaza Model. Design for Office Tower for City Center, Philadelphia, Kahn with Ann Tyng, 1952-57. From Frampton, "Louis Kahn and the French Connection," p. 34. 48

LIST OF ILLUSTRATIONS

CHAPTER II

Fig. 1. Effect of Incidental Patterns. Gallery. Chateau Chamborg, France. 66

Fig. 2a. Comparison of Structure/Space/Light Figurative Spatial Patterns. 67

Fig. 2b. Comparison of Structure/Space/Light Linear Sequential Patterns. 67

Fig. 3. Organized Foci of High Contrast. From Walter Kohler and Wassili Luckhardt, Lighting in Architecture (New York: Reinhold Publishing Corporation, 1959), p. 141. 68

Fig. 4. Effect of Differing Arrangements of Foci of High Contrast. From Walter Kohler and Wassili Luckhardt, Lighting in Architecture (New York: Reinhold Publishing Corporation, 1959), p. 139. 69

Fig. 5. Diagram of Spatial Experience. 70

Fig. 6. Expanded Diagram of Spatial Experience. 70

Fig. 7. Effect of Silhouette. Cornice. San Carlo alle Quattro Fontane, Rome. 71

Fig. 8. Effect of Chiaroscuro. Wall. House of Culture, Helsinki. From Aalto, Synopsis, p. 127. 72


Fig. 11. L.I.K. 'Thick Wall' Diagram. From Jan C. Rowan, "Wanting to Be: The Philadelphia School," Progressive Architecture, April 1961, p. 131. 75

Fig. 12. L.I.K. 'Wrapping Ruins' Diagram. From Jan C. Rowan, "Wanting to Be: The Philadelphia School," Progressive Architecture, April 1961, p. 131. 76

Fig. 13. L.I.K. Ground Plan. Mikveh Israel Synagogue, Philadelphia, 1961-72. From Tyng, Beginnings, p. 149. 76
LIST OF ILLUSTRATIONS


Fig. 15. L.I.K. Isometric View. U.S. Consulate, Luanda, Angola, 1959. From Tyng, Beginnings, p. 146. 78

Fig. 16. L.I.K. View of Model. Salk Meeting House, La Jolla, 1959. From Architecture D'Aujourdui. 79

Fig. 17. L.I.K. Study Sketches. Mikveh Israel Synagogue, Philadelphia, ca. 1961. From Tyng, Beginnings, p. 148. 80

Fig. 18. L.I.K. Study Section. Mikveh Israel Synagogue, Philadelphia, ca. 1961. From Ronner, ed., Louis I. Kahn Complete Works, p. 191. 81


Fig. 20. L.I.K. Notebook Sketch. From Richard Saul Wurman, ed., What Will Be Has Always Been (New York: Rizzoli, 1986), p. 352. 83

Fig. 21. L.I.K. 'Hollow Column' Diagrams. From Louis I. Kahn, "Remarks," Perspecta 9/10 (1965): 310. 84

Fig. 22. L.I.K. 'Hollow Column' Diagrams. From Louis I. Kahn, "Remarks," Perspecta 9/10 (1965): 310. 84

Fig. 23. L.I.K. 'Hollow Column' Diagrams. From Louis I. Kahn, "Remarks," Perspecta 9/10 (1965): 310. 85

Fig. 24. L.I.K. View of Curtain Wall. A.F. of L.-C.I.O. Medical Clinic, Philadelphia, 1954. From Tyng, Beginnings, p. 139. 86

Fig. 25. L.I.K. Pastel Sketch. Temple of Apollo, Corinth, Greece, 1951. Louis I. Kahn, The Travel Sketches of Louis I. Kahn, p. 48. 86
LIST OF ILLUSTRATIONS

Fig. 26. A.A. View toward Altar. Parish Church, Murrame, 1927-29. From Pearson, Alvar Aalto and the International Style, p. 53.

Fig. 27. A.A. View toward Entry. Parish Church, Murrame, 1927-29. From Pearson, Alvar Aalto and the International Style, p. 53.

CHAPTER III


Fig. 2. A.A. Travel Sketch of Capital. Olympia, Greece, 1953. From Alvar Aalto, Sketches (Cambridge, MA: The MIT Press, 1978), p. 27.


Fig. 5. L.I.K. Travel Sketch of Wall. Rome, 1951. From Louis I. Kahn, Architecture and Urbanism.

Fig. 6. L.I.K. Pastel Sketch. Luxor, Egypt, 1951. From Louis I. Kahn, Architecture and Urbanism.

Fig. 7. L.I.K. Plan. Salk Meeting House, La Jolla, 1960. From Architecture L'aujourd'hui.

CONCLUSIONS

Fig. 1. Michelangelo. Rondanini Pietà. From The Complete Work of Michelangelo (New York: Royal and Company), p. 144.
PREFACE

This paper was prompted by the contention that the significance which daylighting may hold for architecture has been underestimated by theoreticians and practitioners alike, and, furthermore, that the role of natural light in architecture is not limited to the provision of adequate illumination levels and the creation of incidental patterns on surfaces. The system of daylighting in a building fulfills another role because it may be organized to facilitate the viewer's perception of the architect's spatial concept (his structured reality), either as a reinforcement of a figurative space, or as the punctuation of a linear sequence, or both. Therefore, the goal of this paper is to explore the means of controlling daylight and its inherent potential as a primary ordering principle during both the creation and the perception of architectural space. A comparison of the ways in which two contemporaries, Alvar Aalto and Louis I. Kahn, approached daylighting serves as the vehicle through which to address this goal. While the author recognizes the limitation inherent in this methodology, that is, that the conclusions drawn from an examination of two architects may not be deductively applied to others, he understands that it is as the initiation of a process for further inquiry that this study may prove its merit.

There are many whose encouragement and efforts have contributed toward the realization of this document. Special among these are several members of the faculty of the Rice School of Architecture who have offered useful criticism and guidance during the development of this paper. The author is particularly grateful to faculty members Andrew Bartle, Peter Papademetriou, Anderson Todd and Gordon Wittenberg, who have asked those difficult questions that served to challenge assumptions and thereby guide the research. Moreover, the author wishes to recognize the fundamental contribution made by faculty member Peter Waldman who, by offering fruitful suggestions and explicit criticism during the difficult and lengthy process of conceiving, organizing and presenting this body of ideas, has proven to be an invaluable aid. Lastly, it is important to acknowledge the support the author gained through the insightful observations of his colleague David Jones and his fellow students at the Rice School of Architecture which brought to mind important related issues just as they were in danger of being overlooked.
INTRODUCTION: Individual Beginnings

The basis of this comparison which serves to challenge the thesis that controlled daylighting may facilitate the viewer's perception of the architect's spatial concept is the selection of two architects each of whom has earned a reputation for his particular approach to daylighting. A parallel is further established by the fact that these two architects, who both belong to the second generation of modernists, originated from nearly the same place, and were born at nearly the same time. Their respective births not only occurred within a three year period but also took place within a 250 mile radius stretching across the narrow Gulf of Finland (Fig. 1). These two architects, Hugo Alvar Henrik Aalto, born on 3 February 1898, in Kuortone, Finland, and Louis Isidore Kahn, born 20 February 1901, in Õsel, on the island of Saarama, Estonia were trained, like their first generation modernist elders, in traditional historicist modes of architectural thinking. Unlike their elders who reacted against these historicist modes, however, Aalto and Kahn were not seeking in the early days of their careers to implant or propagate a revolutionary vision of what architecture and indeed society should become - which is what had already been done after 1925 in France, 1930 in Finland and 1932 in the U.S. Rather than with this revolutionary role, it is more accurate to identify Aalto and Kahn with an evolutionary position because they searched for an ambiguous synthesis, rather than an antithesis, as a resolution of the conflict between the language of modernism that they were to inherit and the more eclectic and traditional sensibilities that they fostered during their previous formal training, a training which was Scandinavian neo-classicism fused with technical pragmatism in Aalto's case and one which was pure (albeit imported) French Beaux-Arts in Kahn's.

Despite the fact that each architect was strongly influenced by a traditional form of architectural training, especially during the early phase of his life, each was also profoundly influenced by the physical and cultural climate within which he lived, the lifestyles and occupations of his family members, and his socio-political station. Thus, while the chronological parallel between Aalto and Kahn noted above suggests a commonality of experience shared by
them as part of the same generation, it is important not to underestimate the fundamental impact that their differing early environments exerted on the subsequent development of each architect.

Finnish Native versus American Immigrant

The depth to which Aalto’s attitudes were influenced by his uninterrupted presence (until his twenty-fifth birthday) in the vast Finnish landscape, is documented not only in the works of the mature architect, but also in the drawings (Fig. 3) and writings of the young apprentice. For example, in his 1924 travel sketch of Innsbruck, the major portion of the drawing is devoted to the contours and textures of the Austrian landscape and very little attention is given to the built artifacts of man. This drawing reflects the landscape of Finland with which Aalto had grown so familiar. This sparsely populated landscape, which had traditionally proven to be culturally potent, was generally characterized not only by the shorelines of its 55,000 lakes but also by its woodlands which were more extensive than any other European country. Composed of a rich variety of patterns, many of which were produced by glaciers of the last ice age, this landscape was a formal progenitor of Finnish design throughout the nineteenth century. In fact, it inspired one Fin, Dr. Elias Lönnroth, to the extent that he, when confronted with the pending loss of Finnish traditions, traveled throughout the remote Karelian region gathering the tales of folk culture. He then transcribed and edited these into the “Kalevala”, the influential Finnish national folk epic, published in 1835. Through this document, the landscape was shown explicitly and symbolically to embody a set of moral values (something which all Finns seemed to sense implicitly before this time).

Finland’s climate proved to be as rich and varied a source of inspiration as her landscape for young Aalto. Her high-latitude position intersecting the Artic circle determined her solar pattern, resulting in winters of near lightless days, summers of sun-dominanted nights, as well as those unique periods of transition during which the extension of dawn and dusk seem to dislodge one’s temporal orientation. Out of these circumstances Aalto drew much of his inspiration and developed a characteristically Finnish respect for the inherent qualities of natural materials and the
limitations and potentials derived from the Scandinavian sun. Toward the capturing of the available daylight, he developed early in his career methods of maximizing the usefulness of light by reflecting and diffusing it off of broad white surfaces, and of minimizing the sun's harsh glare which resulted from extremely low altitude angles by introducing secondary daylight "filters" which provided an intermediate level of brightness between the softly-lighted interior surfaces and the clear exterior sky. Therefore, what was typically absent in Aalto's early work was the presence of a strong contrast between light and shadow, a phenomenon which characterized most of Kahn's early work, and one that is attributable to his more Mediterranean, as opposed to Aalto's more distinctly Scandinavian, sensibility.

In addition to the concrete principles which Aalto derived from a literal interpretation of the topographic and climatic characteristics of Finland, one may discover abstract principles which he derived from analogical and metaphorical interpretations of the region, as well. In his essay on the vernacular architecture of the remote Karelian region (the same region which was to be surrendered to the Soviet Union in 1945), he described what he deemed to be one of the essential qualities of traditional Finnish architecture, that it evidenced the natural life cycles of the land and the visual patterns that these cycles formed.

Another significant special feature is the manner in which the Karelian house has come about, both its historical development and its building methods. Without going further into ethnographic details, we can conclude that the inner system of construction results from a methodical accommodation to circumstance. The Karelian house is in a way a building that begins with a single modest cell or with an imperfect embryo building, shelter for man and animals and which then figuratively speaking grows year by year. "The expanded Karelian house" can in a way be compared with a biological cell formation. The possibility of a larger and more complete building is always open.

This remarkable ability to grow and adapt is best reflected in the Karelian building's main architectural principle, the fact that the roof angle isn't constant.

Just this fact, the apparently arbitrary handling of the roof angle, makes possible this conglomerate building that suggests a crystal-type cluster. In and of itself, this free-roof-angle principle is a rather unusual, not to say very rare, phenomenon. In conventional architecture, which often develops from foreign literary influences or, for example, from the propaganda of imperialistic influences, the roof angle is frozen into position without exception and in the end is most often a typical artificial unifying factor. In the refined, free-roof formations of Karelian architecture, which nonetheless do not lack
INTRODUCTION

a system, we find, in other words, a refreshing closeness to nature, a kind of fight for existence that has succeeded in creating exactly the organically living and flexible forms necessary both for the fight and for existence.16

Presentation of temporal changes in nature, whether they be due to the cycles of growth and decay, the additive process described above, or the gradual softening of manmade forms by natural forces, is a quality that had been prevalent in traditional Finnish design and one that is reflected in Aalto's fascination with the growth forms described above. His interest in the expression of growth and open-ended compositions was also evident in some of his earlier writings in which he outlined theories on standardization and design methodology conceived in terms of a biological metaphor.

Nature, biology, offers profuse and luxuriant forms; with the same cellular structures it can produce millions and millions of combinations, each of which is an example of a high level of form. Human life comes from the same roots. The objects that surround man are hardly mere fetishes and allegories with some mystical eternal value. They are more likely to be cells and tissues, alive just as cells and tissues are, the building components of which human life is composed. They cannot be dealt with in a different way from biology's other units, otherwise they would be in danger of becoming unsuited to the system, of becoming inhuman.17

In contrast to the view which sees in established forms and the standardization of new forms the only way towards architectural harmony and a building technology that can be successfully controlled, I ... want to underline that the most profound property of architecture is a variety and growth reminiscent of natural organic life. I should like to say that in the end this is the only real architectural style. If barriers are set up before it, architecture fades and dies.18

Above, he describes organizations which, while experientially functional, do not conform to apriori rules but rather allow for a more empirical development over time. In much the same way, Aalto's design solutions, while following general typological models such as those documented by Porphyrios and Duany, also were open-ended compositions allowing for periodic growth and change.19 One fundamental example of Aalto's types, the open courtyard, often referred to by either the "fish and egg" or the "head and tail" metaphor, figured centrally in a variety of his growth form plans throughout his prolific career (Figs. 4-6).
Also influential on the young architect were the cultural circumstances in which he found himself. The cultural climate during the time prior to his matriculation at the Technical University of Helsinki was the manifestation of a number of historical circumstances which combined to shape the public mind of Finland. Much of the character of early twentieth century Finland was attributable to the fact that she was a subject state throughout her history, first under the Kingdom of Sweden and then under the czars of the Russian Empire. Until 1808 nearly all of Finland's culture was inherited from the Swedes. With the establishment of the agreement at Tilsit in 1807, between France's Napoleon and Russia's Alexander I, however, Finland was effectively ceded to Russia. In the following year, upon the invasion of Finland by Alexander, the weaker and more distant Swedish monarch legally conveyed all control and ownership of Finnish soil to the Russian Emperor.20

Despite the constant presence of an alien ruler, the Finnish people remained surprisingly self-sufficient and strongly committed to controlling their own destiny. After 1863, Finland became the only Russian state which still maintained the practice of regular parliamentary proceedings, and was then involved in a period of rapidly expanding capital and industrialization which ultimately lead to the expansion of her previously-negligible middle class.21 The new rise to prominence of a more liberalized bourgeoisie, directed shifting cultural trends toward the pursuit of international importations and away from a reliance on national or regional traditions. However, this trend reversed when a deep split developed during the late nineteenth century between Finland and Russia and climaxed about 1899. Evidence of this profound shift lay in the expressions of the writers, musicians, artists and architects of the National Romantic movement.22 With the outset of Russia's Bolshevik revolution on 6 December 1917, Finland declared her independence and was immediately embroiled in civil war over her control.23 With the subsequent triumph of the non-socialist "whites" over the communist "reds", art no longer was "a tool of the political struggle, and the new generation cares nothing for the masters of the Art nouveau of the beginning of the century or for their nationalism. Inspiration is no longer sought in the nation and its folklore, but rather in urban life on the continent and in civilizations of the past, for example Antiquity."24 Therefore leading artists sought to express the newly-installed
INTRODUCTION

doctrine of democracy, which, in outline, recalled that of the great republics of the ancient world. They subsequently chose to model their monuments after the great Republican monuments of Greece and Rome. This Scandinavian form of abstract classicism grew in influence to become the dominant mode of expression of early twentieth century Finland.25

Not only from the recent political history of his homeland, but also from exposure to his father’s occupation as a land survey engineer, Aalto gained a deep appreciation for the social values embodied in the Finnish landscape. By observing his father’s functioning as a dedicated civil servant, he learned the value of social consciousness and social responsibility. From his maternal grandfather of Swedish heritage, Hugo Hamilker Hackstedt, who had been a state forester, Aalto gained an insight into the intangible link between man and his natural surroundings. These lessons were to have profound manifestations in the work of the developing architect.26

In contrast to Aalto’s continuity with his native traditions, Kahn could, in early childhood, sense that his cultural heritage had been dramatically severed. While his father could recall when he had been a svelte Russian soldier as well as a successful stained glass craftsman in Estonia, and his mother when she had been free to leisurely cultivate her education and musical gifts,27 the young Kahn was exposed to none of the luxuries of this former lifestyle, but rather was only able to hear of it from his now impoverished parents. Since he was only four years old when he and his family emigrated to Philadelphia in 1905, the world of Kahn’s early memories was that of the poverty and uncertainty of foreign-speaking immigrants in a new land.28 While he gained a great deal of support from his family at home,29 his difficulty in making the necessary contacts with the world beyond eventually served to strain his self-confidence and restrict his interaction. Throughout this early difficulty with social adjustment, however, two patterns emerged which anticipated the form of his ultimate contribution as an architect and teacher. The first is that, owing to the social barrier caused by his severely scarred face and hands, young Kahn rarely interacted comfortably in groups of people.30 While this may have proven to be problematic in many ways during his childhood development and primary education, it reinforced his tendency to be socially removed and introspective, and later fueled his self-disciplined study of the works
of Goethe and the German Romanticists, as well as musical performance on the piano.\textsuperscript{31} The second is that, because of his natural ability as cultivated under his father's tutelage, Kahn developed a high degree of artistic skill very early in his adolescence.\textsuperscript{32} This brought not only recognition, but also modest but much needed income to help support his family. It was, in fact, the proceeds from Kahn's combination of jobs such as sign painter and movie house musician which, when combined with his family's support served to finance his education.\textsuperscript{33}

While Kahn's adopted home of Philadelphia did serve as his surrogate homeland for the balance of his life, he was unavoidably dislodged from his ancestral landscape and transplanted to one of urban America. While these circumstances are difficult to trace to specific ramifications, they imply that, while financial security and cultural continuity allowed for strong ties to traditions for Aalto, hardship and discontinuity prevented Kahn from experiencing a longstanding traditional environment with such immediacy. It suggests also that Kahn, without Aalto's familiarity with and admiration for his native land, had been searching for a place on which to reconstitute his familial heritage from a tabula rasa.\textsuperscript{34} It is not surprising, then, that it is the city, in general, and his adopted city of Philadelphia, in particular, to which Kahn assigned the roles of guardian of the moral and societal models for human interaction and storehouse of the remembrances of the origins of human institutions. He said the city, which was composed primarily of streets or "rooms of human agreement"\textsuperscript{35} "which want to be buildings,"\textsuperscript{36} had begun at "volume zero" of the book of human history.\textsuperscript{37} Also, he believed that it began at the origin of the institutions of meeting,\textsuperscript{38} learning, working, health, and recreation, as they expressed the immutable human will.\textsuperscript{39} Therefore, his critique of the form of development that Philadelphia had followed in the twentieth century was a critique of the manner in which contemporary man had chosen to live.

When one thinks of simple beginnings which inspired our present institutions it is evident that some drastic changes must be made which will inspire the re-creation of the meaning, City, as primarily an assembly of those places vested with the care to uphold the sense of a way of life.

The city is measured by the character of its institutions. The street is one of the first
institutions. Today these institutions are on trial. I believe it is so because they have lost the inspirations of their beginning. The institutions of learning must stem from the undeniable feeling in all of us of a desire to learn. I have often thought this feeling came from the way we were made, that nature records in everything it makes how it was made. This record is also in man and it is this within us that urges us to seek its story involving the laws of the universe, the source of all material and means, and the psyche the source of all expression, Art.

The institution will die when its aspirations are no longer felt and [it] operates out of matter of course.\textsuperscript{40}

Technical Background versus Artistic Background

In 1927, Aalto moved from his "hometown" of Jyväskylä to Helsinki to begin his studies at the Technical University, the only Finnish school offering instruction in architecture. The traditional education he gained there was oriented toward both technical and stylistic issues. On one hand, the specific curriculum required the accumulation of a number of rudimentary skills in drawing, interpreting plans and organizing spaces. In these areas, his education was straightforward and a consistent extension of the pragmatic foundation established by his immersion in his father's and grandfather's occupations,\textsuperscript{41} the latter being, at least in part, responsible for the attention young Aalto paid to Finland's native timber stock and heavily forested environs, while the former being responsible for both Aalto's cognitive understanding of exacting technical operations and his intuitive familiarity with the constituent geometries of the Finnish landforms as they were represented in his father's maps.\textsuperscript{42} In the area of stylistic expression, however, his education was pluralistic and disjointed in that it provided exposure to classicism and romanticism and the fundamental principles of the emerging modernism as well. The influence of the National Romantic movement described above was well on the wane by the time Aalto arrived in Helsinki, but the then dominant Doricist neo-classicism was not unanimously embraced by all academics and practitioners. It proved to be a characteristic of Finland, and Helsinki especially, at this time, that much debate was devoted to stylistic issues.\textsuperscript{43} However, two professors whose influence (albeit indirect) on Aalto's early work seems to have been exceptionally strong were Gustaf Nyström, professor of architectural history and design at the Polytechnic, and Yrjö Hirn, professor of aesthetics at Helsinki University.\textsuperscript{44}
This is evident in Aalto's schemes for his small residence commissions executed after returning from his first Mediterranean travels in 1924 (Fig. 7). The Roman courtyard plan organization and Greek ornamental motifs of Villa Väinolä indicate that, through his travel experiences, he was able to internalize his academic lessons and to synthesize them within his own design process. He describes his open attitude toward the influence of imported cultures in his essay of 1922, "Motifs from Times Past."

Perhaps it would seem unnatural to treat separately these stylistic motifs, details in the totality of our older architecture; on closer inspection, it seems impossible. But one can, with a faint, hardly legible theoretical line, define on the one hand that in our historic architecture which is inherited, which has developed gradually from generation to generation, and which is essentially based on any one era's technical achievements, having its roots in climatic conditions, standards of comfort, and indigenous aesthetic traditions. On the other hand one can distinguish something that we can perhaps call architectural luxuries, in other words, everything that has been added as a result of exterior influences, of impulses from afar, sometimes brought directly from abroad, whether in the form of a detail or merely a feature in an architectural whole.

My purpose has been only to underline the stimulating effect of these currents from abroad on our art....

...Nor is it an indication of weakness or of a small nation's constant emulation of larger ones. Rather it implies a true understanding of our country's past and can be seen as a definite strength, because now no local European style or personal theory (Morris or van de Velde) can pull us into its vortex. Now we are setting our own course. And when we see how in times past one succeeded in being international, free of prejudices and at the same time true to oneself, we can with full awareness receive currents from ancient Italy, from Spain, and from modern America. Our ancestors will continue to be our masters.

Thus it was in this manner that his training in Helsinki resulted in a fusion of technically-proficient pragmatism with the Doricist neo-classical expression.

As suggested above, Kahn's formal inspiration as an artist developed early on from his father's training and as an architect, emerged out of his Beaux-Arts training, being strongly linked to the elementalist compositions (Durand) of nearly-pure platonic units (Boullée). Under the tutelage of Cret, Kahn was exposed to what Frampton has termed the "Greco-Gothic Ideal" as it was manifested in Auguste Choisy's Historie de l'Architecture. Kahn’s Beaux-Arts training
exposed him fully not only to the great works of the past as they were represented in Choisy's *Historie*, but also to both the structural rationalist principles of Viollet-le-Duc as they were interpreted by Guadet in his academic formulas and Perret in his built works, and the rationalist classicism and elementalist compositional principles of Boullée as they were systematized by Durand and constructed by Labrouste. As a result of his attendance at one of the most successful Beaux-Arts institutions in the country, his work thereafter carried the imprint of three fundamental Beaux-Arts principles; classically inspired compositions of grand axes and strong symmetries, the 'honest' expression of structural components as espoused by the voices of French structural rationalist theory, and the characterization of space along an architectural promenade with the intention of evoking an emotional response. However, under Cret, Kahn avoided one of the most common pitfalls of traditional Beaux-Arts exercises wherein the formal parti is simply drawn from historical building models with little thought given to its modern transformation. Against this common practice of dependence upon formal type, Cret proposed (and Kahn accepted) another model which presented the 'type' as a non-formal recurrence based on similar qualities of space. Cret's respect for historical buildings did not restrict his interest in and appreciation of the contribution of the engineer to modern building. In fact, in his essay of 1928, this fact is clearly documented and was thereby passed on to Kahn quite naturally, so that Kahn's inherited respect for the inherent 'spirit' of materials, for the open expression of construction techniques, and for the practice of establishing the parti upon a geometrically redundant order of structural elements as illustrated by his school project for a shopping center (Fig. 2) is an echo of these words of Cret:

Thus, the architect, collaborating with the engineer, finds that even in the construction of the framework itself he can exert an influence toward the architectural design that he is to develop. On the other hand, for him to evade the influence of the mechanical design would be a fatal step in the direction of defeating the whole aesthetic purpose. He cannot allow himself to forget, for instance, that the 'spirit' of a steel form is not the spirit of stone. In the middle of the last century Labrouste was among the first to realize this important canon of modern architecture and to experiment in designs peculiarly adapted to the strength and simplicity of the steel frame. The 'beauty of iron' is not the beauty of marble or granite. The cartouches and architectural mouldings of the stone vocabulary lose all meaning as the ornamentation of a metal form.
From Cret, Kahn adopted a design methodology which lead him to question the limits of International Style modernism. While his critique recognized the importance of the principle of the "honest" expression of structure, as credited to Labrouste above, it focused on the fundamental necessity for monumental expression in urban architecture. In 1944, Kahn participated in the symposium, "New Architecture and City Planning," and, thereafter published an essay entitled "Monumentality" in its proceedings.

Monumentality in architecture may be defined as a quality, a spiritual quality inherent in a structure which conveys the feeling of its eternity, that it cannot be added to or changed. We feel that quality in the Parthenon, the recognized architectural symbol of Greek symbolization.

Some argue that we are living in an unbalanced state of relativity which cannot be expressed with a single intensity of purpose.

Monumentality is enigmatic. It cannot be intentionally created.

No architect can rebuild a cathedral of another epoch embodying the desires, the aspirations, the love and the hate of the people whose heritage it became. Their faithful duplication is unreconcilable. But we dare not discard the lessons these buildings teach for they have the common characteristics of greatness upon which the buildings of our future must, in one sense or another, rely.55

While the focus of the essay was the importance of monumental expression as a fundamental and timeless principle of architecture, Kahn illustrated his argument with drawings of his recent designs employing large scale welded tubular frames (Figs. 8, 9). He drew an analogy between the structural expression of Beauvais Cathedral and that of his own contemporary designs in steel, thereby suggesting the direction that a new monumentality might take. Missing within his argument which brought modern construction techniques and use of materials to bear on a traditional architectural issue, was a proposition as to how one might mediate between the interior space and the climatic conditions on the exterior. Through glass walls the heat and light of the sun were allowed to enter unchecked. An additional consequence of which was that, while he had captured a monumental expression in structure as an implication
of this gargantuan construction, he eliminated the opportunity for the enclosed or defined space(s) to have a decidedly different character from that surrounding the structure. Thus by reducing the enclosure to a steel skeleton and glass infill system, he diminished the degree to which he could distinguish the space inside from that outside and all but eliminated the reading of the interior space as "different." He had not yet achieved his goal of a monumental expression of space, but he, like Aalto, began to expand the tenets of the first generation modern architects to embrace traditional architectural issues.
Map of Gulf of Finland.

L.I.K.  Ground Plan.  Student Design for a Shopping Center, University of Pennsylvania, 1924.
Fig. 3.

A.A. Travel Sketch. Innsbruck, 1924.
Fig. 4.

Fig. 5.
Fig. 6.

A.A. Ground Plan, Final Scheme. Villa Mairea, Noormarkku, 1938.
Fig. 7.

Fig. 8.

Fig. 9.
L.I.K. Perspective Sketch. Comparison Between Auguste Choisy's Analysis of Beauvais Cathedral and Kahn's Esquisse for a Modern Cathedral of Welded Tubular Steel, Philadelphia, 1944.
CHAPTER I - Differing Interpretations of Functionalism

When, in the 1920's, proponents of rationalist and functionalist design methods rejected traditional interests in style and typology but addressed nearly all other aspects of building art, the issue of controlled daylighting, once a forte of Beaux-Arts design, was rejected as well. In the early works of the functionalists architects, controlled daylighting was sacrificed out of a preference for broad expanses of plate glass which served to visually and conceptually link the inside with the outside, yield a perception of uninterrupted space, and manifest an idealization of the requirements for human habitation.\(^1\) Emerging out of this period of functionalist building during the late 1920's, Aalto and Kahn were later to prove to be two architects who based their visions for the future upon their reevaluations of the production of these previous years. Although both architects, shortly after graduating from their respective institutions of traditional instruction (Aalto in 1921 and Kahn in 1924), accepted the modernist vocabulary as it was being practiced by its leading proponents,\(^2\) both soon realized the limitations of its anti-historical, anti-traditional, and anti-regional doctrines. It was Aalto, however, who first realized the liabilities of applying Le Corbusier's 'five points' to typically Finnish considerations of human comfort.\(^3\) He saw that experimentation with the demands of more that just aesthetics was necessary for the development of an architecture compatible with the requirements of its users. While he did not reject rationalism, he did broaden its definition to include considerations of the physiological and psychological well-being of the human occupant. In addition, his methods were not limited to strict rationalist procedures, but rather integrated these with intuitive processes. He worked through a design project by first gathering and internalizing the pertinent factual data which constituted the given situation, and then turning his focus to formal or abstract design issues which were seemingly unrelated to the building in question, but which, in fact, constituted the beginning of the synthesis of the design scheme. Despite the prevalence of rationalism during the 1930's, Aalto respected and trusted his intuitive abilities as he indicated in his essay entitled "The Trout and the Mountain Stream."

When I personally have to solve an architectural problem I am confronted, almost always, with an obstacle that is difficult to surmount, a kind of "courage de trois heures du matin." The cause, I believe, is the complicated and intense pressure of the fact that architectural design operates with innumerable elements that internally stand in opposition to each other. They are social, human, economic, and technical demands that
unite to become psychological problems with an effect on both the individual and the
group, on group and individual movement and internal frictions. All this becomes a maze
that cannot be sorted out in a rational or mechanical manner. The large number of
different demands and subproblems form an obstacle that is difficult for the architectural
concept to break through. In such cases I work—sometimes totally on instinct—in the
following manner. For a moment I forget all the maze of problems. After I have
developed a feel for the program and its innumerable demands have been engraved in my
subconscious, I begin to draw in a manner rather like that of abstract art. Led only by
my instincts I draw, not architectural syntheses, but sometimes even childish
compositions, and via this route I eventually [sic] arrive at an abstract basis to the main
concept, a kind of universal substance with whose help the numerous quarreling
subproblems can be brought into harmony.4

A visible manifestation of this process, his design for the Municipal Library at Viipuri, illustrates his reliance
on imagination.

When I designed the city library at Viipuri (I had plenty of time at my disposal, five
whole years) for long periods of time I pursued the solution with the help of primitive
sketches. From some kind of fantastic mountain landscapes with cliffs lit up by suns in
different positions I gradually arrived at the concept for the library building. The library's
architectural core consists of reading and lending areas at different levels and plateaus,
while the center and control area forms the high point above the different levels. The
childish sketches have only an indirect connection with the architectural conception, but
they tied together the section and the plan with each other and created a kind of unity of
horizontal and vertical structures (Fig. 1).5

These childlike intuitive sketches were by no means the only influences through which Aalto developed the
first, second and final schemes for Viipuri.6 However, they were a manner of working which recognized and embraced
intuitive exploration as a valid design practice. In concert with this, he followed a broadened line of rationalist
investigation which addressed the physiological and psychological needs of man, as well. As an example of this
investigation the following statement from an essay of 1940 describes the other fundamental design criterion used to
develop the Viipuri solution.

Daylight through ordinary windows, even if they are very large, covers only a part of a
big room. Even if the room is lighted sufficiently, the light will be uneven and will vary
on different points of the floor. That is why skylights have mainly been used in libraries,
museums, and so on. But skylight, which covers the entire floor area, gives an
exaggerated light, if extensive additional arrangements are not made. In the library
building the problem was solved with the aid of numerous round skylights so constructed
that the light could be termed indirect daylight. The round skylights are technically
rational because of the monopiece glass system employed. (Every skylight consists of a conical concrete casement six feet in diameter, and a thick jointless round piece of glass on top of it without any frame construction.) This system is humanly rational because it provides a kind of light suitable for reading, blended and softened by being reflected from the conical surfaces of the skylights. In Finland the largest angle of sunlight is almost 52 degrees. The concrete cones are so constructed that the sunlight always remains indirect. The surfaces of the cones spread the light in millions of directions. Theoretically, for instance, the light reaches an open book from all these different directions and thus avoids a reflection to the human eye from the white page of the book. (Bright reflection from book pages is one of the most fatiguing phenomena in reading.) In the same way this lighting system eliminates shadow phenomena regardless of the position of the reader. The problem of the eye; a good reading light permits the use of many positions of the human body and every suitable relation between book and eye. Reading a book involves both culturally and physically a strange kind of concentration; the duty of architecture is to eliminate all disturbing elements (Fig. 2).}

From 1921 when Aalto received his Diploma, he began a period of stylistic as well as technical experimentation. His travels in 1923 and 1924, his first direct contact with the monuments of antiquity, affirmed the classically-based education he had received in the polytechnic. While his subsequent projects demonstrated the strong influence of this background, by 1928, when Aalto traveled to Paris to attend a conference on the recently popularized techniques of reinforced concrete construction, he had begun to question the appropriateness of explicitly historicist expression in favor of greater abstraction as characterized by the current work of Gunnar Asplund in Stockholm. Furthermore, by 1930 when he attended the Asplund-designed Stockholm Exhibition of Scandinavian anti-traditional functionalist designs, Aalto had already demonstrated his abilities in working in the modernist vocabulary.

Kahn's post-graduate period after he received his Bachelor of Architecture degree from the University of Pennsylvania in 1924 was also characterized by a sense of searching for a manner of resolving the conflict between his formal Beaux-Arts training and the lessons of the modern masters. His influence from his teacher and subsequent employer (1929-30), Paul Philippe Cret, was profound and ideologically as well as formally direct. A comparison between Cret's scheme for a memorial to war veterans and Kahn's scheme for the Philadelphia Bi-centennial Exhibition of 1926 illustrates this influence (Fig. 3, 4) which also was apparent in Kahn's design work for Cret's Folger Library, Washington, D.C. of 1930. The strong pattern of alternating light and dark contrasts in common to both and is a characteristic which reemerged in Kahn's work upon his return from Rome.

Kahn's experience from the point of his graduation until he received his professional license in 1935 took the form of either practical training under the guidance of another architect or free exploration through graphic media. It was
his relative inability to freely test his ideas architecturally which limited his reaction to the international style modernism. Upon entering into private practice, however, Kahn began to directly explore the modernist vocabulary and thereby to begin to conceptually question its limitations in terms of its capacity to embody the ideals of man's institutions. 10

A Humanitarian Goal versus a Conceptual Goal

Things [in Modern Architecture] are seen from too formal a point of view. The difficult problems are not encountered in the search for a form for modern life, but rather in the attempt to create forms based on true humanistic values.11

The temporary need and universal values must completely interact only then is a design in the domain of architecture.12

In his lecture, from which the first statement above was taken, Aalto outlined what he felt to be the tasks of the contemporary architect—"the architect has an obvious task: to humanize the characteristics of building materials ... The architect's task is to restore the correct order of values ... The architect's task is to make our life patterns more sympathetic"13—and thus identified the priorities of his work. Kahn, like Aalto, was also not willing to accept unchallenged the modernist program as it was propagated by the current literature,14 although both Aalto and Kahn followed generally modernist principles from very early in their individual practices. One example of a limitation that they could not accept was the introduction of a maximum amount of light without any differentiation for use or orientation. In response, Aalto followed a line of experimentation which lead to the specialization of interior spaces for specific uses. It was such experimentation which lead to the development of the indirect skylights and the acoustical ceiling treatment at Viipuri and the development of a special patient-oriented environment including a noiseless sink, a continuously ventilating window, and a glareless light fixture at his Tuberculosis Sanatorium at Paimio, his goal in each case being that of securing a more comfortable environment for the human inhabitant.15 Kahn, on the other hand, responded by questioning not the physical or psychological comfort of the occupant but the ability for the modernist vocabulary to embody the traditional values of man's society as they had been represented in traditional architecture for millenia. He saw the key to this expression in monumentality, in the ordering of the large-scale structural frame, an
analogy to the large-scale stone constructions of the great Gothic cathedrals.¹⁶

Aalto's study of daylighting began with the need for functional illumination. However, his pragmatism soon lead him to develop a rich variety of light diffusing devices to optimize the impact of sun-poor Finland's available daylight. It also lead him to reinvest modern architecture with environmental qualities normally associated with primitive buildings because of their similarities with those found in the natural environment.

We have created ... better and better forms of artificial lighting. Our electric light is much more practical than our grandfathers' oil lamps or wax candles. But is the quality of this light really better than what we obtained from the old sources? In fact it is no better at all. Nowadays we use a sixty- to eighty-watt lightbulb when we wish to read at a certain distance from the light source. Our grandparents managed with two candles. Even incandescent light is no longer good enough: high-intensity fluorescent lights have been introduced which give an inconstant light with excessive amounts of blue. We are using more light for the same task as before, because the physical and psychic qualities of the light are no longer satisfying. The same phenomenon exists everywhere. I hesitate to mention the observed fact that ventilation through metal ducts is thoroughly impractical. For years we have known the best ingredient in the air, ozone, disappears on account of the friction that arises in the ducts. Laboratory tests have in fact proved that the biologically active elements of air almost completely disappear as a result of the rapid mechanical pumping of air into office buildings. We pump air into the poor typist but only a small fraction is of use to her. It keeps her alive, but not much more. Nobody thinks of her physical well-being.¹⁷

In contrast to Kahn, Alvar Aalto placed greater emphasis on built reality than on abstract ideology. He denied the validity of polemics in architecture in favor of a more positive approach centered on building. When asked to explain his concepts he would normally respond in one of two ways, either by instructing the curious party to refer directly to the source of information by visiting the building in question, or by simply responding with "I build."¹⁸ Furthermore, Aalto's physical experimentation in the plastic arts as an auxiliary method of discovery helped him develop his innovative formal strategies for the construction of his buildings and furniture designs (Figs. 5,6). Rather than viewing this abstract experimentation as an independent art form, he considered it, a concrete way to test architectonic ideas. Furthermore, Aalto realized the potential for light to articulate an architectural sequence. His use of daylighting recognized the importance of appropriately lighting a space for a human activity, and also provided a rich repertoire of effects for the orchestration of a sequential circulation route and the definition of assymmetrically balanced interior spaces.
In contrast to Kahn's desire to clarify the distinction between man and nature, Aalto emphasized man's experiential contact with nature; his essential continuity with the organic world. He applied this point of view toward creating a more sympathetic environment for man and for this reason stressed the selection and treatment of materials to achieve a greater comfort for human inhabitants. Integration was his formal means of recognizing and celebrating the particularities which grew out of the many conflicting pragmatic, formal and symbolic requirements of human life. Toward this end, he developed a repertoire of elemental techniques and typologies in his early and middle work, which were reapplied and refined throughout the rest of his career. This explains the similar elements and relationships found in buildings of the same type but located in different climates and created at different stages of his career, such as the centrally positioned control point, the sectionally depressed reading room, and the indirect daylight 'filter' which are found in all of his library projects. In the projects of his later period, he relied more heavily on the purity of a formal gesture in the built designs. In these more heroic works, he exhibited a more powerful visual force, which, while being perhaps more effective in evoking the viewer's emotional empathy, were often less successful at meeting the architect's goal of physiological and psychological comfort.

Aalto pursued a path of rationalism and functionalism throughout his career, but not to the detriment of his intuitive creativity. Even while at the Helsinki Technical University and, shortly after, when he designed the "700 Years of Turku" exhibiton, functional logical and artistic intuition were integrated. Despite the opinion of Sigfried Giedion,19 Aalto did not rely on his artistic intuition as the sole determinant of form, and, in fact, repeatedly wrote about the inappropriateness of arbitrary, formal compositional techniques when applied to the design of the human environment. His intention was to directly express what was "necessary and desirable" for a productive human life.20 Toward this end, his compositions tended to germinate from a principle diagram, and only thereafter evolved into a highly articulated 'symphony' of events (Figs. 7, 8). In the process of development from diagram to building, he invested the building with rich layers of texture and pattern by articulating circumstantial conflicts of order. In this way, what might have been formal collisions were resolved into formal events. His typical treatment of the entry hall into an auditorium, such as those at Wolfsburg and Jyväskylä, exemplified this practice.

Aalto's initial approach to a building almost invariably is an orderly ... scheme. Then he
works it over; taking each part separately resolving each individual problem, steadily chopping away at the regularity of the original concept. Finally he puts the parts together, but in a premeditated way, with little attempt at formal recognition. 21

His lack of preconceived solutions has allowed for great freedom for the architect's evolution. Over the course of his prolific career, he has drawn freely from a diverse and paradoxical range of local, national and international cultural influences. However, in no example of his work did he surrender totally to these influences. Instead, throughout his periods of stylistic evolution, the inherently Finnish compositional, material and conceptual treatments in his work were maintained in concert with the imported gesture. 22

At about the same time that his built work was beginning to evidence a promising clarity of intention as presented by the Trenton Bath House, Kahn's philosophy was also beginning to congeal as a consistent search for the source of those human institutions which invest life with meaning, those which he felt were recorded in the "Volume Zero" of human history. This search was evidenced by the time he returned from Rome in his recorded thoughts on the creative process.

By 1959 Kahn envisioned thinking and feeling as functions that run parallel to each other in the mind of the architect. Gone was his earlier insistence that thinking was subordinate to feeling. Once he made the initial break from International Style ideology, he gradually returned to a more moderate standpoint in which thinking and feeling were given equal importance. 23

Out of this will emerges thinking, which gains an objective perspective through its separation, then eventually returns to add greater impact to the original idea. 24

Order is...
Design is form-making in order.
Form emerges out of a system of construction. 25

At this time Kahn's monumentalization of structure, when challenged as to its space characterizing abilities, lead him to tangential discoveries. The chronological relationship between the appearance of his first mature work and his travels through northern Italy, Greece and Egypt has been well-established by Scully in the exhibition catalogue of Kahn's travel sketches. 26 The apparently deep-reaching influence that this trip exerted was born out by his continued interest in Egyptian architecture and culture following this experience. In fact Scully notes that it was predominantly his direct experience during this period with the "greatest monuments" of antiquity and their accompanying interplay of
light and shadow which accounted for his dramatic shift in architectural intentions, from lightweight modern constructions to massive 'timeless' monuments. Kahn's first significant independent built work, the Yale Art Gallery, New Haven, coincidentally designed and executed in 1951 immediately upon his return to the United States, was well-documented in "Order and Form," Perspecta 3, in 1955. The Art Gallery was also the first significant work to follow his last structural steel building, the Pincus Therapy Building, Philadelphia, of 1949-50, executed immediately before leaving for Europe. In the article, "Order and Form," the staff writer observed ...

Inspired by the subtle structural integrity and convincing visual order of Gothic structures, Louis I. Kahn, the architect of the new Art Gallery and design center at Yale, set himself the task of creating a space in which the structure and the mechanical equipment—lighting, acoustical and climatic—would all live one life and would become the basic means of artistic expression. Integral unity in form was his first objective.

His second objective was permanence. The uses of the building were to be varied - exhibition space, offices, drafting rooms, lounges, workshops. All future uses could not possibly be anticipated. A building tightly fulfilling the present requirements would quickly become obsolete. Therefore, a universal space was to be created, easily adaptable to new patterns of use. 27

A comparison of the plan of the Pincus Therapy Building with that of the Yale Art Gallery reveals that the spatial zoning of the latter was intergrated with the structural zoning and the daylighting zoning, while that of the former is not. Furthermore, the scale of the structural elements had been increased from the lightweight steel system to more massive concrete, a decision attributable only in part to the increase in scale between the two buildings (Figs. 9, 10a, 10b).

Thus, the pursuit of these two objectives, "integral unity in form" of disparate systems and "permanence" united the modern with the traditional agendas for architecture. In fact, in I. E. S. Edwards' book, The Pyramids of Egypt, a copy of which Kahn received upon his return to this country, the morphological seeds of his mature production may be found. His conceptually integrated orders lead him to a hierarchical type of functionalism which separated programs into zones according to types of use space, ultimately to become his servant/served spatial model. In fact, it was in 1953, at the end of construction phase of the Yale Art Gallery, that he conceived of his "nature of space, order, design" theory which formed the foundation for his further theoretical inquiry.
External shapes must wait until 'the nature of space' unfolds, and before 'order' can be evolved or created.

Now that is the reason why I had difficulty explaining order before. The basis from which order could be derived was absent.

The genius works without separation but he must in these times of so many unsolved problems use separation. And the student, and the teacher who must understand the student, can profitably make the separation. And also I believe that the puzzle of who [is] or who is not a designer can maybe be discovered and all would profit consequently.

Order I believe is mostly the structure. The structural idea harboring [or] embodying the needs of air, light, quiet, noise, etc. It is embodying what makes the structure grow into a life of fibre enveloping the space so that its nature can be felt. It is the seed. It is integration from which Design can work.

[Design] is the arranging adjusting (choosing?) (throwing away?) maybe order? to meet in circumstantial conditions.

Though the creative mind combines design with order and the n[ature] of space, the separation happens less obviously.

It is akin to what happens in feeling and thinking.

Feeling is our great well of consciousness. Thinking is a satellite, a meteor, meant not to be shot from feeling and never to return. It must return to the field of feeling to have meaning in depth. But some people always separate feeling from thinking and build their solution around thinking only.

That is why the creative mind cannot accept separation categorically of the nature of space--order--design, and rightfully so because feeling embodies all at once intuitively. BUT the intuitive needs help to actuate and direct his field to a single objective at times (to build a building). We must know--therefore we must separate--in order to feel with greater creative effect.

Feeling will always remain the source made effective for creativity by the adventures of thinking brought home again.29

Through the last twenty-five years of his life, Kahn was engaged in a search for a language of universal communication. The goal of this search was to find the means by which to manifest through architectural creation the fundamental nature of the human psyche. Kahn believed that it is only as one appeals to the true source of human consciousness that culture and art can once again be brought into harmony with humankind and cultural continuity can thereby be reestablished.
When I design a building, I want a man to be able to walk down the street, see it, feel the logic behind it, and perceive the derivation of its need.30

It was in pursuit of this general ambition that Kahn found value in the texts documenting and comparing various types of hieroglyphic languages from past civilizations. Joseph Burton, in his work discussing the germination of Kahn's philosophical principles, identifies Kahn's conscious intention to empower his work with the means of universal communication. The architectural vocabulary of this universal communication was, for Kahn the "natural hieroglyphic" language of a neoplatonic philosophy. His intention was to achieve a personal interpretation and practical application of the romantic philosophical principles established in the previous centuries.

Kahn's mature philosophy owes a great deal to the cultural and spiritual environment of his childhood as manifested in his mother's early tutoring in German Romanticist literature and musical performance. His maternal teacher, Bertha Mendelssohn Kahn, had both the cultural exposure and the social privilege necessary for her to offer all three of her children a strong humanist background in philosophy, religion, music, and languages. But for Louis, his exceptional closeness to his mother meant that he benefitted from an even greater exposure to her teaching. As a child he reportedly first spoke German before he spoke English and probably had read German as well. He and his brother and sister were encouraged to read literature, especially the German Romantics, including Mrs. Kahn's favorite, Goethe. These interests may have resulted from more than a merely academic interest since a genealogical link existed tracing back to the German Romantic composer, Felix Mendelssohn (1809-1847), and his famous grandfather, the German Jewish philosopher of the Enlightenment, Moses Mendelsohn (1729-1786).31 Therefore, Kahn, having developed a personal internalized philosophy of 'essences' before the time when he was appointed to the American Academy in Rome and began his Mediterranean travels (1950-51), must have sensed an enigmatic affinity with the qualities embodied in those great monuments of the past, upon finally experiencing them in person.

The Neoplatonic ideal, which had implicit influence on Kahn through his exposure to German Romantic literature and his strong personal version of the Jewish faith were largely responsible for shaping his view of nature and natural phenomena. This view manifests itself not only in his understanding of man in relationship to the natural world, but also in the manner in which he understood the essential qualities of inorganic objects as well.
In this context Burton outlines the heritage of Kahn’s philosophical viewpoint. In describing the process by which, at the end of the eighteenth century, the hieroglyphic...

...began to lose its Egyptian cast and came to be seen more in the light of Romantic natural philosophy, the phenomenal world being identified as a vast, sacred tome, sometimes called the "Book of Nature," filled with natural "hieroglyphics" of God’s Word.

...he defined these natural hieroglyphics as...

...reflecting Plato's philosophy that the phenomenal world, language, and physical beauty are poor copies of the archetypal realm of the ideas. ... Plato's word "idea" meaning in Greek, "Form," but form seen only by the mind's eye.

It was toward fulfilling the role of a natural hieroglyphic that Kahn recognized the potential in daylight phenomena to psychologically, emotionally and perceptually link the human respondent to the cosmological order of nature. By referring to the immutability of the sun and its satellites, he sought to metaphorically charge his buildings with the perpetual forces of the eternal. He embraced the poetic potency of the sun in terms of the phenomenal constancy of its presence. Kahn searched through the last third of his lifetime for the appropriate technique by which his work would attain an interior of "silence" created in daylight. Then, to complement this quality of silence, he also sought to infuse his spaces with daylight’s experiential dynamism of organic vitality and unpredictable changability.

A space can never reach its place in architecture without natural light. Artificial light is the light of night expressed in positioned chandeliers not to be compared with the unpredictable play of natural light... The structure is a design in light. The vault, the dome, the arch, the column are structures related to the character of light. Natural light gives mood to space by the nuances of light in the time of day and the seasons of the year as it enters and modifies the space.

Kahn’s recognition of and theorizing on the nature of the human psyche, lead him to develop his architectural theory toward the realization of this principle in built form. Through his experience of the built work, the human being, Kahn thought, would be returned to a realization of his beginnings, which lies within the universal constant of
the "World Psyche," the source of all psychic commonality. Through the function of (emotional) psychic communication, gained from the direct experience of spaces, he believed, the "Form" of the embodied institution, would be elicited.

I know of no greater service an architect can make as a professional man than to sense that every building must serve an institution of man, whether the institution of government, of home, of learning, or of health, or recreation.

One of the great lacks of architecture today is that these institutions are not being defined, that they are being taken as given by the programmer, and made in to a building.35

Regional Modernism versus Metaphysical Modernism

Architecture is not merely national but clearly has local ties in that it is rooted in the earth. Through its forms it can achieve an international influence. ...it is the balance between these two concepts that we need in today's world, where the concepts national and international can hardly be separated from each other.36

The work of Aalto offers many lessons for the visually aware student of design. Each project may be understood as a further level of investigation to those projects which came before it. The multi-disciplinary nature of Aalto's work also allows for parallels to be drawn between his works in city planning, building design, furniture and industrial design, and painting, and thereby suggests a common philosophical and aesthetic agenda underlying all of his creative activities. It is by means of this type of comparison of different modes of design as well as by comparison of different scales of design from overall organization to detail within the same work that one can define the focus and priorities of Aalto's intentions.

The works themselves offer the most reliable information as to what Aalto had intended. However, one need not overlook the opportunity to explore his theory of design as it is presented in his extensive body of brief essays. It is through the exploration of the built and literary resources independently, and of their comparison that the greatest insight into Aalto's significance may be gained.

An investigation of any career as prolific and diverse as Aalto's benefits from an outline of a set of issues on
which to focus and by means of which to evaluate the individual works. For the purpose of this investigation, four factors may be identified as constituents of Aalto's oeuvre. These are: "heterotopic"\textsuperscript{37} collage as a technique of ordering the composition of architectonic elements, architectural spaces and constructional materials; the predominant use of organic constructional materials in a natural and unadorned manner\textsuperscript{38} thereby allowing the building to nearly merge with the materials of the earth; the reuse and reinterpretation of traditional architectonic elements and traditional building types;\textsuperscript{39} and the desire to accommodate the physiologic and psychological needs of the building dwellers more fully than had been done as a result of the proliferation of the International Style modernism during the 1920's and 1930's.\textsuperscript{40}

The eventual result of the situation in modernizing Finland was confrontation, externally between the conflicting groups of the society, and internally between the conflicting desires of each citizen. Aalto's production was directly influenced by the character of these confrontations. However within the framework of his built works one can identify evidence not only of his separately embracing conflicting qualities such as the international and the regional, the rationalist/functionalist and the traditional, and the conceptual/utopic and the empirical/realistic, but, more importantly, also of his accommodating both extremes simultaneously in single works.

Like Kahn's, Aalto's architecture also has an aspect of mysticism inherent in it, but in this case owing to the fact that he was culturally embedded within the traditional myths of the Karelian tribalists. Simultaneously, his work exhibits latent traces of the classical principles practiced by Brunelleschi, Alberti, and Palladio.\textsuperscript{41} These two cultural sources manifest themselves by means of their respective formal traditions, those of romantic vernacular informality and abstract classical symmetry. The latter came to Aalto by virtue of the fact that Finland's history is one of prolonged subject nation status, first under the westernized Swedish crown and then under the Europeanized Russian Empire.\textsuperscript{42} The former came to him from the traditions manifested in the "Kalevala", the epic poem which was the single most important inspiration behind National Romantic cultural movement during the late nineteenth century. It is important to understand that, as a result of their political history as a subject nation, the Fins wanted to be both culturally autonomous from and culturally aware of the leading industrialized western nations.

Aalto's method of addressing a building problem was in part shaped by his experience in the harsh climate of the Finnish winter. He recognized early on that the practicality of vernacular buildings in response to their climate
offered lessons from which the architect could benefit. He did not accept these time-tested solutions uncritically, however, but rather, conducted rigorous empirical experiments to improve and adapt traditional solutions to new circumstances. Often this experimentation led to new solutions removed from their traditional inspiration.43

The desire common to many Fins at the turn of the century to be considered modern like successful citizens in the world's leading western nations (such as Great Britain, for example) and at the same time to be seen as culturally well-bred like the aristocrats who were well-establishmented in the age old traditions of the world's imperial nations (such as pre-revolution Russia) created the dilemma which Aalto and his contemporary Finnish artists faced in the early twentieth century. Toward a solution to this dilemma, Aalto designed according to an accommodating manner of composition, one which has been termed "heterotopic" by architect and historian Demetri Porphyrios. This manner of composing architectonic elements, architectural spaces, and constructional materials in the form of a collage involves the juxtaposition of clearly disjunctive elements to produce a new (but "uneasy") synthesis of the constituent parts. It is dependent upon two qualities; an obvious discontinuity between the parts, and the abruptly adjacent placement of the parts.44 Of primary importance in this compositional method is the successful resolution of the joint between the parts. As Porphyrios notes, it is by focusing first on the joint that the relative success of each work may be quickly and accurately assessed.45

Aalto's recurrent and predominant use of organic constructional materials in a natural and unadorned manner allowed him to exploit the process of their natural aging and to manifest the intention that the buildings might begin to merge with the natural environment (for the built order to merge with the natural order). The importance of the imagery of the ruin as his design model is clearly identified in his essay of 1941 in reference to the typical Karelian dwelling. Not only do his statements in this piece expose his fascination with buildings in their ruined state (traceable back to his first travels to Greece) but also reveal his respect for the traditional Finnish standards of hand craftsmanship. Created in pursuit of this paradoxical goal Aalto's buildings often seem to exist at the ambiguous point of balance between ruin and artifice. Toward this goal one finds that even the earth itself becomes an organic but maleable material subject to his manipulation. It is shifted and shaped in a way which manifests in its abstract contours the lines of his father's topographic survey maps mentioned above.46

Aalto's writings often reveal the nature of his inspirations and his intentions, allowing for a better
understanding of his built work and clarifying the nature of his eclectic tendencies. In his essay of 1941 titled "Architecture in Karelia," he wrote...

The first essential feature of interest is Karelian architecture's uniformity. There are few comparable examples in Europe. It is a pure forest-settlement architecture in which wood dominates almost one hundred percent both as material and as jointing method. From the roof, with its massive system of joists, to the movable building parts, wood dominates, in most cases naked, without the dematerializing effect that a layer of paint gives. In addition, wood is often used in as natural proportions as possible, on the scale typical of the material. A dilapidated Karelian village is somehow similar to a Greek ruin, where, also, the material's uniformity is a dominant feature, though marble replaces wood... The possibility of a larger and more complete building is always open.\(^{47}\)

This statement by Aalto suggests that one may identify both classical (symmetrical) and romantic vernacular influences (asymmetrical) in the same work. The important issue here is not only the presence of these influences, but also of their transformations, as well. This architect was not content to collage bits and pieces which had been borrowed from elsewhere leaving each bit identifiable to its source. Instead he sought to achieve a totally new synthesis from the pieces which would allow for only an ambiguous memory of their origins. The same may be said of his use of traditional building types. The courtyard building, as the most frequently recurring example, suggests Aalto's method of transformation. Of his courtyard scheme for the 1937 Finnish Pavilion, he wrote...

One of the most difficult architectural problems is the shaping of the building's surroundings to the human scale. In modern architecture where the rationality of the structural frame and the building masses threaten to dominate, there is often an architectural vacuum in the left-over portions of the site. It would be good if, instead of filling up this vacuum with decorative gardens, the organic movement of people could be incorporated in the shaping of the site in order to create an intimate relationship between Man and Architecture (Figs. 9-13).\(^{48}\)

The courtyard building, for Aalto, was one of the "almost archetypal building configurations" which was able to "express basic forms of human society."\(^{49}\) But his courtyard schemes invariably followed his 'fish and egg' diagram which allowed for both a focal space at the center and a physical and visual link to the surrounding landscape. His words reveal this latent goal. "Architecture should always offer a means whereby the organic connection between a building and nature (including man and human life as an element of greater importance than others) is provided for."\(^{50}\)
Thus it is clear that he intended buildings to act as intermediaries between man and nature.

Elsewhere in his work, Aalto utilized the "organic movement of people" as a means of organizing the heterotopic fragments of the plan into a coordinated synthesis. In fact, the orchestrated sequence of circulation which so frequently occurs in the joints between the fragments is a consistent technique which he used in building after building. This orchestrated sequence, punctuated by his coordinated use of controlled daylighting with the horizontal and vertical circulation, established the character of the architectural experience in the Aalto building. Thus, the movement of the viewer is a fundamental consideration to an exploration of Aalto's built works and is the origin of a linear sequential pattern.

Although Aalto is probably most well-known for his intuitive approach of design, his work in a rationalist/functionalist manner, toward accommodating the physiological and psychological needs of man, was, in many ways, opposed to the functionalists of the 1920's who sought to clearly express the individual functions of the building. In 1960, he clarified this intention.

To make architecture more human means better architecture, and it means a functionalism much larger than the merely technical one. This goal can be accomplished by only architectural methods - by the creation and combination of different technical things in such a way that they will provide for the human beings the most harmonious life.\textsuperscript{51}

Aalto's approach to problem solving holds clues for the attitude with which he approached architecture. He does not separate the analysis of a problem from the generation of the solution to that problem. His special kind of functionalism is the result of this approach.

Every commission is different and so solutions to problems cannot be stereotyped. The examples I have given are individual and are only valid as a method in other applications. There is a great deal in architecture which never gets beyond the analysis level, though synthesis is what is actually needed. Nothing is more dangerous than to separate analysis and synthesis: they absolutely belong together.\textsuperscript{52}

Toward problem solving Aalto looked to "nature as a guide and teacher,...[a] natural resource for inspiration."\textsuperscript{53} He wrote "architecture cannot disengage itself from natural and human factors, on the contrary, it must
never do so...Its function rather is to bring nature closer to us.54

Historian William Curtis explains that the results of Aalto's investigations in fusion and collage created "a style deeply related to the human condition, in which weathered materials, lyrical spaces, and magical effects of light, produced a lasting primal poetry far beyond merely 'modern' conditions.55 While his distrust for international modernism stemmed from the wide and uncritical replication of the International Style by mediocre copyists, the continuing separation between the avant-garde architects and the society at large, and the tragedy of WWII and its destructive conclusion which brought home the real dangers of the false faith in unbridled technology, Aalto's development from an architect of a traditional building mode, to one of modernist/functionalist vocabulary, and finally to one of modernism inflected to its regional context by embracing vagaries of site, climate, and circumstantial human needs, can be understood to have evolved out of his personal interpretation of Finnish nationalism. After 1930, the year that he met his future patrons Mairea and Harry Gullichsen, peasant vernacular buildings became increasingly more important as one of his points of inspiration because of his greater appreciation and acknowledgement of differences of site, climate and setting.

Architecture really does not exist.
Only a work of architecture exists.
Architecture does exist in the mind.
As man who does a work of architecture does it as an offering to the spirit of architecture... a spirit which knows no style, knows no techniques, no method. It just waits there for that which presents itself.
There is architecture it is the embodiment of the unmeasurable.56

Kahn's method of approaching a building problem, referred to here by the term Metaphysical Modernism, was used to describe the work of Kahn because he was able to infuse his architectural production with an enigmatic presence of the original state. Many of the patterns that were to characterize the life of Louis I. Kahn may be traced to sources in his early life. Although born in Estonia, Kahn can clearly be listed among the truly American architects in that he experienced the challenge and optimism that accompanies a settler in the New World. His early environment as a member of a Jewish family had proven to be fundamental to the formulation of his ideas and approach to architecture, in that his father and mother contributed to the development of his approach to questioning and philosophical pursuits.
While he exhibited talents in both music and art, at the point of his matriculation at the University of Pennsylvania School of Fine Arts in 1920, he chose to pursue a career in the latter.

An attempt to understand and analyze the production of Kahn's career is faced with difficulty owing to the essence at the heart of his mature work. This essence, which like that of Aalto, may be characterized as the union of paradoxical characteristics, may be partially the resultant of Kahn's training in the Beaux-Arts at the same time that international modernism was emerging in Europe. Within the work one may discover the following difficult unions of paradoxical characteristics: classical stability and symmetry of forms with romantic sense of incompleteness as if in a ruined state; free application of advanced technology and archaic sensibility of material use; transcendence of technical functionalism and the use of functionalist aesthetic ideas; dependence upon rationalist stereometry and the utilization of thin casings and transparent blocks which refute the illusion of mass; and the use of the vital concepts of the organic philosophy without resorting to use of organic forms. This design agenda, as an extension of classically inspired composition and French structural rationalist theory, owes much to the complexity of Kahn's personal search for an architecture which evokes a presence of origins.

Space is not a space unless you can see the evidence of how it was made. Then I like to call that a room. What I would call an area, Mies would call a space, because he thought nothing of dividing a space. That's where I say no. Let me draw a diagram. Here is a large area. You can divide it into four parts. No matter how many partitions are in it, Mies would always call the whole area a space. I would call any one of the four divisions a space, but, after you divide it the whole thing is not a space any more. I would call this a space, provided it is never divided. What you see in the third diagram are four spaces I consider these four rooms. Mies would consider this space within which divisions could be made. In the Miesian spaces he allows division, but for me there's not an entity when it is divided.

While Kahn was no less affected by the importation of International Style modernism than his American and Finnish contemporaries, his production during the period before he earned his professional registration in 1935 was performed under the direction of supervising architects. Therefore, it is through a consideration of his work executed soon after 1932, the year of the Museum of Modern Art exhibition and catalogue by Hitchcock and Johnson, The International Style, and after 1935, when he began to practice independently, that the degree of this influence is revealed. His Carver Court Housing Project in Coatesville, Pennsylvania designed and executed between 1941 and 1943 with
George Howe and Oscar Stonorov exhibited the starkness of detail and the purity of rectilinear form that characterized many of the International Style projects included in the exhibition. While it also may be considered modern in its straightforward use of materials and expression of structural elements, it lacked conviction in its use of traditional lap siding and punched windows. It is in the support walls which lifted the dwelling off the ground as if on Le Corbusier's piloti that the suggestion of his later search for monumental expression is seen. In strong light, these walls created the light/dark perceptual rhythm that was analogous to that of Cret's American Battle Monument Memorial of 1928 and to Kahn's earlier Philadelphia Sesquicentennial Exhibition of 1926 (Figs. 3,4). This rhythmic use of strong dark/light contrast reemerged as a formal characteristic of his design work even more dramatically upon his return from his Rome Fellowship. One may trace a clear development of the idea of strong contrast as an organizational device from his Pyramid Studies of 1951, through his studies for a mural for the Weiss House of 1955, to his scheme for the curtain wall of the A.F. of L.-C.I.O. Medical Clinic of 1954-56, and eventually to his conceptual development of the "column as the giver of light" (Figs. 16, 17; Chapter II, Figs. 19, 24).

A parallel development in Kahn's work was his proposition of monumental urbanism as a necessary component to the modern city. In the ongoing studies for Philadelphia, he sought to embody in structures of advanced technological construction the sense of timeless monuments which demonstrate the continuity of fundamental human institutions. His scheme for the Tower for City Center, which combined a technologically advanced windframe with a platonic earthwork, addressed both the circumstantial and pragmatic needs of tall buildings and the inherent monumentality of pure geometry constructed in the surface of the earth (Fig. 18). Similarly, his scheme for a City Center Forum, based on an analogy to medieval Carcassonne, limited the impact of automobiles on the city by storing them in "harbors" at the perimeter of the Forum. Both schemes evidence his searching for a timeless monumentality. Both also address circumstantial needs of modern city life as the vehicle for attaining this timeless quality. In each case, it is the pursuit of the "unmeasurable" goal which lead him through the design of the "measurable" means of attaining that goal.
Fig. 1.


Fig. 2.

A.A. Rough Sketch Showing Illumination with Natural Light and Artificial Light. Municipal Library. Viipuri, ca. 1927.

Fig. 5.

A.A. Abstract Painting in Oil, 1949.
A.A. Wood Experiment for Chairs. Municipal Library, Viipuri, ca. 1930.
Fig. 7.

Fig. 8.
A. A. Ground Plan. Parish Church, Vuoksenniska, 1956-59.
Fig. 9.


Fig. 11.

Fig. 12.
Fig. 13.

Fig. 14.
Fig. 15.

Fig. 16.
L.I.K. Four Pyramid Studies, Egypt, 1951.

Fig. 17.
Fig. 18.


Fig. 19.

CHAPTER II - Techniques to Mediate Daylight

Daylight is constantly changing. The other elements of architecture ... can be exactly determined. The architect can fix the dimensions of solids and cavities, he can designate the orientation of his building, he can describe precisely the quantities and qualities he desires in his building before a stone has been laid. Daylight alone he cannot control. It changes from morning to evening, from day to day, both in intensity and color. How is it possible to work with such a capricious factor? How can it be utilized artistically?1

Light, being the specific wavelength of electro-magnetic radiation which lies within the visible spectrum of the human eye, is necessary for all visual perception to occur. It displays physical properties which are required for its universal use in that it can be felt, seen, and recorded. Similarly, as an ethereal presence, it displays intangible properties which are related to its culturally-dependent symbolism, such as in light as power,2 light as truth,3 and light as God.4 As light is received from the sun, either directly as sunlight, or indirectly, as daylight, it demonstrates the sun's diurnal movements, which are periodic and predictable, and it thereby displays a temporal property as well.5 Thus, while daylight is an important consideration for the architect because it triggers a physiological operation in providing for functional illumination, and an emotional operation as responses to its incidental patterns which characterize a space (Fig. 1), it is also important because it produces a psychological operation in its destruction or reinforcement of the perception of a spatial organization. Therefore, while spatial enclosure and elements of structure are the primary physical media for the definition of space through built form, they are fundamentally dependent upon the presence of light in order to be visually perceived. Not only does the relative complexity of the arrangement of enclosure or structural elements determine the clarity of the perception of a figurative space or a linear sequence, but also does the degree to which daylight functions as a potential revealer or concealer of this arrangement. Therefore, the organization of controlled daylighting suggests a third medium of physically defining space, one which is based on the psychological operation of visual perception and one which should be integrated with and complementary to the other two media if the perception of an architectural unity is intended. Furthermore, it follows that during the design process, the ability to conceive of this third medium and to compare the arrangements of these three ordering media is desirable
and may be accomplished through the comparison of their respective figurative spatial patterns or linear sequential patterns by superimposing the geometric plan diagrams that describe the three ordering systems of the given design. This comparative superimposition allows for their coordination toward the reinforcement of the overall spatial strategy and is a fundamental method by which the architect may enhance the viewer's perception of his spatial concept (Fig. 2).

Visual Perception

Visual perception in all cases requires a contrast between a thing and its surroundings in order for the operation to yield information. The simplest type of visual contrast is a contrast in value, between dark and light. Wherever a contrast occurs, a potential focus is created which may cause the viewer to notice its location, size, shape, and color, and thereby allow for interpretations of its meaning. Similarly, when a group of contrasts occur within the same cone of vision, these potential foci may cause the viewer to notice not only their individual locations, sizes, shapes, and colors, but also the pattern of arrangement which they form (Fig. 3). While the potential recognition of this pattern is not equatable to the recognition of all of the information which would be available at that moment, it is because it constitutes a simpler phenomenon that it may be recognized. While the occurrence of contrasts is a prerequisite for visual perception, it is the choice of foci from the contrasts available which constitutes the fundamental operation of perception. Furthermore, the way these foci are related determines one's perception of the physical facts (Fig. 4). This perceptual operation is illustrated in simplified form by a diagram (Fig. 5) which, when expanded, includes the specific variables which constitute the architect's tools (Fig. 6).

By common consent, the Parthenon is a great work of art. Yet it has esthetic standing only as the work becomes an experience for a human being. Human perception is an active, information-seeking process which involves many mechanisms in the eye and the brain, some conscious and others unconscious. William James underlined the selective nature of perception when he wrote: "Millions of items of the outward order are present to my senses which never properly enter into my experience. Why? Because they have no interest for me. My experience is what I agree to attend to. Only those items which I notice shape my mind - without selective interest, experience is an utter chaos. Interest alone gives accent and emphasis, light and shade, background and
foreground - intelligible perspective, in a word. It varies in every creature, but without it
the consciousness of every creature would be a grey chaotic indiscriminateness,
impossible for us to even conceive.\textsuperscript{8}

From the preceding words of psychologist William James it is clear that, for man, the means of drawing order
out of the everpresent overload of undistinguished information with which he is confronted requires that the mind first
take interest in specific stimuli. This 'taking interest' is the subconscious selection process which must occur so that
perception may take place. Thus by this operation of human mentality, the observer subconsciously picks out stimuli
of interest, makes evaluations as to the relative importance of the received information and attempts to organize it into
simple meaningful messages. The philosopher Alfred North Whitehead describes the process in this way:

In sense perception we discern the external world with its various parts characterized by
form of quality, and interrelated by forms which express both separation and connection.
These forms of quality are the sensa, such as shades of blue, and tones of sound. The
forms expressing distinction and connection are the spatial and temporal forms. The
world, as interpreted by exclusive attention to such forms of sense perception, I will term
nature.

These forms, qualitative and spatio-temporal, dominate this experience. They are
indifferent to emotion, being just themselves, namely the vivid realization of things
capable of abstraction from that instance of actuality with its cargo of emotion. Nature is
devoid of impulse.

Sense perception is the triumph of abstraction in animal experience. Such abstraction
arises from the growth of selective emphasis. It endows human life with three gifts,
namely, an approach to accuracy, a sense of the qualitative differentiation of external
activities, a neglect of essential connections.\textsuperscript{9}

Familiarity with the mechanism of visual perception, leads one to recognize the full measure of significance
of natural light when it is organized into an architectural ordering system. Since perception and its associated mental
processes assigns meaning by the organizing of points of focus within a phenomenal space, the daylighting system is
the means of visually transmitting spatial information. Therefore, it determines its own figurative spatial pattern of
the given space. Furthermore, one can identify three qualities which necessarily impact the visual perception of
architecture. These are contrast, clarity and consistency. These qualities may be exploited by the architect when he
understands that the conceptually organized, controlled use of daylighting will result in a more unified perception of his intended spatial concept.

Awakening light first enables us to perceive contrast, then to recognize forms; finally, form and color determine the kind and depth of visual perception of the material world around us. Apart from occasional and additional tactile, olfactory, and auditory sense perceptions, light not only gives us our impression of any space, but actually creates it in its effect upon us within and without, in natural as well as artificial illumination.10

The process of the perception of architecture in light, relies on the relative contrasts generated by light and dark to form spatial foci (what Whitehead described as "sensa" in the passage above) that are distinct from their respective backgrounds. With an understanding of the manner in which foci contribute to the perception of order in architecture, it is now helpful to examine the interaction of the three qualities of contrast, clarity and consistency as they contribute to spatial perception. Light may enhance or detract from the communication of spatial information to the degree to which it is controlled to emphasize points of significance within the defined space or arrangement of structure. This emphasis is provided by either differences observed in the surface luminance levels from a given point, or between the surface luminance and a light source, such as a lamp, a flame or an opening.11 The range of contrasts among several foci within the same space may be very wide, from very low to very high. In this way foci may be created and organized to contribute to the viewer's overall spatial perception, reinforcing the ordering principles of the spatial enclosure and the structural elements. The significance of an understanding of luminance contrasts for the architect lies in the fact that foci, as distinct perceptual messages, may be conceived and organized in their relationships to one another. In this way, the control of light as a conscious design discipline establishes a figurative spatial pattern analogous to the geometries of those of the enclosure and the structural arrangement.

Light falling on surfaces supplies very little spatial information when there is a nearly constant level of surface luminance. In this case, the profile of the surface exhibits greater contrast to its surroundings than does one area of the surface to another, and thus, results in an emphasized silhouette. Under these circumstances, surfaces with nearly
uniform luminance levels obscure the perception of physical depth, and therefore make an accurate perception of one's surrounding surfaces difficult. The resulting spatial perception tends to be flat, abstract and neutral with an emphasis on outline of form (Fig. 7). On the other hand, when a high degree of contrast exists between one area of a surface and another, a resulting emphasis on qualities of mass and volume, or chiaroscuro, is present (Fig. 8). This illustrates an important principle that lower contrast conditions on surfaces supply fewer spatial clues to mass and volume than higher contrast conditions. Furthermore, when the surfaces in a space exhibit only a narrow range of surface luminance levels varying gradually over a relatively broad area of space, the visitor may interpret this nearly constant level of light as visual homogeneity, producing an ambiance of quiet calmness in the space. The available light present to a space may be greatly diffused or highly concentrated, based on the percentage of light incident on a surface that is reflected back into the space. This quality of reflectivity of any given surface is a function of its material, value, and texture. High reflectivity leads to a dematerialization of mass and form. Low reflectivity serves to emphasize these. High reflectivity may be utilized to improve poor lighting conditions as it was by Aalto. He addressed the low level of daylight available throughout much of the Finnish year by evenly diffusing the available light and thus reducing strong contrasts. Kahn, on the other hand, who typically reflected daylight off of secondary surfaces that were relatively rough in texture, dark in color, and articulated in three-dimensional relief, created conditions that did not maximize the diffusion of the available light, but which heightened the contrasts between different surfaces. Thus, in conjunction with contrast, surface reflectivity is also a primary determinant of spatial perception through its effect on luminance level contrasts.

Another issue of spatial perception through light is the specific perception of each individual source of illumination. Of primary concern is the level of contrast between each light source and the surrounding surfaces. This level of contrast depends on the manner in which light is mediated by the window, by the spatial enclosure, by the structural elements, or by all of these. Thus the perceptual qualities of each individual focus interact with light's temporal movements, controlled contrast levels and reflections off surfaces, to determine the viewer's perception of focal points.
While perception of contrast is the important first stage of spatial perception, it is immediately followed by the mental recognition of individual forms, and then, by means of form and color, is culminated in a visual perception of the material world.\textsuperscript{12} The architect, in anticipation of the perception of particular areas of contrasting light and dark, may seek to organize these areas in order to emphasize specific spatial figures or structural elements. This principle leads to the need for the development of various techniques to admit and control light. Because of the potential diversity of these techniques, the level of effective contrast may be varied from the subtlety of a barely detectable distinction to the clarity of a dramatic brilliance. With respect to spatial perception, it is the relative light level, or brightness, as opposed to the absolute light level, or luminance, that is the primary issue in considering contrast. However, the overall light level within a space does influence the character attributed to that space, especially when this level approaches either extreme.

Relaxation and comfort will be enhanced by clarity of biologically important information such as circulation patterns, the nature of structure, views, evidence of sunlight, etc.\textsuperscript{13}

The directness and clarity of a "message" yields the most predictable communication of information. Because of this fact, clarity of order in a building system implies a sense of stability. It promotes the straightforward perception of buildings suggestive of a cause (choice of program, spatial enclosure or structural system) and its effect (building form) relationship, but it does not necessarily require simplicity. Clarity facilitates spatial perception and cognition to the extent that it reduces the length of time needed by the visitor to derive an understanding of the spatial enclosure or structural system. In extreme cases the experience of only one or two spaces or of one or two bays of structure may provide an understanding of the whole edifice. In this case, the danger is that the observer may not be encouraged to explore the rest of the building, but rather may tend to grasp the salient characteristics of the total from a brief period of exposure. Ambiguity, as it may be balanced with clarity, plays an important role here in encouraging longer exposure and allowing for multiple readings.\textsuperscript{14}

Originating in the human mind, spatial perception reflects the general principles of Gestalt psychology. This
leads to the interpretation that ordered space as it is physically defined by enclosure and structure and as it is revealed by controlled daylighting is one of the primary products of architectural perception in opposition to a commonly held view that architecture is solely involved with the play of light on form. In order to create architecture which may hold the viewer’s prolonged interest, any given gestalt may be interrupted to alter his expected perception. It may have been, in part, toward this end that the precursors of the modern movement created experiences of spatial extension in direct contrast to the common expectation of traditional spatial containment.

In an unfamiliar environment it is helpful if the perceptible patternings of visual information are sufficiently consistent that they may easily be used for orientation and guidance.

Consistency of perception implies that the building embodies a clear, though often complex, logic in the manner in which the space defining elements are disposed. Redundancy is an extreme example of achieving consistency whereby identical relationships are used. Accordingly, the multiple repetition of stimuli sanction a forceful inertia toward the perception of an obvious experience. As an alternative to redundancy, however, the more common method used to achieve an animated consistency is one whereby analogical relationships are developed within a language. In contrast to the pitfall of extreme redundancy is the complementary pitfall of extreme variety to a level which yields inconsistency and chaos. Whitehead warns of this disruption to productivity:

There is a natural affinity between order and goodness. It is not usual to accuse people of "orderly conduct." Undoubtedly there are limits to the excellence of mere order. It can be overdone. But there can be no excellence except upon some basis of order. Mere disorder results in a non-entity of achievement.

As implied by Whitehead above, ambiguity may be a key to richer experiences. However, its multivalence, the possibility of it offering several meanings, if excessive and without a dominant order within which to exist, may prove not to enrichen experience but rather to destroy its meaning. Architect David Niland defined the perception of
consistency in architectural order as...

an establishment of a language which is refinable. ...simply a semantic, syntactical consistency that makes it possible for a human viewer, participant, or respondent, not necessarily to understand but to perceive what the architecture expects of him, and what intuitively, subconsciously, unconsciously, he may expect of it. Architecture should beckon, entice, seduce and deliver that discovery. But if there isn’t that element of consistency, confusion sets in. Then you lose the empathy that has to be there in order to respond. I think of architecture as theater. It can get very complex. I don’t think it can become complicated and at the same time introduce something that is in contradiction, because contradiction, in my judgement, destroys empathy and disassociates the respondents from a position where they can continue the process of participation.¹⁹

These perceptual sensitivities yield the syntax for spatial order. The viewer’s encounter with the visual and haptic phenomena of contrast, clarity and consistency form the basis of his perception of defined architectural spaces and his recognition of animated architectural sequences. Therefore, order is the means by which individual aspects of the building convey meaning or ‘make sense’. With deference to the perception of the complete whole, however, these aspects convey meaning by consistency of syntax, requiring first, the coordinated subordination of the aspects to the whole, and second, the hierarchical relationships of the various aspects to each other. Furthermore, while this investigation focuses on the three primary ordering systems of architecture, spatial enclosure, structural elements, and daylighting control, the three secondary aspects, those of material detail and construction, use of color, and thermal zoning, also contribute to reinforce or contradict the formal organization perceived from the whole.

A good visual environment caters to the visual information needs of the occupants. Surfaces of interest are highlighted, surfaces lacking interest are subdued. There is a maximum of ‘signal’ and minimum of ‘noise.’ What is lit and how, is considered more important than how much. The best visual sources of light are those surfaces one enjoys looking at: room surfaces, people, interesting views of nature... Information subconsciously needed for our activities or for survival.

Poor visual environments are dominated by visual information that is irrelevant to our interest or needs, or are ambiguous, unpleasant or distracting from our desired perceptions. We like seeing well-framed views through clear glass; we dislike views through dirty glass and disorderly arrangements of blinds. We like rooms in which the lighting fixtures are inconspicuous; or better yet, where the lighting elements organize the space and
reinforce the perception of other features of the room. We dislike rooms in which the lighting elements are conspicuous and disrupt the space unless they are clearly designed to be interesting focal points.

Visual environments are generally most pleasing when the surfaces of interest are the principal [sic] apparent sources of light, and the actual sources are concealed from normal view.\(^{20}\)

As described above, for the perception of architecture, two types of value contrasts form the basis of more complex hybrids of organized daylighting. These are silhouette, the effect of sunlight or daylight originating from behind a form and passing through it, tending to emphasize its profile or its layering of profiles, and chiaroscuro, the effect of sunlight or daylight falling across a form, tending to emphasize its texture and stereometry. These terms and their roles in the operation of visual perception establish the grounds for the analysis of the approaches toward the control of daylighting employed by Aalto and Kahn. While historically these two architects developed at different rates and clearly began from differing points of departure, the comparison of the strategies that each employed during the mature period of his career reveals concurrence between their underlying discoveries.

The Thick Wall

The clarity of the impression of volume is diminished by any sort of complication. Volume is felt as immaterial and weightless, a geometrically bounded space...\(^{21}\)

Thus as a corollary of the principle of surface of volume is the further requirement that the surfaces shall be unbroken in effect, like a skin tightly stretched over the supporting skeleton\(^{22}\)

From the above description of one of the three principles set down by Hitchcock and Johnson in 1932 to describe the International Style, it is apparent that their emphasis on the "taut skin" and the dematerialized boundary of volume implied a goal toward the reduction of the dimension of the enclosing wall to an absolute minimum. Through the exploitation of non-structural curtain wall construction, it was now possible to achieve thin membranes of unprecedented shearness, and, by default, to bring in unfiltered direct and reflected insolation (Fig. 9). Conceptually, as
well as practically, these thin membranes stood in direct opposition to the traditional mass wall which acted as a thermal, luminous, and acoustical filter.\textsuperscript{23} The reintroduction of the traditional idea of the wall as filter, which was all but exorcised from architecture by early modernist architects' obsession for shear glass and taut skins, first occurred in 1931 at Le Corbusier's studio in Paris. In this situation, the brise-soleil or sun-breaker was conceived as an externally attached device, distributed about the building as needed in order to maintain a moderate level of human comfort within the space.\textsuperscript{24}

In contrast to Le Corbusier's applied device to mediate between inside and out, Robert Venturi, in his influential work of 1966, \textit{Complexity and Contradiction in Architecture}, posited that the rediscovery of the thick wall could fulfill this role based upon its potential to mediate between the differing necessities of the inside and outside. Many of the examples quoted in this book and used to illustrate the richness inherent in this idea were drawn from the works of Aalto and Kahn. Venturi explains:

Contrast between the inside and the outside can be a major manifestation of contradiction in architecture. However, one of the powerful twentieth century orthodoxies has been the necessity for continuity between them: the inside should be expressed on the outside. But this is not really new--only our means have been new. The Renaissance church interior, for instance has a continuity with its exterior vocabulary. The result is subtle modification but little contrast and no surprise.

[But] The inside is different from the outside.\textsuperscript{25}

Since the inside is different from the outside, the wall--the point of change--becomes an architectural event. Architecture occurs at the meeting of the interior and exterior forces of use and space. These interior and environmental forces are both general and particular, generic and circumstantial. Architecture as the wall between the inside and the outside becomes the spatial record of this resolution and its drama.\textsuperscript{26}

Contradiction between the inside and the outside may manifest itself in an unattached lining which produces an additional space between the lining and the exterior wall. Venturi's plan diagrams illustrate that such layers between the inside space and the outside space can be more or less contrasting in shape, position, pattern, and size (Fig. 10). Residual space becomes 'open poché', an open pocket into which things may be placed. Aldo van Eyck understood these pockets to allow for the use of different spaces while enhancing their reading through ambiguous boundaries.\textsuperscript{27}
Kahn's development of the idea of "served and servant spaces" is one example of how open poché has been used to accommodate incongruous but necessarily-coupled spaces without sacrificing the use of either one.

The Window

To distinguish between the means of introducing natural light into a space that characterizes a mature Aalto project from that which characterizes a mature Kahn, one may begin with the thick wall and the concept of mediation through depth as a common principle. Both architects recognized the opportunities inherent in particularizing natural light by expanding the distance between the outside and inside surfaces. While this generative idea consistently formed the strategic point of departure for both, it is the manner in which the idea was specifically implemented which offers the means of a distinction between their works.

Of particular interest is the manner each architect chose to study the technique of mediation by depth. Kahn's diagram, although it emerged from the process of designing the U. S. Consulate at Luanda, describes a generalized condition. As drawn, the diagram has no explicit reference to his consulate project or any other specific place or time. Therefore, it may be interpreted as representing a universal concept, one allowing for specific applications (Figs. 11,12).

Aalto's sketch, on the other hand, is of a technique developed for a specific application in his third scheme for the Municipal Library at Viipuri (Fig. 2, Chapter I). It illustrated his concern for the proper quality of light to accommodate reading under conditions of both natural and artificial illumination. This particular application of the typical Aalto conical skylight, a deeper and more refined version of the one originally introduced for the Turun Sanomat (1928-30), and then modified for the Paimio Sanatorium (1928-33), creates a quality of light unique to this building. The eveness of the diffused light that is provided owes a great debt to the exaggerated depth between the outside membrane and the inside opening. While Pearson suggests that this depth may have been a by-product of the "unavoidable structural considerations" of spanning this wide volume, it is evident from Aalto's sketches that he did intend to create a glareless and shadowless light by which to read. He accomplished this intention through the single
and double reflection of light patterns as they penetrated the deep roof structure.

Interestingly, the provision of artificial light, necessary for not only nighttime operation, but also to augment the insufficient natural provision by Finland's winter sun, is designed to simulate the "reflection and dispersion" of the skylights. While the relative success of these fixtures is difficult to evaluate, the seed of an idea that Aalto later developed is clearly present. The subsequent use of the conical skylights, seen in Baker House (1946-49) and the Rautatalo Building (1951-55), for example, included the addition of external light fixtures which, when lighted, illuminate the inside of the cones in a warm light, much like the sun would do. In addition to simulating daylighting qualities artificially, another important lighting precedent set at Viipuri is the use of the white plaster wall surface as a primary light diffuser, spreading the light evenly over a broad area. This technique is fundamental to the balance of light characteristic of Aalto's later libraries. However, in the later buildings he brought the diffusing surface down from the ceiling as a sculptured soffit in a position directly opposed to a large clerestory window.

The invention of a "room for light," a special ancillary space between the inside and the outside layers of the thick wall, was a central theme of many of Kahn's most noteworthy accomplishments. While his early works up through the period immediately following World War II, were generally undistinguished, they anticipated the developments that were to follow in that they exhibited a clarity of the structural system which had emerged out of his exploration for a new monumentality. As a result of his teaching appointment at Yale in 1947, the structural rationality which seemed to be underlying his work up to that point emerged as an issue by which student work was evaluated. At this time, Kahn began his now-familiar practice of lecturing and questioning his students and peers about architectural meaning. This seems to have provided a needed forum by which he could explicate and reexamine his own intentions. That this practice served him in his pursuit of particular aesthetic solutions is doubtful, but it did seem to serve as an intellectual litmus by which he could test the philosophical and strategic doctrines he was forming.

For example, the plan of the Weiss House (1948-49) built just after Kahn's teaching began at Yale in 1947, exhibits a clearly modular rhythm of structure. Also in elevation this rhythm may be read in the vertical roof supports dividing the window wall. However, once inside the clearly expressed structural order is not yet permitted to serve as
the organizing order of the spatial enclosure. Instead, the separate spaces exhibit a degree of asymmetrical spatial continuity reflecting the general modernist tendency of the day.

Upon returning from his pivotal appointment at the American Academy in Rome during 1950-1951, he continued this exploration of architectural meaning based on a potency of articulated structural members. During this period of the early 1950's, Kahn evolved an artistic language of structural elements and spatial definition which embraced the foundations of architectural expression and recognized the unrealized potential inherent within developing construction techniques. His work evolved toward a increasing clarity of structural articulation and began to articulate spaces similarly. In addition, he gradually began to exaggerate the relative scale of the structural members themselves, inflating them in order that they might define a "spatial zone," a zone dedicated to structure.

While this zone was absent from the Weiss House and the Picus Therapy Building (1949-50), the inherent structural rhythm is present and extremely clear. In the Yale Art Gallery (1951-53), however, this zone is defined by the large square concrete columns and is articulated by the material patterns in the floor and structural ceiling. The importance of distinguishing between the zone given over to structure and that given to usable space lies in the recognition that it anticipates by several years his conceptual deployment of "served and servant" spatial hierarchy as illustrated by the Richards Medical Research Building (1957-61).

In the Adler House (1954), the structural zone is again articulated, in this case, by the dimension of square stone columns. Kahn took a significant step when he, by literally applying the theoretical proposition that he stated in the previous year, inflated the width of these stone columns and increased the depth of the structural zone. In 1953, Kahn had described this idea:

In Gothic times, architects built in solid stones. Now we can build with hollow stones. The spaces defined by the members of a structure are as important as the members. These spaces range in scale from voids of an insulation panel, voids for air, lighting and heat to circulate, to spaces big enough to walk through or live in.28

The columns of this building were built of "hollow stones" and were used to house the vertical mechanical
services. Also, they were grouped in fours to form a series of structurally-distinct building units which, when composed contiguously, formed the totality of the building. The individual square structural bays exhibit a central focus because of the consistent structural zone circumscribing their implied spatial figure. However, the dominant spatial pattern of the house as a whole contrasts this message because it is characterized to a large degree by a free spatial intercommunication between distinctly separate structural bays.

Kahn took another step toward the realization of his mature servant/served hierarchy when in the Adler House he organized the plan by placing casework and other 'solids' within the structural zone. Not only does this practice anticipate later planning refinements, it is perhaps of even greater significance because it was a means of distinguishing openings from the formerly uniform plate glass infill. This type of window and its accompanying light assumed a noticeably more particular quality as compared to that of the broad curtainwall. This is because the light entered through smaller, more particularized openings and because it subsequently reflected off surfaces perpendicular to the window before reaching the interior space. The implications for future developments from this experience lie within Kahn's ideas expressed in a letter to Anne Tyng in 1954.

My latest idea is that the area of support of each column is the area for the control of light and air so that we can say that we have evolved from the Greek completely. 29

Because of the depth established by the exaggeration of the structural zone and the accompanying depth of the 'solids', the light entering the interior through this zone of mediation is shaped and filtered in the process. For the first time (except for the glass block monitor in the Yale Art Gallery stairwell) the window in Kahn's work indicates his line of future development. In the projects that followed (1954-), the concept of the "hollow column" attained a high level of development. In 1955 Kahn designed and built the Trenton Bath House, in which the twelve hollow columns were used to support four pyramidal roofs (Fig. 14). This was the first time that he had realized hollow columns as a place for human occupation. The further development of this idea, through the design of later projects, served as the basis for his highest achievements.
Kahn's other nuance of light mediation, suggested by the deep window pockets of the Adler House were further developed in the Esherick House (1959). The windows of this house established a deep zone, in this case, divorced from a structural role, created by a window surround projecting perpendicular to the glass into the living space. This device not only limits the view, but also mediates the otherwise sharp contrast between the sunlit objects outside and the much darker interior surfaces surrounding the wall. In addition, the use of this window type produces a dramatically different character of space than that produced by his earlier use of glass curtainwall. This is because the space is softly lighted by a narrow vertical window in the corner of the room. Thus the "room" emerges as a newly-rediscovered architectural principle. From the effects of chiaroscuro observed in the works of painters such as Rembrandt and van Dyck, it is apparent that this lighting principle and its associated lighting quality was appreciated by the Flemish masters as well.30

The similarities between the windows used in the Esherick House and those used in the Fisher House (1960) makes the use of a free-standing wall of the U. S. Consulate project for Luanda (1959) even more suprising (Fig. 15). Explaining his first use of this device, Kahn (in 1961) described how the interiors of the consulate must be protected from the harshness of the Angolan sun:

One doesn't feel like having the view cut away, so I thought of placing openings in the wall; the wall then becomes part of the window. When that wall got the light—even the direct sunlight—it would modify the glare. So therefore I thought of the beauty of ruins ... the absence of frames ... of things which nothing lives behind ... and so I thought of wrapping ruins around buildings; you might say encasing a building in a ruin so that you look through the wall which had its aperatures by accident. But, in this case you'd want to formalize these openings and I felt this would be an answer to the glare problem. I wanted to incorporate this into the architecture instead of it being a device placed next to a window ... I should say, desire for light, but still an active fighting of the glare.31

In addressing a particularly difficult glare problem, Kahn had adopted a local tradition of screening window openings, and created a monumental interpretation of it in order to characterize the institution, as well. The conceptual diagram, "wrapping ruins around buildings", proved fruitful in other projects as well.
I came to the realization that every window should have a free wall to face. This wall receiving the light of the day would have bold openings to the sky. The glare is modified by the lighted wall and the view is not shut off. In this way the contrast made by separated patterns of glare which skylight grilles close to the window make is avoided.  

From the idea boldly presented in the unrealized Luanda project, Kahn may be seen to have advanced rapidly toward a self-confident consistency in the treatment of light. The conceptual sketches (Figs. 11, 12) indicate the level of order Kahn hoped to achieve in handling this specific glare problem and in introducing light into the building in general. As the diagrams indicate, he considered daylighting to be an architectural problem, one the solution of which should integrate into the overall building order.

By applying this concept in the design of the Salk Institute Meeting House (1959-65), he evolved the "wrapped ruin" into a free-standing building. This project includes a series of glass boxes surrounded by a punctuated free-standing "ruin", and acts as building within a building (Fig. 16).

By 1960 this concept (hollow column) was finally applied to the Salk Institute lecture halls. Here the concept of wrapping a building in a free-standing shell can also be seen as an enlargement of the hollow column to the scale of the building itself.

This unrealized scheme lead immediately to the implanting of the hollow columns into "thick walls in the design of the Mikveh Israel Synagogue (1962) (Figs. 13, 17-19). The concept of the hollow column, as applied here, has been refined to allow for the inhabitation of the interior of these "light bottles and window rooms."

These nonstructural cylinders act as diffusion chambers. Daylight shines through their exterior openings, ricochets around the inside of the columns, and filters subtly through the openings into the synagogue.

And in 1964, in terms of the hollow columnn, he explicitidly describes what he's seeking:
I think that the columns are hollow and much bigger and that their walls can themselves give light, then the voids are rooms, and the column is the maker of light and can take on complex shapes and be the supporter of spaces and give light to spaces. I am working to develop the element to such an extent that it becomes a poetic entity which has its own beauty outside of its place in the composition. In this way it becomes analogous to the solid column I mentioned above as the giver of light (Figs. 20-23).\footnote{36}

This description evokes images of the great spaces of the Baroque Age, especially those of the Italian masters of light and movement, Francesco Borromini and Guarino Guararini. It outlines the manner by which the room as determined by light, receives its character from the light as in the breakfast room of the Sir John Soane house or the nave of Balthasar Neumann's Vierzehnheiligen. But unlike these spaces, those which Kahn was to develop received their glory of natural light by means of structure and were most successful when their daylight enhanced the structure.

The attitude toward the window and the introduction of daylight is less clearly enunciated by Aalto than by Kahn, but it was just as clearly illustrated in his created works. Aalto's was an attitude which he developed at a earlier point in his career (as evidenced at the Municipal Library, Viipuri completed when he was 35) and one which he held for the balance of his career. As opposed to Kahn who developed a philosophical strategy by which to guide his architectural design work toward a singular daylighting goal, Aalto, instead, established a strategic methodology very early on and subsequently built up a compound repertoire of daylighting devices throughout the rest of his career. Several of the principle uses of daylight in his design methodology were: a series of skylights to mark the circulation zone, first seen at the Reval National Art Museum, Tallinn, in 1934; a grid of skylights to provide even illumination over a large space, first seen at the Municipal Library, Viipuri, in 1933; a glass plane covered with slatted screen, first seen at the Savoy Restaurant, Helsinki, 1937; projecting "crystal" skylights, first seen at the National Pensions Institute, Helsinki, 1948; and a high clerestory with diffusing broad white soffit, first seen at the Technical Institute Main Building, Ontaniemi, 1955-64.

The development of the conical skylights for the Municipal Library at Viipuri, mentioned above, were not Aalto's first exploration of daylighting. His first use of daylighting followed much more closely traditional Finnish precedents as influenced by his interest in Scandinavian classicism. His church at Muurame of 1927-29 employed Mediterranean Italianate massing with deeply set windows punched rhythmically along the nave walls. To light the
alter, he employed a lateral wash of eastern light as had been done for centuries in traditional medieval Finnish examples and more recently by architects Lars Sonck and Erik Bryggman. In this early example, one finds a fundamental demonstration of Aalto's emerging daylighting sensitivities. The pattern of punched openings along the nave generated a figurative spatial pattern which reflects the pure symmetry of the classical basilica plan. However, the lateral wash at the altar, which acted as a countertheme to the nave symmetry, produced an immediate contact with the natural world beyond through its movements and fluctuations in brightness and color. Furthermore, it demonstrates Aalto's consideration of the importance of circumstantial events in the context of dominant patterns (Figs. 26, 27).
Fig. 1.

Effect of Incidental Patterns. Gallery. Chateau Chamborg, France.
Fig. 2a.

Comparison of Structure/Space/Light Figurative Spatial Patterns.

Fig. 2b.

Comparison of Structure/Space/Light Linear Sequential Patterns.
Fig. 3.

Organized Foci of High Contrast.
Fig. 4.

Effect of Differing Arrangements of Foci of High Contrast.
Diagram of Spatial Experience.

ARCHITECT'S TOOLS:

STRUCTURE

SPATIAL ENCLOSURE

CONTROLLED DAYLIGHTING

(MATERIAL CONSTRUCTION)

(COLOR)

(THERMAL ZONING)

Fig. 6.

Expanded Diagram of Spatial Experience.
Fig. 7.

Fig. 8.

Fig. 9.

Fig. 10.

Robert Venturi. Plan Diagrams Showing Relationship of Inside to Outside.
Consider the inside and the outside as though they were separated from each other of different character (insulation).

Walls could come together in the absence of glass.

A glass wall needs protection from glare.

L.I.K. 'Thick Wall' Diagram.
Fig. 12.
L.I.K. 'Wrapping Ruins' Diagram.

Fig. 13.
Fig. 14.

Fig. 15.

Fig. 16.

Fig. 17.

Fig. 18.

Fig. 19.

There is a remarkable similarity in the design of the great temple of Egypt, in which the columns are of marble and the roof is of stone, with the columns of the Great White Temple. The column, in fact, is like the column of the temple where the light is not. L.I.K. Notebook Sketch.
Fig. 21.

L.I.K. 'Hollow Column' Diagrams.

Fig. 22.

L.I.K. 'Hollow Column' Diagrams.
Fig. 23.

L.I.K. 'Hollow Column' Diagrams.
Fig. 24.

Fig. 25.
Fig. 26. A.A. View toward Altar. Parish Church, Murrane, 1927-29.

Fig. 27. A.A. View toward Entry. Parish Church, Murrane, 1927-29.
CHAPTER III - Approaching Buildings as Ruins

A building rising from its foundations is eager to exist. It still doesn't have to serve its intended use. Its spirit of wanting to be is impatient and high, allowing no grass under it. A building built is a building in bondage of use. Its spirit then must call out and remind its user of its will to have been. Isn't it true that sometimes a building being built is of more interest than one that is finished? A building that has become a ruin is again free of the bondage of use. But it is different from when it was being built because it now allows foliage to grow over it, as loving as a father permitting the child to pull at his carefully chosen clothes.¹

The ruined state of a building may suggest an immanent quality.² The recognition of immanence may be compared to what Kahn called the "unmeasurable" and supports his desire to conceive of his later works as built ruins, buildings constructed in a seemingly incomplete state. The fourth dimension of experience is thereby brought to the foreground, that is the perception of the influence of time. Built form and the suggestion of its change over time fuse to expose the tentativeness of the viewer's position of privilege.³ It is toward this recognition of the viewer's tentativeness that the metaphor of the built ruin contributes most significantly but most ambiguously.⁴ The fascination with ruined forms of both Aalto and Kahn is well-documented in their travel sketches. In Aalto's drawings of 1953, the built elements either interpenetrate with or form a basis for a surface of vegetation, whether it is the planted but rocky soil, such as at Delphi (Figs. 3,4), or attenuative vines, such as at Olympia (Fig. 1).⁵ In contrast to Aalto's depiction of a circumstantial interaction between man-made and natural growth forms, Kahn's sketches of the same period describe a more anxious scene, one of open-formed arches and deserted colonades, lacking the interplay of plant material which might have served to soften hard forms.⁶

Open Forms in the Landscape and the City

The compound use of daylighting effects produced through both silhouette and chiaroscuro were used by Aalto and Kahn to reinforce the viewer's perception of "built ruins." It was, in fact, a ruined structure to which Kahn referred when he drew his famous sketch of light emerging from the order of structure. Kahn's sketch describes an open form, a
structure of ambiguous enclosure, much like the ruined monuments of Rome that he admired so much. In fact, in Kahn's metaphysical 'built ruin', one may see the synthesis of the ideal settings of arcadia (Eden) with utopia (Jerusalem). It follows then that the use of the open form may follow either an agrarian or an urban model, as evident in a comparison of Aalto's Finnish Pavilion, Paris (Fig. 2) to Kahn's Salk Meeting House Project, La Jolla (Fig. 7).

Buildings designed toward their early ruination do not immediately imply the pursuit of well-built artifacts. However, a focus on well-built artifacts does not preclude the process of ruination being anticipated and embraced in order to merge the built with the living environment. Ultimately, this interaction may approach the sublime of the Gothic monuments and nonetheless may involve the empathetic participation in the temporal cycles of natural seasonal growth and decay. Evidence of Aalto's investigation of this idea is not only found throughout his later oeuvre, but also quite clearly in early projects, as well. In fact, he proposed in both of the schemes that he entered in the 1927 Summer House competition sponsored by Aitta (which captured first and second prizes), a bucolic sod roof. While the two schemes differed in their specific stylistic idioms, it is significant that both included such reference to the merging of the building with the landscape. The idea was further explored in the same year in another competition for Aitta, that for a villa. In his entry, termed the 'Merry-Go-Round' Villa, Aalto developed a circular courtyard scheme with one open side, somewhat modeled after the traditional Ostio-Bothnian and Scandinavian bay houses. In an article predating this scheme Aalto had written:

Northern climate that requires clear separation between the warmer inside spaces and outside has become a stumbling block to the architect... The garden (courtyard) belongs to the home just the same way as any of the rooms. Let the step from the herb garden be a much smaller contrast than from the street or the road to the garden... A Finnish home should have two faces.

Kahn understood the imperative of including elements of the natural world within the immediate environs of man, even in the city. In 1961, he wrote:

The circumstantial demands of the car, of parking and so forth, will eat away all the
spaces that exist now, and pretty soon you have no identifying traces of what I call
loyalties—the landmarks. Remember, when you think of your own city, you think
immediately of certain places which identify the city as you enter it. If they're gone, your
feeling for the city is lost and gone... If because of the demands of the motorcar, we
stiffen and harden the city—omitting water, omitting the green world, the city will be
destroyed. Therefore, the car, because of its destructive value, must start us rethinking the
city in terms of the green world, in terms of the world of water, and of air, and of
locomotion and that is really the animal world. 9

Similarly, Aalto extended the point of contact between man and nature in order that the natural context might
once again become the primary setting for human interaction, as it once was in Arcadian paradise. His tactic of
integration, employing the device of the built ruin, aimed at restoring modern man back to a more 'primitive' state.

Personally I'm against sports becoming universalized so that summer is turned into
winter and winter into summer. I think that one should pursue a sport and change it
according to the time of the year so that one may experience the natural changes of the
seasons. Javelin throwing indoors is not as noble a sport as javelin throwing outdoors in
the woods or by the shore. In an indoor swimming pool or an ice hockey arena the
seasons are changed de facto and a person's leisure activities have been divorced from
nature. 10

I was once in Milwaukee together with my old friend Frank Lloyd Wright. He gave a
lecture that began, 'Ladies and gentleman, do you know what a brick is? It is a small,
worthless, ordinary thing that costs 11 cents but has a wonderful quality. Give me a
brick and it becomes worth its weight in gold.' It was the first time I had heard an
audience told so bluntly and expressively what architecture is. Architecture is the turning
of a worthless stone into a nugget of gold. In Finland we have certain difficulties with
this process of transformation.

My associates and I have tried to establish an experimental house to encourage the
process. We have built many experimental walls with different types of bricks and we
have been able to communicate with the bricks each time we stay in the house, for it is
always easier to discover brick's qualities in untouched surroundings. We have also
examined the effects of plants on a brick wall. For an architect it is a shock suddenly to
see yellow lichen creeping out over the stone; and however small the plants may be, they
are stimulating. 11

Aalto's desire to integrate the building with nature manifested his goal of placing man in a more immediate
contact with the natural world in an attempt to recapture the lamentable position lost by Adam in the garden. In
contrast, Kahn's built ruins were aimed at causing the relationship of modern man to the natural world to be ambiguous
and thereby to encourage contemplation. He believed that an appreciation of the presence of the "unmeasurable," an appreciation only possible if one is reoriented toward its presence, might serve as the foundation for a new utopia, one which fully embodies the inspiration of its beginning.
Fig. 1.


Fig. 2.

A.A. Travel Sketch of Capital. Olympia, Greece, 1953.
Fig. 3.

Travel Sketch of Theater. Delphi, Greece, 1953.

Fig. 4.

Travel Sketch of Theater. Delphi, Greece, 1953.

Fig. 7.

CONCLUSIONS AND FURTHER HYPOTHESES

History is not continuous. It is made up of stops and starts, of presences and absences. The presences are the times when history is vital, is 'running', is feeding on itself and deriving its energy from its own momentum. The absences are the time when the propulsive organism is dead, the voids in between one 'run' of history and the next. These are filled by memory. Where history ends, memory begins.¹

Despite their traditional historicist training, both Aalto and Kahn were, in fact, working within the limits of modernist architectural principles. They did so in order to expand the possibilities of modernism's applicability by exposing its limits and proposing a synthetic alternative. Each brought a critical eye to challenge the assumptions of progress represented by the International Style. Rather than ignoring the conflicts between these revolutionizing modernist ideals of the 1920's and traditional societal values, between functionalist (what Aalto called 'Form Functionalist') doctrines and entrenched cultural traditions, between international stylistic trends and regional vernacular practices, and between abstract ideals of fabrication and the realities of established and logical craft techniques of material use, each sought to resolve these conflicts in their respective architectural projects by dissolving the clear distinctions between antithetical positions toward the discovery of a more responsive and time-enduring synthesis. The focus of this synthesis became, for both architects, the conception of the built work as a medium for the dignified expression of human institutions and its manifestation as a metaphysical stage in the continual and inevitable process of ruination. In some cases figuratively, by the exploitation of controlled daylighting, and in some cases literally, by the exploitation of the aging process of organic building materials, they sought to merge the built work with elements of nature and thereby with the natural landscape. This proposition was used to suggest the building's origins, in its memory of its construction, on the one hand, and in its genealogy as a descendent of the mythical primitive hut, on the other. In addition, as the merging of building with landscape, the built ruin blurred the distinction between the productive activities of artifice and those of agriculture.² It demanded from the architect not only well building (craftsmanship) but also well-directed building, both of which embodied a moral imperative for Aalto and Kahn. The internal issue of the well crafting of the artifice was clearly a central concern for both architects throughout their careers. However, their
CONCLUSIONS

interests in the broader, external issue of well-directed building was ultimately demonstrated through their metaphorical ruins. In principle, the fundamental goal of architecture is the sheltering of man, physically, psychologically and spiritually, implying the definition of space by an enclosure or elements of structure. While this goal was seemingly compromised by the merging of building and landscape, the greater ambiguity offered by this practice served to challenge the functionalist doctrine of the provision of mere shelter alone.

Furthermore, the ambiguous nature of the built work, suspended as it was between artifice and agriculture, was heightened still more as it suggested that an organic process was currently underway, one of either the built work emerging out of its construction process or that of its merging into its ruined landscape, and it thereby outlined a moral imperative. It allowed for consideration of the process as well as the work, and brought to mind a prior obligation as in the manner of a mute memorial, such that the work could be interpreted as incomplete, caught between anticipation and decay. In the following description of Michelangelo's "Slaves," the author described this same ambiguous state of incompletion discovered in the sculptures.

Although they are not finished, the originality of the composition and the power of the idea that moves them are striking, with a superb suggestion of emerging life of liberation from the matter that still retains them, that dominates them or against which they are in rebellion. We do not believe that Michelangelo consciously wished to leave these sculptures as they are because he felt they were completed. But, in the long run, this occasional unfinished quality must have given him thought. Keeping them in his Florentine studio in Via Mozza for so long must have brought out their full value and the full scope of his researches into form. These researches were to bring him to increasing interiorization of the dynamic relationships impressed on the figures; they 'would be summed up in rapid essential notes, pure exhalations of life emerging from the destruction of the matter'.

And again in his 'Rondanini Pietà' one confronts the same state of a suspended process which allowed for a richer and multiple reading of the piece.

'Others have made the contrary conjecture, that the sudden halting of work was caused by satisfaction over having completed the embodiment of his vision: by reason of the
emphasis that the unfinished gives the sculptural relief when compared with the finished [Venturi, Bertini]; or the heightened emotional expression given by a very rapid and daring synthesis [Bertini]; or the accentuation of movement arising out of a form striving to liberate itself from the block [Bertini]; or love of ancient sculptures, more powerful and expressive when worn and truncated [Toesca]; or the suggestive power of figures that emerge from the rough marble, in which the activity of the human spirit seems to be associated with the forces of the cosmos and, therefore, has an infinite ideal background instead of the limited background of a personality or an epoch.' (Fig. 1)\textsuperscript{7}

It was the latter interpretation which directly parallels to the works discussed above. The built ruins served to isolate themselves from the limited background of the particular and circumstantial, in favor of forming stronger associations with the universal cosmos.

...the 1965 design for the Dominican Sisters convent of Media (the direct progenitor of Stirling's Berlin designs of ten years later), or for the Philadelphia College of Art in 1964 are, in some way, the culminating point of this idea of design as a sequence of defined and reciprocally significant places. In Kahn's monumental whole, the rule of the construction of the entire system has skilfully (sic) cancelled out all excessively blatant traces by which it can be recognized. We see it as something powerful but mysterious, something which is continuously interrupted, the possible extreme archeological ruin of our future.\textsuperscript{8}

Therefore, in this metaphorical device identified in the work of Aalto and Kahn, both of W. A. McClung's archetypes of paradise are found.\textsuperscript{9} The first, that of the original state, of God and man in the perfect environment of the garden, is suggested by Aalto's literal interpenetration of building with setting, such as at the Villa Mairea. The second, that of the New Jerusalem, the constructed paradise, is suggested by Kahn's development of isolated interiors invoking the immutable qualities of the pyramid, such as at Exeter Library.

Thus, Le Corbusier's modernist ideal of the 'machine in the garden' may be understood as the machine of the garden, the two being much more symbiotic in their relationship. Man, then, may more freely occupy the area of overlap allowing for cultural, economic, and industrial progress while retaining close connections to his natural origins.

The quiet ruin reveals again the spirit out of which it once stood as a proud structure, now it is free of its bonds.
To [sic] of this spirit is a building being built now more wonderful than when it will be completed. Its spirit is young and anxious to become itself. It too is free and need not answer.

The building standing complete has its spaces locked in unbending structure. Its bonds are the duties of use. The spirit is engaged and must answer.

The quiet ruin now freed from use welcomes wild growth to play joyously around it and is like a father who delights in the little one tugging at its clothes.

The ancient building still vigourous in use has the light of eternity.
Fig. 1.

Michelangelo. Rondanini Pietà.
NOTES

PREFACE
1 An interesting parallel can be drawn here between the use of daylighting in architecture and the depiction of daylight in fin-de-siècle painting. In Cubism, Edward Fry notes that in his review of a 1910 exhibition of Picasso paintings, art critic Léon Werth drew the distinction between the interest of the impressionists in documenting "fugitive light effects" and that of Picasso in his cubist works in searching for "an intellectual structure of reality," one which he believed to be "the only way to depict sensory perceptions accumulated over a passage of time." Thus one can distinguish between daylighting which has been organized merely to create incidental patterns on surfaces versus that which has been organized to reinforce the perception of a spatial order.

INTRODUCTION

2 Ibid., p. 92: "It was as if the true modern style was to be the style to end all styles, as if it was supposed to be privy to some esperato of expression, transcending countries and conventions, and noted in central structures of the mind." One aspect of what architecture should become according to the first generation modern masters was ahistorical, which was in direct contrast with the position held by Aalto and Kahn.

3 The circulation of Le Corbusier's Vers une Architecture which was published in Paris in 1923, and of the journal L'Esprit Nouveau which he and his co-editor Amédée Ozenfant had been publishing from Paris since 1920, as well as the inclusion of Le Corbusier's Pavilion l'Esprit Nouveau at the "Exposition Internationale des Arts Decoratifs et Industriels Modernes" signaled a heightened sense of recognition for French modern architecture.

4 The opening of the exhibition of anti-traditional functionalist design in Stockholm in 1930, housed in structures designed by Gunnar Asplund, and the simultaneous publishing by Asplund, Bergsten and Markelius of the "Functionalist Manifesto" of Swedish architecture marked the formal introduction of modernism to Scandinavian designers and the public at-large.

5 "The International Style," the exhibition of mostly European modern architecture held at the Museum of Modern Art in 1932 and its accompanying catalogue of the same name organized and written by Henry-Russell Hitchcock and Philip Johnson propagated throughout the western hemisphere the abstract forms and industrial detailing that characterized this "style." The subsequent emigration to the U.S. in the 1930's of many of the Dessau Bauhaus masters, including Marcel Breuer, Walter Gropius, and Ludwig Mies van der Rohe, reinforced the ultimate role that modernism was to assume in the development of twentieth-century American architecture.

6 In this regard, Aalto and Kahn were shadowing the genius of Michelangelo who operated within what Fred Koetter called an "area of difficult assessment and composite conclusions," in which multiple readings are possible and absolute conclusions are suspended. Fred Koetter, "Notes on the In-Between," Harvard Architecture Review 1 (1980): 62-73.


Aalto's respect for the inherent qualities of the Finnish landscape is evident in his early articles for local newspapers in which he criticized the emotionalism and provincialism of the National Romantic Movement while he simultaneously praised the modesty and propriety of the native Finnish vernacular building stock.

This point is well-made by the photographs and text in the exhibition catalogue *Finland: Nature, Design, Architecture*, edited by Markku Komonen and is referred to by Taipio Perläinen on p. 17 as one of the principle lessons of the exhibition.


Ibid., p. 110.


Kahn's Mediterranean sensibility to light and shadow may have initiated with his contact with Paul Cret and the works of the French Beaux-Arts architects. However, it is important to recognize as Vincent Scully suggests in the exhibition catalogue *The Travel Sketches of Louis I. Kahn* (Philadelphia: Pennsylvania Academy of Fine Arts, 1978), p. 11, 20 that Kahn's innate aesthetic sensibilities resounded with the scenes he depicted in his travel drawings made in the Mediterranean region in 1928-29 and 1950-51.


Ibid., p. 33.
22Ibid., p. 34. Those artists included painter Gallén-Kallela and architects Eliel Saarinen, Herman Gesellius, Armas Lindgren and Lars Sonck.

23Ibid., p. 37.

24Ibid., p. 36.

25Ibid., p. 3.

26Schildt, "Foreword," Sketches.


28Ibid., p. 3.

29Ibid.

30Ibid.

31Ibid. Kahn’s mother, who had taught him to speak German before she taught him to speak English, was an enthusiast of German Romanticist literature as well as an accomplished musician.

32Kahn’s father had highly developed design skills and was, in this way, Kahn’s first mentor in the visual arts. The young Kahn was rewarded very early for his drawing skills and in 1919 was awarded the first prize for best drawings in the Philadelphia high schools.

33Tyng, Beginnings, p. 3.

34Aalto was successful in the Municipal Library, Viipuri Competition as an independent architect at the age of 29, while Kahn, who had worked for other architects until he was 34, had been unemployed for two years prior to his earning professional registration. The impact of Philadelphia on Kahn is suggested by his recurrent attempts at remaking it to conform to his ideal of the generic city. Kenneth Frampton, "Louis Kahn and Philadelphia: Notes on Modernization and the Transhistorical City," Rassegna 21 (1979): 126.


39Ibid., p. 19.

40Ibid., p. 17.

Ibid., p. 5.

43Pearson, *Alvar Aalto and the International Style*, p. 35.


45Ibid., p. 16. Pearson notes that Aalto's exposure to neo-classicism at the polytechnic must have initiated him in order to allow for his later sudden stylistic shift.


50Ibid., pp. 21-53.


52Ibid., p. 8. Cret's theory was founded on a recognition of a "continuity of architecture. He believed that there were certain principles inherent in architecture that remained constant through its history, and he considered the permanence of ancient monuments praiseworthy." Kahn was to eventually work for Cret and to function as designer on the Folger Library, Washington D.C.


54Ibid., p. 23.


CHAPTER I

1In the works and literature of the 1920's and 1930's, a great deal of energy was devoted to increasing the natural light and ventilation for urban dwellers.

2Aalto's Standard Apartment Block, Turku, 1927-29, was viewed as the "first functionalist building in Finland." Pearson, *Alvar Aalto and the International Style*, p.70. Kahn's Carver Court Housing, Coatesville, 1941-43, was clearly an expression of the modern idiom of the time.

3Le Corbusier, *Creation is a Patient Search* (1960). Purist and functionalist architecture by promoting large glass membranes as a minimal separation between inside and outside did not allow for the mediation of the sun's heat or light. In fact, it was not until he experienced the discomfort of his east/west facing studio at in 1931 that Le Corbusier realized the problems inherent in unmediated sunlight and daylight. It was at this time that he "invented" his famous brise-soleil, or sunbreaker.

5 Ibid.

6 Pearson, *Alvar Aalto and the International Style*, p. 112-23. The author clearly describes Aalto's stylistic shifts from the Scandinavian Doricism of his school days, to an Italianate classicism evident in his competition entry for the Municipal Library, Viipuri of 1927, then to of an Asplund-influenced Egyptianesque classicism evident in his second Viipuri library scheme of 1928, and finally to an abstract but constructivist-influenced functionalist expression in the final Viipuri scheme of 1933.


8 This is demonstrated not only in the evolution of the designs for the Municipal Library, Viipuri but also in the designs for the Turun Sanomat, Turku (1928) and the Tuberculosis Sanatorium, Paimio (1928-31).

9 Vincent Scully, Jr., *Louis I. Kahn* (New York: Braziller, 1962), p. 11: "The young Kahn did not regard himself as a revolutionary. As a dutiful student he traced and adapted forms from archetypal academic books ... The spaces of his student schemes are symmetrically made by solid structure and distinguished as to type by changes in structural scale."

10 Tyng, *Beginnings*: "The International Style was Kahn's awakening..."


14 Alvar Aalto and the International Style, p. 33. As Pearson noted, with the design of his Worker's Club of 1923, Aalto signaled the end of a tolerance for the sentimentality of National Romanticism which was clearly expressive of the Finnish struggle for national independence.


18 Goran Schildt, "Foreword," *Sketches*.


23Alexandra Tyng, Beginnings, p. 27.

24Louis I. Kahn, Letter to Anne Tyng, 18 December 1953, Beginnings, p. 27.


26Vincent Scully, The Travel Sketches of Louis I Kahn.


29Louis I. Kahn, "Letter to Anne Tyng, 1953," Beginnings, p. 64.

30Louis I. Kahn, Beginnings, p. 89.


32Ibid., p. 74.

33Ibid., p. 72.


35Louis I. Kahn.


37Porphyrios, Sources of Modern Eclecticism, p. 2.

38Ibid., p. 63.

39Ibid., p. 44.


41Quantrill, Alvar Aalto: A Critical Study, p. 3.


44Porphyrios, Sources of Modern Eclecticism, p. 3.

45Ibid.

NOTES

47 Aalto, "Architecture in Karelia," *Sketches*, p. 82.


49 Schildt, "Foreward," *Sketches*.

50 Aalto, "Foreward," *Sketches*.


52 Alvar Aalto.

53 Schildt, "Foreward," *Sketches*.


55 Ibid., p. 233.


CHAPTER II


2 "Light as power", for example, is embodied in the nickname of Louis XIV, the Sun God, as well as at Abu Simbel in New Kingdom Egyptian culture, in that once a year the Pharaoh's effigy was illuminated by dawn's rays.

3 "Light as truth" is embodied in the symbolism of light revealing truth, as in Brunelleschi's dome for Florence, and Copernicus' theory of the gravitational paths of heavenly bodies.

4 "Light as God" is embodied in Abbé Suger's scheme for the chevet at St. Denis as a means of evidencing God's presence on Earth through sunlight, and in ancient Egyptian mythology based on the god Ra, the sun.

5 More than any other characteristic, it is the temporal dimension of daylight, its changeability with respect to time, the weather and the seasons, which infuses daylight with qualities not fully reproducible by artificial means.


11 "Luminance level is a measurable time rate of light flow from the surface in question with respect to a unit solid angle in a specific direction." Fuller Moore, Concepts and Practice of Architectural Daylighting, p. 282. Thus the luminance of any given surface is a function of its material, its value, and its texture.

12 Kohler and Luckhardt, Lighting in Architecture, p. 110.


16 Lam, Perception and Lighting as a Formgivers for Architecture, p. 27


18 Whitehead, Modes of Thought, p. 75.


20 Lam, "Sunlighting as a Formgiver for Architecture," p. 77


22 Ibid., p. 45.

23 Norberg-Schulz, Intentions in Architecture, p. 65, and Olgyay and Olgyay, Solar Control and Shading Devices, p. 57.

24 Le Corbusier, Creation is a Patient Search.

25 Venturi, Complexity and Contradiction in Architecture, p. 70.

26 Ibid., p. 86.

27 "Architecture should be conceived of as a configuration of intermediary places clearly defined. This does not imply continual transition or endless postponement with respect to place and occasion. On the contrary, it implies
a break away from the contemporary concept (call it sickness) of spatial continuity and the tendency to erase every articulation between spaces, i.e., between one reality and another). Instead the transition must be articulated by means of defined in-between places which induce simultaneous awareness of what is significant on either side. An in-between space in this sense provides the common ground where conflicting polarities can again become twin phenomenon." Aldo van Eyck, Architectural Design 12 (1960): 560.

28Louis I. Kahn, in Beginnings, p. 59.
29Ibid., p. 65.
30Rassimusen, Experiencing Architecture, p. 206.
31Tyng, Beginnings, p. 163.
33Tyng, Beginnings, p. 145.
34Louis I. Kahn, Complete Works 1935-74, p. 221.
35Tyng, Beginnings, p. 145.
36Louis I. Kahn, in Beginnings, p. 167.

CHAPTER III
1Louis I. Kahn.

2Webster's New Twentieth Century Dictionary, Unabridged, 2nd ed. (New York: Prentice Hall Press, 1983), p. 908. While according to Webster's the noun 'immanence' is defined as "the state or condition of being immanent (living, remaining, or operating within; inherent)," it has been defined with particular respect to architecture as being "the realm of 'another time now.'" Andrea Brown, "In Caesura," Investigations in Architecture, ed. by Jonathan Jova Marvel (Cambridge, MA: Harvard University Graduate School of Design, 1986), p. 14.


4Jeffrey Kipnis, "Star Wars III: The Battle at the Center of the Universe," Investigations in Architecture, p. 43: "Eisenman held that at least two absences are immanent in every situation: the historic, that which had been but was no longer (the Presence of Absence) and the metaphoric, that which had never been but could be (the Absence of Presence)."

5Aalto's 1953 travel sketches of Delphi and Olympia are included in Sketches, figs. 9 and 15.
6Kahn's 1951 travel sketches of Egypt and Rome are included in A + U, Special Edition.
7"The design in both instances, however, does express a romantic notion of a humble summer dwelling, and the sod roof strikes an emotional note in keeping with the strongest traditional images of bucolically isolated Finnish summers." Pearson, Alvar Aalto and the International Style, p. 73.
8Alvar Aalto, Aiita, October 1926, p. 63, cited by Pearson, Alvar Aalto and the International Style, p. 76

10 Ibid.


**CONCLUSIONS**


2 Alvar Aalto, "Rationalism and Man," *Sketches*.

3 John R. Stilgoe, *Common Landscapes of America: 1580-1845* (New Haven, CT: Yale University Press, 1982), pp. 137, 267. "Husbandry is not farming. Husbandry is noble in the eyes of others; it is the avocation of enlightened kings; it is the first work of God Himself. 'It began with man and the world,' preached an obscure English clergyman in 1652, and has together with man and the world been perpetually continued throughout all ages without interruption.' Sermons emphasized what husbandmen wanted to hear, that husbandry is sanctified by divine word and dignified by royal proclamation, and reinforced what every husbandman knew, that husbandry is necessary to the health of any nation. Without food there is no commerce, no building, no life. Husbandry caresses the soil, urging it to bear fruit in its own time, at the proper season; husbandry is cyclical and illuminated by the sun. Artifice embodies rape, and abortion and transmutation too. Artifice thrusts into the very womb of mother earth, into infernal dark, and wrenches living rock from living rock. Smelting, forging, and casting torment the aborted fetuses with fire. Earth, air, fire, and water combine in an unholy alchemical alliance from which husbandmen stand away, shielding their eyes. Embryo becomes artifact."


5 These terms were first described by David Jones, in "A Presentation to Students," Shah Alam, Malaysia, 1987.


9 William Alexander McClung, *The Architecture of Paradise* (Berkeley: University of California Press, 1983), p. 13: "a local [in the Mormon community of Nauvoo, Illinois] editorial of 1842 exhorted the citizens in plain but eloquent language to marry their houses to their gardens: 'Let the division fences be lined with peach and mulberry trees ... and the houses surrounded with roses and prairie flowers, and their porches covered with grapevines, and we shall soon have some idea of how Eden looked.' The significance of this remarkably literal experiment in the construction of Paradise is not, however, primarily economic but mythic and metaphoric: mythic because Nauvoo is a striking instance of the duality of the Paradise tradition, metaphoric because the paradisal myth informs the planning and architecture of other communities in ways that are no less significant for the absence of theology ... In the residential quarter, he metaphorically reconstituted Paradise lost, the garden that was man's proper environment on this planet and that continues to serve as the model even after nature, like man, has fallen. Yet Smith's version of Eden is compromised, as his Jerusalem is not, by an architectural presence whose very modesty and degree of integration with
nature - with the gardens that grow around and even into the house - are evidence that Eden in its pure form is irrecoverable. The terms in which the antitypes of the celestial city manifest themselves at Nauvoo are wholly architectural, but the terrestrial paradise must accommodate the lapsarian fact of the need for shelter. The architecture of Paradise is thus dual, as is Paradise itself: an architecture of heaven is juxtaposed to an architecture of nature," and on p. 19: "The history of Paradise is thus the history of the loss of belief in the possibility of pastoral, that is, of unelaborated nature benign without reservation, limitation, or threat. The uncertain status of the garden in history reflects the failure of an arcadian or pastoral model of beatific existence within the context of a purged and renewed heaven and earth; the survival of Eden depends, therefore, upon whatever accommodation can be reached with the city. To survive, in fact, Eden must become a garden-city."

APPENDIX A - Timeline of Alvar Aalto, Architect and His Works

(Entries in bold-faced type indicate significant works by Aalto referred to in the text.)

1835 Finnish doctor, Elias Lönnrot, published Finnish folk epic, the "Kalevala", which he had collected and transcribed from various folk tales. It inspired the Finnish National Romantic art movement which reached its height of influence at about 1895.

1898 Hugo Alvar Henrik Aalto born in Kuortane, Finland to Juho Heikki and Selvy Mathilda (Hackstedt) Aalto.

1901 Aalto moved with his family to Alajärvi (exact year unknown).

1903 Selvy Aalto died, Juho Aalto married Selvy's sister to give his family a proper home.

1906 Aalto moved with his family to Jyväskylä (exact year unknown).


1910 Charles-Edouard Jeanneret joined the office of Peter Behrens in Berlin, worked on the A.E.G. Turbine Factory.


1911 Charles-Edouard Jeanneret undertook "voyage d'orient" to Italy, Greece, and Asia Minor.

1912 Pablo Picasso and Georges Braque followed hints in Cézanne's paintings and African sculpture to "develop a visual language blending abstraction with fragments of observed reality". From Modern Architecture Since 1900, by William J. R. Curtis. p. 93

1914 World War I (-1917)

1914 Geoffrey Scott first published The Architecture of Humanism. From the Foreword written by Henry Hope Reed for the 1974 edition comes the following excerpt, "Our inclination is to dismiss Scott’s alternative [which was the classical tradition posed against modern architecture's "fallacies"] because the academic tradition is simply not part of art today. But Scott went further and dwelt on the importance of an awareness of the human body's role in art. This awareness goes beyond the use of the human form in painting and
sculpture and consists in our unconsciously transcribing our physical selves into terms of architecture and architecture into terms of our physical selves. This is what he understood to be humanism." p. 5

1917  Finland won its independence from Russia at time of Bolshevick revolution. Finland is an independent state for the first time in its history. A brief civil war between the communist "Reds" and the non-socialist "Whites" followed independence. Aalto enlisted with the "Whites" but saw little combat.

1920  Eric Gunnar Asplund began design for Stockholm Public Library.

1920  Le Corbusier joined Amédée Ozenfant in Paris and together they published L'Esprit Nouveau until 1925.

1921  Le Corbusier and Pierre Jeanneret designed the Citrohan House project.

1921  Aalto received Diploma in Architecture from Helsinki Technical University.

1922  Ludwig Mies van der Rohe designed the Brick Country House project.


1922  Aalto wrote "Motifs from Times Past". "When we visit a medieval church, look at an old manor house, or contemplate a hundred year old vernacular building, we find that there is something that reaches to us, a mood. It may be caused partly by handicrafted surfaces, by the building materials' artistic purity, by the simple lines that harmonize with the landscape; partly it is created by the materials' one-hundred-year old patina and fine worn surface." Sketches, p. 1

"When we see how in times past one succeeded in being international, free of prejudices and at the same time true to oneself, we can with full awareness receive currents from ancient Italy, from Spain, and from modern America. Our ancestors will continue to be our masters." Sketches, p. 2


1923  Aalto moved practice to hometown of Jyväskylä in early part of year. Workers' Club Competition (first prize), Jyväskylä. Doricist neo-classicism detailing, thick wall construction resting on squat abstract Doric columns with glass infill.
1923  Aino Marsio joined firm at end of year.
1924  Aalto first traveled to Italy and Austria.
1924  Aalto married Aino(-1949) in spring and for honeymoon traveled to Mediterranean.
1925  **Civil Guard Buildings**, Seinäjoki. Round semi-subterranean chamber with thick wall, Minoan columns and sodded roof which anticipates his goals of the 1950's.
1925  **Town Church competition**, Jämsä. Italianate basilica plan with thick wall construction and high large clerestory windows, sited on hilltop.
1925  **Casa Lauren**, Jyväskylä. Two-family house with Greek details executed in wood.
1925  **Villa Väinölä**, Alajärvi (-1926). Covered two-story courtyard house based on Roman atrium house with Greek Doric columns and detailing executed in wood.
1927  Buckminster Fuller designed Dymaxion House 27. Neologism signified "dynamism plus efficiency".
1927  Weissenhof Siedlung begun in Stuttgart.
1927  **Parish Church**, Muurame (-1929). Italianate basilica with thick wall construction, large high clerestory windows and eastern floor-to-ceiling side light to wash apse wall as was common in Medieval Finnish churches.
1927  **Standard Apartment Block**, Turku (-1929). With its precast concrete construction, a sparse interior and exterior, and the use of ship's rails, it has been viewed as Finland's first functionalist building.
1927  **Municipal Library Competition** (first prize), Viipuri (-1935). Original competition entry had elements lifted directly from Asplund's Stockholm Public Library; neo-classical plan, axial scala regia, astatic facade and freeze, and Egyptianesque door.
1927  At end of year Aalto and Aino moved residence and office to booming coastal town of Turku to secure better
1928  
_Turun Sanomat_, Turku. Shows direct influence of Pravda project by Russia's Vesnins brothers. Employed deep conical skylights in series, horizontal ribbon window, large-scale projection of newspaper, and skylights which raked daylight across columns from behind.

1928  
Asplund's Stockholm Public Library completed.

1928  
_Municipal Library_ (second version), Viipuri.

1928  
Aalto traveled to Paris for reinforced concrete conference and was exposed to Duiker's work.

1928  
_Tuberculosis Sanatorium Competition (first prize)_ Paimio (-1931). Fully established modern functionalist vocabulary with Russian constructivist details and Dutch school planning influences. Employed deep conical skylights in a row, horizontal ribbon window, and articulated slab-edge to allow maximum winter insolation.

1929  
Ludwig Mies van der Rohe's German Pavilion built at the Barcelona Exposition.

1929  
700th Anniversary Exhibition, Turku. w/ Erik Bryggman. Influenced by Asplund's Stockholm Exhibition of 1928. Aalto designed timber choral platform and shell with functionalist profile and "thick" wall.

1930  
Aalto traveled to Brussels for C.I.A.M. and to Sweden to see Asplund-designed Stockholm Exhibition of anti-traditional functionalist designs.

1930  
Asplund, Markelius, Bergsten authored the "Functionalist Manifesto" in Sweden.

1930  
_Tehtaanpuisto Church Competition_. Included hidden source of daylighting, glass covered by slatted screens, and wave profile acoustical ceiling.

1930  
_University Hospital Competition_, Zügerb. Employed vertical wash of daylighting from hidden overhead source.

1930  
Aalto met Maire and Harry Gullichsen who became two of his strongest supporters and patrons. Maire was
heiress to large Ahlström timber, paper and cellulose concern. Invited Aalto to produce furniture for industrial production.

1931  
Le Corbusier worked in building at 24 Rue Nungesser et Coli, which was a "typical reinforced concrete structure with two glass sides, east and west. No protection against the sun. The seventh floor housed Le Corbusier's studio...It was here that the brise-soleil (sun-breaker) was invented ... and with good reason."
From Creation is a Patient Search, by Le Corbusier, 1960. p. 107

1932  
Henry-Russell Hitchcock and Philip Johnson published The International Style in New York. The exhibition and catalogue defined the three principles of the modern style as an "emphasis on volume," "regularity as opposed to symmetry," and a conscious "opposition to applied ornament." Hitchcock and Johnson, The International Style, p. 26.

1933  
Aalto traveled to Athens to attend C.I.A.M. (aboard S.S. Patras) where he met Le Corbusier, Walter Gropius, and Ludwig Mies van der Rohe.

1933  
Aalto moved office to Helsinki.

1933  
Patented method for bent wood construction used to make stools for library at Viipuri.

1933  
Municipal Library (final version), Viipuri. Employed conical skylights in a grid, punched windows, plate glass curtain wall, wave profile acoustical ceiling, and interior planting growing over window slatting.

1934  

1935  
Marie Gullichsen founded Artek furniture company to distribute Aalto furniture.

1935  
Sunila Paper Mill and Workers' Housing, Sunila (-1939). Designed for Marie Gullichsen. First attempt at resolving conflict of natural landscape and planning for
large scale industrial facility. Timber industry patrons Alstrom and Enzo-Gutzeit "led
him to reappraise the value of timber over concrete as a primary expressive material."
This seems to have brought him back to the textured spirit of the National Romantic
movement.

1935 Wrote "Rationalism and Man". "At the moment we live in an intoxication of modernism; the old resistance
from the traditionalist side has grown weaker. In a way both groups have grown closer and together form a
large formalist front that stands in opposition to a rational view of life and art. An accusation against
rationalism from this front would perhaps be formulated in the following manner. 'The form of an object
independent of its other properties and playing with form involve in and of themselves a universal human
value of highest importance. Rational working methods certainly have their given place in the preliminary
work. But to build up the applied arts based on rationalisms a cultural factor leads to inhumanity'. Sketches,
p. 47

"Whatever the cause, the production of 'form functionalism' has been enormous and in any case extensive
enough to clarify the fact that mutual independence of form and function is not the way in which people will
get better and more human things with which to build their surroundings." Sketches, p.48 "A series of
requirements that can be made of almost every other object and that up to now has been given scant
consideration surely belongs in the sphere of another science - psychology. As soon as we include
psychological requirements, or, let us say, when we can do so, then we will have already expanded the rational
method to an extent that, to a greater degree than previously, has the potential of excluding inhuman results."
Sketches, p. 49

1935 "Nature, biology, offers profuse and luxuriant forms; with the same cellular structures it can produce
millions and millions of combinations, each of which is an example of a high level of form. Human life
comes from the same roots. The objects that surround man are hardly mere fetishes and allegories with
some mystical eternal value. They are more likely to be cells and tissues, alive just as cells and tissues are,
the building components of which human life is composed. They cannot be delt with in a different way from biology's other units, otherwise they would be in danger of becoming unsuited to the system, of becoming inhuman." Written by Alvar Aalto in 1935, excerpted from Finland: Nature, Design, Architecture, p. 7

1936 Aalto Residence, Munkkiniemi. Composed in L-shaped plan, used a collage of textures. Use of materials and plan type suggests his retreat from a language of International Modernism and constructivist details while retaining an interest in collage as a compositional device.

1937 Finnish Pavilion for World Exposition, Paris. It was "chiefly important for its formulation of the site planning principles of his later career... Shows a rhetorical use of wood which demonstrates its various properties. "One of the most difficult architectural problems is the shaping of the building's surroundings to the human scale. In modern architecture where the rationality of the structural frame and the building masses threaten to dominate, there is often an architectural vacuum in the left-over portions of the site. It would be good if, instead of filling up this vacuum with decorative gardens, the organic movement of people could be incorporated in the shaping of the site in order to create an intimate relationship between Man and Architecture. In the case of Paris Pavilion, this problem fortunately could be solved." A. Aalto, from Frampton, Modern Architecture, p. 197

1937 Savoy Restaurant, Helsinki, with Mairie Gullichsen. Employed plant-covered slats over windows.

1937 Villa Mairea, Noormarkku (-1939). Aalto's master work of pre-war era. Primitive use of wood in modern space, white rendered brick used with wood siding, irregular stick rhythm used with repetitive built elements, another interpretation of the L-shaped courtyard, collage as a planning device (between natural form and abstract form) and as a
detail technique used throughout. It formed a conceptual link between the international rationalist/constructivist practices of the twentieth century and the Finnish National Romantic movement of the nineteenth century.

1938  Stepped Housing, Kattua.

1938  Finnish Pavilion for World Exposition Competition (first, second and third prizes), New York.

1938  "Alvar Aalto: Architecture and Furniture," exhibition at the Museum of Modern Art, New York; "the formal introduction of this great architect to the American public." from the catalogue Aalto: Architecture and Furniture, p. 5 In this exhibition, Aalto represents the second generation of modernist architects, "The buildings of men working naturally in an already established style are less assertive of that styles' tenets than those earlier and more puristic buildings which were establishing the style with a necessarily stringent discipline. Certain materials and forms once renounced because of their association with non-modern work are now used again, in new ways or even in old ones. To the heritage of pure geometric shapes, the younger men have added free organic curves; to the stylistic analogies with the painters, Mondrian and Léger, they have added Arp. Personal and national qualities are more apparent than a decade ago." from the catalogue Aalto: Architecture and Furniture, p. 3 Aalto explained that the planning for Paimio Sanatorium reflects his interest in getting therapeutic sunlight to patients. "The disposition of the elements is the result of a carefully coordinated plan whereby the functions of each separate block are taken into account and all are considered in relation to the natural characteristics of the site, the surrounding country and the all-important sunlight. For example, the main wing 'A' faces SSE in order that each patient may receive the full morning sun directly on his bed; the block of open-air terraces at the end is bent slightly southward to enjoy the midday and afternoon light. The wing 'B' containing the dining room and social rooms is turned so that these spaces too may be flooded by direct rays of the sun. The other elements of the plan are phototropically oriented with similar care." from the catalogue Aalto: Architecture and Furniture, p. 7
"In contrast to the view which sees in established forms and the standardization of new forms the only way towards architectural harmony and a building technology that can be successfully controlled, I ... want to underline that the most profound property of architecture is a variety and growth reminiscent of natural organic life. I should like to say that in the end this is the only real architectural style. If barriers are set up before it, architecture fades and dies." Written by Alvar Aalto in 1938, excerpted from Finland: Nature, Design, Architecture, p. 7

1938 Wrote "The Influence of Construction and Material on Modern Architecture"
1939 Winter War (-1940), Finland
1940 Wrote "The Humanizing of Architecture"
1941 Wrote "The Architecture of Karelia"
1943 World War II (-1944), Finland was Axis ally, signed treaty with U.S.S.R. in 1944 which called for considerable territorial concessions (Karelia) in addition to Finland's own war debt of $300,000,000.
1948 National Pensions Institute, Helsinki (-1956). Invented three-dimensionally projecting "crystal" skylights, ribbon windows, glass walls conical skylights in a series, and conical skylights in a grid.
1949  **Town Center,** Säynätsalo (-1952). Used wooden slatted windows. "With its steps, overgrown with grass and weeds, its variations of silhouette, and its weathered materials, Säynätsalo had almost the aim of an ancient complex of buildings which had grown gradually, bit by bit." The buildings blended with their forest setting and with the varying levels of the site. Any lapse into the merely picturesque was held in check by an underlying formal discipline." from **Modern Architecture Since 1900,** by William J. R. Curtis. p. 299

Manifests Aalto's interest in a Greek sense of site/building constrast and interdepenence through the juxtaposition of fan-shaped and orthogonal grid geometries, "Time and again the formal contrast was employed to soften and modulate edges, or to blend with landscape formations, nearby buildings of variable geometry, or clumps of trees." from **Modern Architecture Since 1900,** by William J. R. Curtis. p. 299  This contrast of two languages created an ambiguity, a poetic suggestion of the interaction of built and natural form which would draw together the two seemingly contrary ideas of international modernism and site/climate specific design responses.

1950  During the 1950's to the 1970's there was a gradual awakening to human values with regard to modern architecture as attested by these statements of Finnish architect Aulis Blomstedt, "Architecture needs the existence of something old and permanent, like the cycle of the years, the rhythm of the moon, the majesty of the streams, or the old moss-covered rock. I feel that the most important aspect in modern architecture is the attempt to make men rediscover these fundamental values." Excerpted from **Finland: Nature, Design, Architecture.** p. 7  "My purpose, my wish, is to 'prove' that basically architecture does not change in spite of the emergence of new materials, of new conceptions of plastic form, etc." Excerpted from **Finland: Nature, Design, Architecture.** p. 29

1950  **Pedagogical Institute,** Jyväskylä (-1957).
1951 Aalto traveled to Morocco and Spain.

1951 **Rautatalo Office and Commercial Building**, Helsinki (-1955). Plan was reinterpretation of a palazzo.

1952 Finland's war reparations were complete and the future appeared bright for what was termed the 'second republic.'

1952 **Cemetery**, Lyngby.

1952 Aalto married Elissa Makiniemi and she became a partner in the firm.

1952 **Parish Church Competition**, Seinäjoki.

1953 Aalto traveled to Greece.

1954 Aalto traveled to Egypt.

1954 Le Corbusier worked out *La Grille Climatique* (the climatic grid). Le Corbusier "was overwhelmed and discouraged by the uncertainties enveloping the complex effects of the sun in tropical countries." From *Creation is a Patient Search*, by Le Corbusier, 1960. p. 140

1955 **Aalto Studio**, Munkkiniemi.


1955 Wrote "Between Humanism and Materialism".

1955 "Through solving the problem of architecture involves a crucial process of humanization, architecture is faced with the old problem of monumentalism and form just as it always was. All attempts to eliminate it would be as fruitless as an effort to eliminate the idea of heaven from religion." Written by Alvar Aalto in 1955, excerpted from *Finland: Nature, Design, Architecture*. p. 41


1956 **Parish Church**, Vuoksenniska (-1959). Employed light canal above alter, conical
skylight to wash entry wall, double membrane window, punched windows, lateral wash from unseen source at altar, curved profile acoustical ceiling, ribbon window, glass opening with slatted screen.


1958 **Art Museum**, Bagdad.

1958 **Art Museum**, Aalborg (-1970). Invented daylight fixtures to diffuse light evenly as it entered from high clerestory, employed conical skylights in series, and oblong skylights in series.

1958 **Cultural Center and Parish Church**, Wolfsburg (-1963).


1976 Alvar Aalto died on May 11 after a short heart illness.
APPENDIX B - Timeline of Louis I. Kahn, Architect and His Works

(Entries in bold-faced type indicate significant works by Kahn referred to in the text.)

1901  Louis Isidore Kahn born 20 February in Ösel, on Island of Saarama, Estonia to Leopold and Bertha (Mendelsohn) Kahn.

1905  Kahn emigrated with mother, father, sister and brother to U.S. and took up residency in Philadelphia.


1910  Charles-Edouard Jeanneret joined the office of Peter Behrens in Berlin, worked on the A.E.G. Turbine Factory.

1911  Charles-Edouard Jeanneret undertook "voyage d'orient" to Italy, Greece, and Asia Minor.

1912  Pablo Picasso and Georges Braque followed hints in Cézanne's paintings and African sculpture to "develop a visual language blending abstraction with fragments of observed reality". Curtis, Modern Architecture Since 1900. p. 93

1914  World War I (-1917).

1914  Geoffrey Scott first published The Architecture of Humanism. From the Foreword written by Henry Hope Reed for the 1974 edition comes the following excerpt, "Our inclination is to dismiss Scott's alternative [which was the classical tradition posed against modern architecture's "fallacies"] because the academic tradition is simply not part of art today. But Scott went further and dwelt on the importance of an awareness of the human body's role in art. This awareness goes beyond the use of the human form in painting and sculpture and consists in our unconsciously transcribing our physical selves into terms of architecture and architecture into terms of our physical selves. This is what he understood to be humanism."

p. 5

1915  Kahn became naturalized U.S. citizen.

1919  Kahn awarded first prize for best drawings in Philadelphia high schools.

1920  Le Corbusier joined Amédée Ozenfant in Paris and together they published L'Esprit Nouveau until 1925.
1921  Le Corbusier and Pierre Jeanneret designed the Citrohan House project.
1922  Ludwig Mies van der Rohe designed the Brick Country House project.
1924  Kahn earned Bachelor of Architecture degree, University of Pennsylvania, School of Fine Arts. Studied under Paul Philippe Cret in French-style Beaux-Arts program.
1927  Buckminster Fuller designed Dymaxion House 27. Neologism signified "dynamism plus efficiency."
1928  Kahn traveled to Europe, visited ex-classmate Norman Rice at Atelier Le Corbusier in Paris.
1929  Ludwig Mies van der Rohe's German Pavilion built at the Barcelona Exposition.
1929  Kahn exhibited drawings and paintings of European travels, Pennsylvania Academy of Fine Arts.
1929  Kahn held position as designer in office of Paul Philippe Cret (-1930), Philadelphia. Designed the Folger Library, Washington D.C.
1930  Kahn married Esther Virginia Israeli on 19 August.
1931  Le Corbusier worked in building at 24 Rue Nungesser et Coli, which was a "typical reinforced concrete structure with two glass sides, east and west. No protection against the sun. The seventh floor housed Le Corbusier's studio...It was here that the brise-soleil (sun-breaker) was invented ... and with good reason."
From *Creation is a Patient Search*, by Le Corbusier, 1960. p. 107
1932  Kahn unemployed architect (-1933).
1932  Henry-Russell Hitchcock and Philip Johnson published *The International Style* which included a project by Oscar Stonorov. The exhibition and catalogue defined the three principles of the modern style as an "emphasis on volume," "regularity as opposed to symmetry," and a conscious "opposition to applied ornament." Hitchcock and Johnson, *The International Style*, p. 26
This building, which was also included in The International Style, established the presence of International Style modernism in Philadelphia.

1935  Kahn earned professional registration with the A.I.A., and began his independent practice, Philadelphia.

1941  Kahn practiced in association with George Howe (-1942), Philadelphia.

1941  Carver Court Housing, Coatesville (-1943), with George Howe and Oscar Stonorov.

1942  Kahn practiced in association with George Howe and Oscar Stonorov (-1943), Philadelphia.

1943  Kahn practiced in association with Oscar Stonorov (-1948), Philadelphia.

1944  Kahn wrote "Monumentality" for symposium "New Architecture and City Planning." Expessed need for monumentality based on new structural capabilities of welded steel frame.

1947  Kahn appointed Chief Critic of Design (-1952), Yale University, New Haven. Offered appointment through George Howe. Discussed projects in terms of 'structural integrity.'

1948  Kahn appointed Professor of Architecture (-1957), Yale University, New Haven.

1948  Jefferson Memorial Competition, St. Louis.


1950  Kahn appointed Fellow at American Academy in Rome, traveled to Egypt, Greece, Italy (-1951).


1954  Le Corbusier worked out La Grille Climatique (the climatic grid). Le Corbusier "was overwhelmed and discouraged by the uncertainties enveloping the complex effects of the sun in tropical countries." From Creation is a Patient Search, by Le Corbusier, 1960. p. 140

1954  Kahn first wrote about the "hollow column" as modern conveyor of light and air to spaces.


1955  **Trenton Bath House**, Trenton (-1956). Used occupiable "hollow column."

1957  Kahn left Yale as result of Paul Rudolph's unapproved rehabilitation of Yale Art Gallery. Immediately appointed Professor of Architecture (-1974), University of Pennsylvania.


1959  **Goldberg House**. Used high clerestory light hoods.

1959  Kahn traveled to the Netherlands to deliver closing remarks at C.I.A.M.

1959  **First Unitarian Church**, Rochester (-1962). Illustrated distinction between "form" and "design," used deeply recessed plate glass with bay seats and used high blind clerestory light hoods.


1959  **Salk Institute for Biological Studies**, La Jolla (-1965). Used three-dimensional "ruin" wrapped around building (not built).


1962  **Mikveh Israel**, Philadelphia. Used 'hollow column' as a room of light and as exterior light courts.


1966  **Kimbell Art Museum**, Ft. Worth (-1972). Designed daylight-reflecting fixture to complement structure designed for daylight, used empty vault as porch, and used light
courts.

1967  **Phillips Exeter Library**, Exeter (-1972). Building constructed as an empty form. Used high clerestory with daylight monitors in central space and study rooms, and used doubled structure to allow for different daylighting conditions.


1974  Louis I. Kahn died in New York while returning from India.
SELECTED BIBLIOGRAPHY

INTRODUCTORY READINGS


BIBLIOGRAPHY


READINGS ON DAYLIGHTING


BIBLIOGRAPHY


READINGS ON DAYLIGHTING IN HISTORY


BIBLIOGRAPHY


READINGS ON ALVAR AALTO


BIBLIOGRAPHY


BIBLIOGRAPHY


Richards, J. M. 800 Years of Finnish Architecture.


READINGS ON LOUIS I. KAHN


