YAŞAR UNIVERSITY
GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES

MASTER THESIS

THE MODERN HOUSING INTERIOR:

A STUDY OF CASES IN

EUROPE AND UNITED STATES OF AMERICA

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INTERIOR ARCHITECTURE

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We certify that we have read this thesis and that in our opinion it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Science.

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ABSTRACT

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This thesis examines the approach of modern architecture and/or modernism in the modern housing interiors. When the term modernism is mentioned in architecture, it is looked at from the structural aspect or the building shell. Discussing modernism in interior design has not been comprehensively covered and as such, this study attempts to make connections between modernism and the housing interior. The course of this study thoroughly examines how the principles that relate to modernism, which are being applied to any architectural design, have been reflected into interior design.

Eight cases were selected for this research, which will be the focus of study as examples of single-family housing, spanning between the 1920s and 1950s, which are located both in Europe and the United States of America. These two geographies are considered important in the discourse of modernism as they set the foundation for modern architecture. Apart from literature review on modernism, modern housing and specific characteristics of the era, the case studies have been carefully studied by analyzing their interior design characteristics, by means of colored interior images. The criteria selected in this study for analyzing the modern housing interiors are plan layout, materials, furniture, and colors of interior elements. These criteria are considered as major or most influential characteristics of interior design, which reflect interior design approach completely.

This research also aims at establishing a better understanding on how modernist design principles transcend into other fields and for the purpose of this study, interior

design. It also shows the progression of the modern housing interior as the century evolved, creating domestic interiors that were a reflection of the growth of the modern era and modernity concerning the lives of the people. The case study houses are compared with each other according to their respective eras as regards design approach in plan layout, materials, furniture and interior colors. This is made as an indication to determine how the modern interior advanced through these two different geographies.

It is aimed that this study will serve as a means to encourage designers to appreciate housing interiors and to examine the principles or ideologies that give them meaning, providing knowledge concerned with shaping the future.

Key words: Modernism, modern interior, housing, architecture, 20th century house

ÖZ

MODERN KONUTTA İÇ MEKÂN: AVRUPA VE A.B.D. ÖRNEKLERİ

Kolo, Salome

Yüksek Lisans, İç Mimarlık

Danışman: Doç. Gülnur Ballice (PhD)

Kasım 2017

Bu tez modern mimarlık ve/ya modernizmin modern konut iç mekânlarındaki yaklaşımını incelemektedir. Mimarlıkta modernizm kavramının irdelenmesinde genelde yapısal özellikler veya mimari form açısından değerlendirme yaklaşımı yaygındır. Modernizm tartışmalarında iç mekân tasarımı kapsamlı bir şekilde ele alınmadığından bu çalışmada modernizm ile konut iç mekânı arasındaki bağlantıların ortaya konması hedeflenmiştir. Bu çalışmanın amacı, mimari tasarımda uygulanan modernizm ilkelerinin iç mekân tasarımında nasıl yansıtıldığını derinlemesine incelemektir.

Bu araştırma için seçilen 8 adet konut örneği, modernizm yaklaşımının önemli coğrafyalarından olan Avrupa ve Amerika Birleşik Devletleri'nde 1920ler ve 1950ler arasında inşa edilmiş tekil konutlar içerisinden seçilmiştir. Bu örnek yapılar üzerinde detaylı bir şekilde çalışılmakta ve iç mekân elemanları literatür taraması yoluyla analiz edilmektedir. Bu iki önemli coğrafyada hem modern mimarinin temellerinin oluşturulduğu hem de modernizm söyleminin ortaya çıktığı bilinmektedir. Araştırmada modernizm, modern konut ve dönemin özgün nitelikleri ile ilgili literatür taramasının yanı sıra, örnek projelerin iç mekân tasarım özellikleri renkli iç mekân görselleri yoluyla detaylı olarak incelenmektedir. Bu çalışmada modern konutların iç mekân analizi için belirlenen ölçütler arasında plan kurgusu, malzeme, mobilya ve iç mekân ögelerinin renkleri bulunmaktadır. Bu ölçütler iç mekân tasarımını en çok etkileyen temel ve vazgeçilmez özellikler olarak belirlenmiştir.

Bu araştırma modernist tasarım ilkelerinin diğer alanları bu çalışma özelinde de iç mimarlığı nasıl etkilediğine ilişkin daha iyi bir anlayış oluşturmayı amaçlamaktadır. Aynı zamanda yüzyılın evirilmesiyle modern konut iç mekânının gelişimi, modern

çağın bir yansıması olan iç mekânların yaratılması ve insanların hayatlarıyla bağlantılı modernite anlayışı üzerinde durulmaktadır. Örnek olarak seçilen evler kendi dönemleri içerisinde plan düzeni, malzeme, mobilya ve iç mekân renklerindeki tasarım yaklaşımı açısından birbirleriyle karşılaştırılmıştır. Bu karşılaştırma, modern konutun iç mekânın iki farklı coğrafyada nasıl geliştiğini belirlemek için bir gösterge olarak kullanılmıştır.

Seçilen yapılar üzerinden yapılan analiz ve değerlendirmelerin tasarımcılara konut iç mekânlarının değerini daha iyi anlamaları için yol gösterici olacağı düşünülmektedir. Ortaya çıkan sonuçların yapılara anlam kazandıran ideolojilerin ve ilkelerin irdelenmesinde bir araç olarak hizmet etmesi ve böylece geleceği şekillendirmek için gerekli olan geçmişe dönük bilgi birikimine katkı sağlaması beklenmektedir.

Anahtar sözcükler: Modernizm, modern iç mekân, konut, mimarlık, 20. yy konutu

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Finally, this thesis would not have been possible without God. I give all the credit to Him for giving me life and being my strength despite my weakness. For sustaining me throughout my days and being my ever-present help in time of need.

Salome Kolo

İzmir, 2017

TEXT OF OATH

I declare and honestly confirm that my study, titled “THE MODERN HOUSING INTERIOR: A STUDY OF CASES IN EUROPE AND UNITED STATES OF AMERICA” and presented as a master’s thesis, has been written without applying to any assistance inconsistent with scientific ethics and traditions. I declare, to the best of my knowledge and belief, that all content and ideas drawn directly or indirectly from external sources are indicated in the text and listed in the list of references.

Salome Kolo

Signature

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December 12, 2017

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CHAPTER ONE
INTRODUCTION

In the 20th century, after World War I, the issue of housing shortage was a great one, where people needed homes. With an increase in population and a demand for better living standards, architects and planners were put to work (Harwood & Powers, 2008), to solve this problem. Officially, Le Corbusier is the main author of Modern Architecture history written in the West. According to definitions based on this history, the term Modernism, or the Modern Movement encompassed a change in architecture originating in Europe during the period between both world wars (Bozdoğan, 2001), with its defining characteristics involving the use of glass, geometric shapes, reinforced concrete, steel, and the absence of decoration or ornamentation. The Visual Dictionary of Interior Architecture and Design defines that modernism's golden age was in Europe between the inter-war periods of 1920 and 1939 (Coates, Brooker & Sally, 2009). The early 20th century marked major industrial and technological advancements that greatly influenced society, architecture and design due to the war. Modernism was not just another style, but it provided a new thinking approach towards architecture.

There was a change in Europe after World War I, which ended in November 1918. The aftermath of the war completely changed Europe in many ways, that after the years of war, people wanted an easier life (Heynen, 1999). Technology advanced rapidly, machines moved faster, and modern shapes and modern materials emerged in the field of architecture. The concept of modernism in architecture strives to create designs that go beyond ideas considered to be standard, but pursue projects dictated by the modernist principles. One of these principles was by Louis Sullivan who famously stated that, form follows function, in which modernists expressed that the function or purpose of a project might influence the design ideas (Cruz, 2012).

The origin of modernism from Europe is a doctrine that has claimed universal validity and rationality (Bozdoğan, 2001), where the advancement in technology that

led to this modernist movement was being presented to solve the needs of the growing society. In the 1920s, European modernism had arrived in the United States, which could not be mistaken for what had preceded it. Historians quickly labeled this early phase of modern architecture as the International Style, though it was short-lived. For the Americans, the white geometric forms were too bleak for them, especially since they came without the social meaning of their European counterparts (Allaback, 2014). The Europeans influenced the Americans with their trends and tastes, and modern architecture is been seen as an embodiment of modernization.

One of the aims that Modern architecture aspires to achieve is to create designs that are unique in each situation and have the purpose of the project serve as an inspiration in the design process. In the case of residential buildings, they are often stripped down to display the architectural design of the home where the focus will be on the space itself, rather than on any unnecessary detail to the overall design. It is a belief in modern aesthetic that less is more. Modern housing interior spaces employ simplicity and clarity in design; homes kept clean, functional, and simple. Modern cutting edge designs are to be a representation of new materials and meet requirements of the present; they ought to show our own better, democratic, assertive, ideal nature and consider man's practical and scientific accomplishments, as also his undeniable ability for growth (Wagner & Mallgrave, 1988). Concealing the nature of the home is not a common phenomenon in Modernism, but rather lays emphasis and wants the viewer to see and appreciate the inner workings and true nature of materials or elements. There is an idea of a sense of 'truth' present in the home.

The 1920s were a period just after World War I where situations arose and the issue of shortage in housing arose due to growth of urban population in Europe. This brought about challenges to the government in housing areas (Raizman, 2010). There was thus the need to provide affordable housing in a shortest time possible, and this period states to be the beginning of the modernist movement in architecture. Throughout the modernist era, architecture began to advance in terms of technology, and while approaching the mid-20th century, there was a change from the norm where new materials further began to evolve. The house, however it may be, is the center of the family life, and should be a place where the family gets maximum relaxation, happiness and comfort. Ideally, it should provide different spaces to cater

for different functions as well as spaces that enable family activities, such as studying, relaxation, dining, and reception of visitors. Modernist architects believed that architecture played an important role in ensuring the well-being of the society and developed the machine aesthetic where they argued that perfection in housing architecture could be achieved (Coates, Brooker & Sally, 2009).

This thesis is a structured analysis of modern housing interiors carefully selected from these two different geographical locations: the United States of America and Europe, which cannot be overemphasized when dealing with the term modernism. These modern houses span between the period of the 1920s and the 1950s.

1.1. Subject of the Study

The basis of this study is on the principles of modern architecture or modernism, reflected in interior design, with further analysis on the modern housing interiors of pioneering modernist architects, located in parts of the United States of America and in Europe. Modernism as it relates to architecture is discussed and the principles that underline it, as well as definitions of the modern housing interior as explained, in order to establish a relationship between both modern architecture and interior design. Eight case studies are identified and examined further, with an in depth look into their interior design features. These modern houses will be examined based on their design principles by the architects responsible, in each case, for their respective designs, and four important interior design characteristics; plan layout, materials, furniture, and interior colors.

1.2 Problem Statement

Modernism in architecture is a phenomenon that applies to the modernist movement, which became prominent in the 1920s, to harmonize the principles that guide architectural design with the rapid advancement in technology and modernization of the society. An extensive review of literature by various architects, writers, authors and historians, recognize that the modern movement involved a style of architecture that dealt with a forward-thinking approach to buildings, expressing structural innovation. This expression of building structures laid emphasis on reconciling the change and growth of the society with the emergence of new technology, which included machines, new materials and techniques. Some notable writers such as Curtis (1983), Gold (1997), Heynen (1999), Bozdoğan (2001), Colquhoun (2002),

Frampton (2010), Raizman (2010) and Rowe (2011), in discussing the modern architecture movement had common generalizations that this movement adopted two key approaches to structures; functionalism and minimalism. These writers were in agreement to the idea behind what modernism was about, which was an architecture that was conscious or aware of its changing society. Modernism is a significant movement involving the application of technology to building and construction.

Other authors, Brooker & Stone (2007), Coles & House (2007), Nielson & Taylor, (2007), and Brooker & Weinthal, (2013) in discussing interior architecture/design provide an overview to the understanding of a building which is used in the design interior. These writers have considered interactions of humans within a space and provide a more comprehensive approach on how to better the living space in different building types in practice and aesthetics. When the modern interior is involved, Penny Sparke in her book 'The Modern Interior' discusses how the modern interior over the years has just been an abstract concept that does not often times exist in a complete form. She concentrates on the modern interior from the views of professional decorators, designers and the inhabitants. In the case of this book, the modern housing interior from the perspective of the modernist principles is not the focus of discuss.

Often times, the guiding principles of modernism focus on the architectural point of view, and not commonly viewed from how it applies and affects other areas like interior design, which is the focus of this study. Modernism as it has been over the years is the foundation for technological advancement in architecture that we also experience to this present day. The pioneering founders of the modernist movement brought along architectural styles to adopt in building construction, yet these same principles do reflect into other areas such as interior design. From related existing literature, the part of analyzing modernist principles and making connections with 20^{th} century housing interiors has not been extensively examined. The thesis will narrow this gap in literature, which makes references to modern architecture in the modern housing interior by analyzing certain features of these interiors peculiar to modernism. The study investigates the correlation between modernism and the housing interior in Europe and the United States of America, which could possibly provide architects and designers with insight as how to better approach interior design and design for the future.

1.3 Aim of the Study

Modernism has played a key role in establishing architecture to what it is today; however, this research will look at modernism from a different viewpoint, which is how modernism in architecture pertains to interior design. The course of this research contextualizes modernism from a different perspective, by making connections between the relationship between modernism principles and interior design of modern houses. It is the aim of this thesis to provide further understanding about how modernist principles have influenced the interior design world and to create a better understanding and appreciation of housing interiors by designers, which give these spaces meaning and a sense of identity. This study aims to make comparisons and contrasts between the principles of Modernism affecting the exterior (architecture) and the interior (interior design). Modernism and its principles may be considered partly obsolete today, but have an enduring value as a benchmark in the design world today. The intention of this research is to bridge the gap between architecture and interior design as it relates to modernism as a movement.

With a careful analysis of the modern housing interior, this thesis aims at answering the following questions:

1. How has modernism in architecture affected or influenced the design of interior spaces?
2. What interior elements are used to define modernism in design of housing interiors?

1.4 Methodology of the Study

The data that collected for this research was a review of related sources of literature from journals, articles, books and internet sources. The method adopted for this work is case studies of modern houses, with a concentration on the interior spaces and proper assessment and examination of their common areas (living, kitchen or dining areas). To duly examine and analyze the interior spaces of these modern houses, detailed visuals of the case studies such as photographs and sketches are used. Adobe Color program was also used in color analysis of interior spaces.

1.5 Scope of the Study

For the purpose of this study, limit is to single-family housing located in the United

States of America and in Europe, which play significant roles in the history of modern architecture. This research will cover the common interior spaces (living, kitchen and dining areas) of eight different houses by famous architects and designers of the modernist era, spanning between the 1920s and 1950s. The interior spaces of these houses, with respect to plan layout, materials, furniture, and interior colors, will be the major focus in the course of this study as the interior environments of housing units form the most important relationship between man and his house. The selected criteria for study the interiors are considered key and primary in defining an interior space. The selected houses are however to serve as examples to show how modernist principles are being translated to housing interiors, as exhausting 20th century houses is an unmanageable task. It proved difficult to carry out physical analyses of the interior spaces and derive a first-hand experience of the selected case studies due to the inability to travel to locations where these houses are located.

This thesis is presented in five chapters. Chapter one provides an introduction to the overall study on the subject matter, which includes the reason for undergoing this research, the aim of this study, and what the research scope covers. Chapter two is a literature review that provides a background and clear definition of modernism, its underlining principles and influence in the field of architecture and interior design. Chapter three discusses the methodology for this research, which explains the concept of the modern housing interior and gives further explanation and emphasis on the four selected variables for analyzing these interior spaces. Chapter four looks critically into the case studies, discussing principles and evaluation of the interior designs of the eight case studies of single family houses in the United States of America and Europe, by pioneering modernist architects. Chapter five concludes the study, showing results from findings that have been discussed. This chapter also provides further suggestions and recommendations for future research on different focus points when dealing with modernism in architecture and interior spaces.

CHAPTER TWO
THEORETICAL BACKGROUND OF MODERNISM

As a foundation to the examination on the study of the modern housing interior, an extensive review of literature was carried out in order to establish a basis and background knowledge of what modernism in architecture involves. This chapter has its basis on a review of books, journals and articles discussing issues relating to modernism in architecture or the modern movement, from the opinions expressed and the stance taken by other researchers and authors. Relevant literature have been carefully reviewed in order to establish a clear understanding of the subject matter in this research and to clearly understand the themes or ideologies that underline the concept of modernism in architecture. One of the major aspects of modernism in architecture is that it deals with the structural components of any building; however, in literature, a gap exists in dealing solely with architecture and interior design involved with the concept of modernism. The second chapter of this thesis provides useful discourse to the issues that surround modern architecture, offering a more comprehensive account of architectural modernism, stating its underlying principles, and further discusses the schools and organizations that were involved in the modern movement according to the views of other researchers. This part also overviews the subject surrounding modernism by setting it with regards to a scope of ideas that identify with the housing interior's engagement with advancement.

2.1. The Modern Architecture Movement

To understand modernism in architecture or the modern movement, the word 'modern' is explained at first. Heynen (1999), states that historically speaking, the meaning of modern can be recognized on three basic levels; the current, the new and the transient. Firstly, in the oldest sense modern means present, or current, and implies a notion opposite of what is past, or employed in the Middle Ages. Secondly, modern means the new, which describes a present time that experienced a period possessing certain distinguishing features from previous periods. The third meaning

became important during the 19th century, when it acquired the connotation of what is momentary with an opposite notion that is no longer a clearly defined past but an unknown timelessness (Heynen, 1999). These three levels to the meaning of the term modern reflect in the concept of modernity. This is to say that in the modernization process, there are different ways of approaching it. Sparke (2007) suggests that the concept of modernity was not just an abstract one, but also a concept that was physically present and experienced by people. Modernity was visually illustrated as a two-dimensional picture; first through the items that materially went into it, and secondly spatially through the architecture that contained it. In other words, Gold (1997) explained modernity to mean the quality or condition of being modern or living in 'modern times'.

The 20th century architecture is a period in time that involved the development of modernism, which has its understanding in different ways by different authors and critics. Bozdoğan (2001), in her book 'Modernism and Nation Building', gave that officially, pioneering founder of this movement, Le Corbusier, wrote the history of modern architecture in the West. This movement has become a great part for the 20th century cultural history. Based on his account, the modern movement or modernism in architecture enveloped a change in architecture that emerged from Europe during the period between both world wars. The use of glass, reinforced concrete and simple forms, has been defining features in this 20th century movement. In other definitions, the term modern architecture can refer to buildings of the modern era, or architecture aware of its own advancement aspiring for change (Colquhoun, 2002). Modernism reflects an important moment in dealing with architecture and issues relating to modernity or the changing society. As Alan Colquhoun notes in his account of modernism, the term modern architecture or modernism refers to progressive movements in modernization in the 1910s and 1920s (Colquhoun, 2002).

In the book titled History of Modern Design, Raizman (2010), stated that art historians often use the term modernism to refer to ideas that believe the machine is the vehicle for social change in any society. From the 1920s onwards, the term 'modern' came to refer to a particular approach by a group of architects who sought to develop something different for their own time (Sullivan, 2014). These architects were persuaded from the outcome of World War I, that the methods of old Europe

had turned into a disappointment and failure. The 20th century architects with a dynamic personality regarded it essential to establish a unified architectural style.

The views of modernism according to Sullivan (2014), apply to the pioneer movements at the turn of the 20th century, precisely in the 1920s. In this period, efforts were made to establish the rules that outlined architectural design with the progression in technology and the modernization of society. This movement appeared in the form of different design schools and architectural styles, with some not totally in agreement with each other, and along the line, challenging such development.

In the book Modern Architecture translated by Mallgrave, Wagner (1988) stated that in order to suit modern man, modern creations should correspond to present demands, new materials and take into account technical and scientific achievement. Modernist architects saw historical styles develop in response to earlier post-war conditions and the aftermath that surrounded it. This style rejected ornamentation and saw it as outdated and unacceptable, but rather sought to create an entirely different aesthetic based solely on the needs and opportunities of availability of new materials such as reinforced concrete and steel, purity and authenticity of materials. For Rowe (2011), after World War II, the concept of modernism increased and ended up being more acceptable by various architects and architectural educators that this idea proceeded as a prevailing architectural style for buildings into the 21st century.

Gold (1997), presented his findings of modernism stating that for the last 70 years and beyond there have been two grand narratives that put forward knowledge about the origins, development, and purpose of architectural modernism. The first of these narratives viewed the origins and development of modernism and celebrated its rise to prominence. The second however reevaluated matters in the light of further knowledge, recording the fall of modernism and searching for what was responsible for this. Further explaining, the first grand narrative formally appeared in the late 1920s and this dominated the history of architectural modernism for over four decades. In order to show modern architecture as the outcome of a continuous process of change, historians were able to identify key thinkers and map chains of events that led to modernity. Modern architecture was thus regarded as the only authentic architecture because it incorporated the use of materials and constructional methods specific to that age (Gold, 1997). The application of technology to building

and construction is what gave rise to modern architecture, which verifies the account of modern architecture history by other writers and historians.

The second grand narrative traced the causes that linked the deficiencies of recently designed urban environments back to the flawed visions of pioneering modern architects. Those supporting this view reevaluated buildings once regarded as affirmations of social progress. They recognized that the problems associated with such buildings were persistent, and they questioned the results of applying philosophies, such as functionalism and aesthetic minimalism (Gold, 1997). This narrative held their own views and denounced social engineering embraced by many other modern architects.

The modern movement was an act that opposed social modernity and accepted a future that was open to new technology (Colquhoun, 2002), and revolutionized the course of architecture, serving as an inspiration to present day times9. The modern movement according to Gold (1997) embodied architecture, where it constituted legitimate solutions to the problems and possibilities arising from the process of modernization and the experience of modernity. Reconciliations were under way between the changing society and a presence of advancement in technology. Heynen (1999) adopted a position that in the initial phase of modernism, there were strong ties to other movements such as futurism and constructivism, where it shared its views that were in opposition to the traditions of the 19th-century culture. These other movements influenced basic principles associated with modernism directed towards development and a desire for what is new. The 19th-century, however, had several contributions to modernism which included the dominant iron, concrete and glass structures, which formed the basis for architecture that became manifest in the 20th century. According to Le Corbusier & Cohen (2007), Le Corbusier, a pioneering member of the modernist movement noted that technology played a positive role in the lives of people, and stated the house is a machine for living in. The use of new materials such as glass and steel allowed the design of buildings with radical designs, which would not have been possible if these materials were not in use.

It is impossible to state with any accuracy the precise historical moment modernism emerged, since the times that it became recognizable vary according to the nation and the branch of the arts under consideration. However, it can be stated with certainty that modernism achieved prominence in Western and central Europe during

the first three decades of the 20th century (Gold, 1997). With the origin of modernism in Europe in the 1920s, its doctrines have claimed universal recognition. Following World War I, in a response to economic conditions, a German association of artists, designers, and architects, known as Deutscher Werkbund commissioned leading architects of the 20th century, such as Walter Gropius, Mies van der Rohe and Le Corbusier to exhibit a new domestic architecture of modernity, known as Weissenhofsiedlung ("Weissenhofsiedlung", n.d.), shown in Figure 2.1.

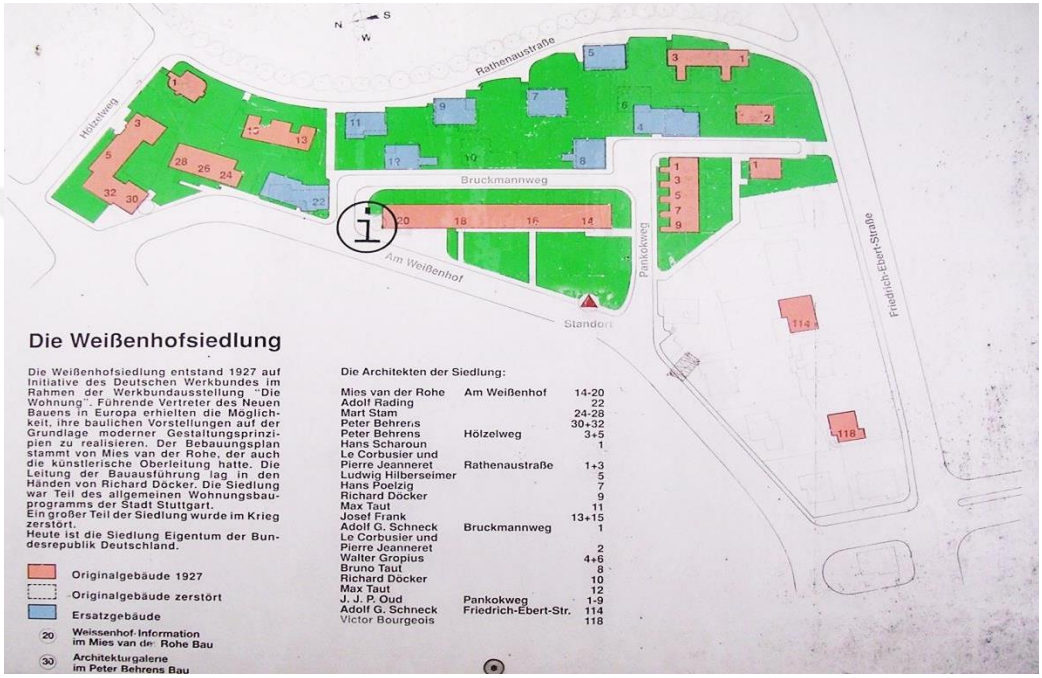


Figure 2.1. Weissenhofsiedlung site plan 1927, Stuttgart, Germany.

In 1927, the Weissenhofsiedlung in Stuttgart-Germany was a major housing exhibition and cultural heritage of the 20th century, that was responsible in creating publicity to the modernist architects of Europe that helped shape modern architecture ("Weissenhofsiedlung, n.d.). The estate comprised of works from 17 different architects from Germany, France, Holland, Belgium and Austria, comprising of 21 buildings that housed 63 dwellings (Kirsch & Kirsch, 2013). An example of one building is shown in Figures 2.2 and 2.3. The Weissenhofsiedlung estate represents the changes that followed at the end of World War I, which were social, aesthetic and technological ("Weissenhofsiedlung", n.d.).

According to Kirsch & Kirsch (2013), the Weissenhofsiedlung building exhibition was under the theme ‘a home for modern city dwellers’. It was part of the municipal housing approved in an attempt to solve the problem of housing shortages following World War I (“Weissenhofsiedlung”, n.d.). As housing shortages persisted, the idea behind the housing estate was to design a variety of buildings to create solutions for better living arrangements, with the use of new building materials and cost-effective methods of construction and mass production. One characteristic that makes this building exhibition stand out is because a project of this caliber could be implemented in the first place, just few years after World War I. (Kirsch & Kirsch, 2013). Modernist principles (especially Le Corbusier’s ‘five points of architecture’) applied to the design of these buildings, which was the characteristic of 20th century architecture (“Weissenhofsiedlung”, n.d.). Modernism and its principles radically transformed architecture and Weissenhofseidlung, was able to transform the lives of the participants.

Figure 2.2. Houses 14 & 15 by Le Corbusier and Pierre Jeanneret. Weissenhofsiedlung 1927, Stuttgart, Germany

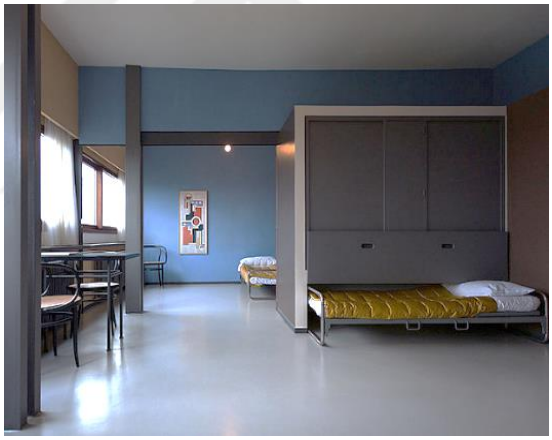


Figure 2.3. Interior view of House 14 by Le Corbusier. Weissenhofsiedlung 1927, Stuttgart, Germany

The transformation and progress made in living arrangements was reflected to other parts of the world from Europe, which Allaback (2014) implied. She also stated that the period of the 1920s was also seen as the time when European modernism arrived in the United States, in which this early phase of modern architecture was labeled as the International Style, though it did not last for a long period of time. Bozdoğan (2001) suggested Philip Johnson derived the name International Modern or International Style after an exhibition of modernist architecture in USA in 1932. Johnson together with Hitchcock and Barr (the then director of MoMA), organized

the exhibition known as ‘Modern Architecture: International Exhibition,’ which introduced European contemporary architecture to the USA (Tabibi, 2005). This exhibition showed at the Museum of Modern Art, New York, featured works that displayed the principles of modern architecture from architects such as Mies van der Rohe, Walter Gropius and others from Europe and the USA (Hitchcock, & Johnson, 1995). According to the findings by Tabibi (2005), Alfred Barr, who planned to organize an exhibition that would introduce modern European architecture to America, conceived the idea for the show. This show was the first architectural exhibition at MoMA, which mostly presented works from painters.

The exhibition introduced an emerging style of architecture characterized by a lack of ornamentation and the use of simple geometry, through photographs, drawings and models (Hitchcock, & Johnson, 1995). This period of modernism notes the time when changes began to occur especially in the field of architecture in the United States. These changes reflected in terms of technological advancement, new materials emerged and machines to make life easier. According to Tabibi (2005), the exhibition comprised of three sections, with the main section titled ‘Modern Architects.’ This section presented projects by the four leaders of modern architecture: Le Corbusier, Walter Gropius, Mies van der Rohe and J.J.P. Oud. The other two sections: ‘Housing’, showed the need for a new domestic environment and ‘The Extent of Modern Architecture’ displayed works by 37 architects from 15 different countries. Figures 2.4 and 2.5 below are some of the models or works shown during the exhibition. Hitchcock, & Johnson, (1995), stated that the exhibition presented three major principles that laid the foundation of the new style, these were, the emphasis of volume over mass, the regularity and standardization of elements, and the avoidance of ornament.

Figure 2.4. Model of Le Corbusier's Villa Savoye from Modern Architecture: International Exhibition, 1932 New York, NY. USA.

Figure 2.5. Modern Architecture International Exhibition., 1932 New York, NY. USA.

2.1.1. Modernism outside Europe and the USA

According to Bozdoğan (2001) in an account to further discuss modernism, modern architecture history outside the USA and Europe is a recent phenomenon and a research area that is rapidly growing. Historians and people with an interest in the subject matter in Asia, Africa, Latin America and the Middle East had marginalized topics relating to modern architecture. This occurred around the last two decades of the 20th century. She also gave her views stating that one reason behind this marginalization had to do with the initial constitution associated with art and architectural history based on European grounds. Non-Western cultures and values were considered to remain inferior and as others with respect to their Western counterparts (Bozdoğan, 2001). In that case, attention was on the classical periods of African, Indian and other cultures. Thus, modern architecture as an imported phenomenon from a different culture was not indigenous to these non-Western societies, but seen as a symbol that contaminated their own Western cultural values. These non-Western societies tried to adopt the modernist principles into their cultural expressions but little attention was devoted to the non-Western cultures to make European modernism their own. The term 'modern' considered as a European concept, was one which other societies could adopt in style but not necessarily copy (Allaback, 2014).

Historians of modern architecture and experts in the field of study have focused on the social and technological determinants of the modern movement, whose sources

emanated from the West. Due to the issues that led to the modern movement, modern architecture in non-Western societies is regarded as extensions of the developments from the West, lacking originality in themselves. The past years have seen an interest and wide spread research in modern histories, experiences and transformations of non-Western societies (Bozdoğan, 2001). There is a notion that the histories involving modernism have been breaking away from the idea of modern architecture as a universal principle adopted by different nations. According to Octavio Paz, Western concept has no equivalent in other civilizations (Heynen, 1999). Though modern architecture has been a representation of modernization, in order to better understand modern architecture, it is important to look at different experiences derived from different societies; from both Western and non-Western cultures.

2.1.2. Social Issues of Modernism

Modernism brought about a real defining term in architecture for what it is supposed to be and how it should relate to conditions of the society. To this regard, modernism here refers to a condition of living imposed on individuals by the socioeconomic process of modernization (Heynen, 1999). Modernism was a break away from tradition, which greatly impacted the daily habits and way of life for individuals of that era, as Colquhoun's (2002) view was that modernism was a reflection of modern life. Heynen (1999) also put, modernization in the 19th century had gained grounds in economic and political fields, dealing also with issues relating to industrialization, and increasing urbanization. She went further to say, the modern movement sought out ways to improve the urban environment by changing living conditions, and breaking away from already established values and traditions. From this growing change in the traditional norms and living conditions brought about by modernization, it caused individuals to experience a divide between their changing world and certain traits that were required of them by society (Rowe (2011).

At the beginning of the 20th century, Adolf Loos among others stated, that it was the task of historians to search for a basis for a new culture. This led to the opinion that no longer should architecture be limited to the design of buildings, but should also develop into other disciplines focusing on the environment as a whole (Heynen, 1999). World War I accompanied experiences that convinced inhabitants of the urgency to bring technological developments under control. As a way of achieving this control, the period after World War I was as an opportunity for a new beginning,

a beginning that offered a chance of establishing in a positive manner, a culture that would guide the process of modernization. According to Chen & He (2013), modernism suggests that gradually machines replaced skilled artisans that led to a reducing cost in production through mass production. The basis for this new culture saw a break away from tradition or norms initially accepted by individuals, as a rapid pace of life, the increase in experiences derived was seen as the driving force for the design of this new culture. Machines began to advance in speed and movement (trains, cars and airplanes), sports and activities of leisure began to spring up, and social codes became more relaxed with increasing social mobility, all these greeted a changing society with enthusiasm.

Another social issue that led to modernism as David Raizman (2010) expressed was that of housing. In the earlier years just after World War I, there was an attempt made to reconcile the economic and social aspects that relate to housing issues. He further stated that after World War I, a shortage in housing and a slow economy suggested that new construction was aimed at efficiency, fulfilling minimum living requirements for the masses. The economic crisis after the war created a concentration in architecture on economic issues that led to a consideration in the cost of housing. This was only right as a way to create better living conditions when the war had ended and the masses felt the consequences surrounding the economic situation. Heynen (1999) gave insight that the aftermath of the economic conditions began to affect living and it was not until after 1929 that public housing became a remedy to both economic and financial problems, with functionality in design considered in terms of cost effectiveness.

The ideas, practices, and techniques of the modernist era in Europe, were required to confront and establish solutions to the crisis that was associated with their bomb-ravaged cities due to the on-going war. Further saying, Rowe (2011) explained that lying at the center of the modernist movement ideals, was for a planned environment that included quality family life and social interaction. The vision of this group was to create areas that were less troubled, by mixing blocks of housing units with terraces, which created squares, zoning services, and amenities interlinked by roads. In order to create better environments and enhance quality of living, the modernists had planned for zoned area; these areas had residential and commercial amenities distinct and separate from each other. Going further to discuss on social housing in

post-war era, Rowe (2011) also stated that modernist ideals did not apply to social housing until 1937. This was when Maxwell Fry's London Kensal House (Figures 2.6 & 2.7) applied the modernist principles to a social housing scheme. The application of these principles became a success and is still popular with its residents today (Rowe, 2011). At that point, it turned into a model for other social housing projects to take after in the case of modern living.

Figure 2.6. Maxwell Fry's London Kensal House, 1938

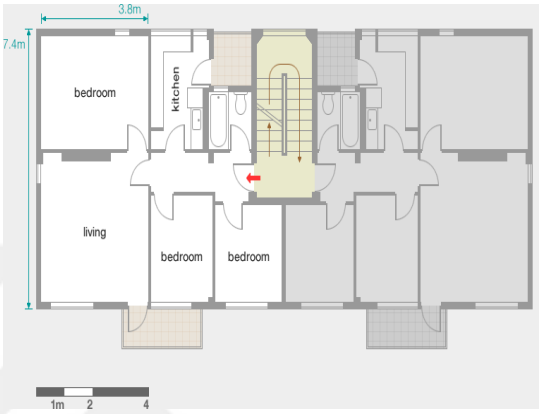


Figure 2.7. Plan layout of Maxwell Fry's London Kensal House, 1938

On the other hand, not all modernist social housing projects were successful, as from the 1970s there were a number of demolitions made due to failure in large-scale. An example to this failure is the now infamous Pruitt-Igoe urban housing development in St. Louis, Missouri (Figure 2.8); completed in 1955. The development was planned according to the modernist principles of Le Corbusier, and comprised of 33 11-story high-rise blocks that were made up of small individual apartments (Rowe, 2011). These blocks had areas for community activities and outdoor spaces for recreation, which fostered an increase in social interaction between the inhabitants. As Rowe (2011), further explained, by the late 1960s, these areas meant for communal activities had become danger zone areas. Vacant apartments in the housing complex indicated that because of the crime-ridden community, even the poor would opt to live anywhere but Pruitt-Igoe.

Figure 2.8. Pruitt-Igoe Urban Housing Development 1955, St. Louis, MO. USA.

The major problems for the residents in this housing unit were crime and poverty. Rowe (2011) attributed that the modernist style for this development was to blame for these social problems experienced in the housing complex especially when compared to the Carr Village, which comprised of low-rise dwellings. The Carr Village (Figure 2.9) had similar demographics to that of the Pruitt-Igoe, despite remaining fully occupied and crime free. During the post-war era, modernism in architecture sought out to rid public housing schemes that constituted of high-rise buildings. To an extent, there is no doubt that modernism was able to solve some issues surrounding it, by keeping in touch with and making the most out of technological advancement. However, one reason the modernist movement was considered a failure in housing complexes was due to its unrealistic ambitions (Rowe, 2011). The public no longer had faith or belief in the modernist movement because of the social problems that residents of public housing estates faced.

Figure 2.9. Carr Village 1942, St. Louis, MO. USA

The group of individuals behind the modernist movement, on the other hand, sought to create a new culture that developed from the transformation of ideas brought about by industrialization producing a machine aesthetic. The period after World War II had become an era that had witnessed the triumph of modernism as the dominant cultural form. From this period, here on out, modernism became a more dominant movement and its ideas were rapidly gaining worldwide recognition.

2.1.3. International Modernism

Hitchcock & Johnson (1995) discussed the International Style as referred to, in detail in terms of its history and principles. To explain this style further, they stated that the 19th century was a period with not just a style, but different styles. The first modern architects revolted against the ideology of having these different styles, and these men sought to explore a variety of possibilities from stylistic discipline to individualism with one dominant style. Today, a single style exists in the world, which is unified and not contradictory.

International modernism was a style that came into the USA from Europe, and it was in America that the promise of a new style emerged first and advanced rapidly (Hitchcock & Johnson, 1995). As illustrated by Frampton (2010), the International Style had spread throughout countries in the developed world by the time of World War II. Sullivan (2014), expressed his views that in 1932, architect Philip Johnson alongside Henry-Russell Hitchcock, an architectural historian, both curated an exhibition at the Museum of Modern Art (MoMA), New York. The style had three main characteristics:

1. An emphasis on architectural volume over mass: Outer walls were thin with windows near the outer surface, which could create the illusion of a shell stretched over the frame. This however, differed from the massive appearance of a load-bearing wall pierced with openings that preceded this era.
2. The rejection of symmetry that was a characteristic of architecture in the classical tradition: Hitchcock and Johnson both argued that modernists created a feeling of rhythm and balance by replacing symmetry with a sense of regularity.
3. The rejection of decoration, rather use beautiful materials, elegant proportions, and the elements of the structure itself (Sullivan, 2014, p8).

The purpose of the show exhibited at MoMA, New York, according to Sullivan (2014), greatly underplayed the social mission set out by the pioneering European modernists, many of whom were convinced that through architecture and urban design, they could make the society a better place. It was their belief that mass housing schemes would be an improvement to the lives of the working class. These modernists believed that their new style would make the world a better place. Aspiring modernists took the 1932 exhibition and its characteristics as a definition for design that was progressive, where its style became more practiced. However, both Hitchcock and Johnson had also argued that International modernism was at home in any social, cultural or climatic situation, causing buildings to spring up in this new style from New York to Moscow, to Rome, to Winnipeg, and, from Seoul to Rio de Janeiro (Sullivan, 2014).

An icon of International modernism is the 1958 Seagram Building (Figures 2.10 and 2.11) in New York designed by Ludwig Mies van der Rohe and Philip Johnson (Chen & He, 2013). This building stays true to its style characteristics and expresses its structure on the outside, void of any ornamentation or decoration. The building emphasizes the structural frame, and not the visible walls, which holds the building; the entrance is a glass box that is smaller than the footprint of the building. To further buttress ideologies of International modernism, Chen & He (2013) gave their views on the Seagram Building when they stated, that despite the site had elevators, and there was an open space on the ground floor that had easy transportation. Though the building looked like a regular hexahedron, it demonstrated the use of modern materials such as steel and glass, which fully displayed the design principle of ‘less is more’. Other features common to many international style structures are the cantilevered shades over the entrance and the setting the building in a large court. Scully & Levine (2005) stated that the skyscraper had become the major modern symbol of modernism in architecture.

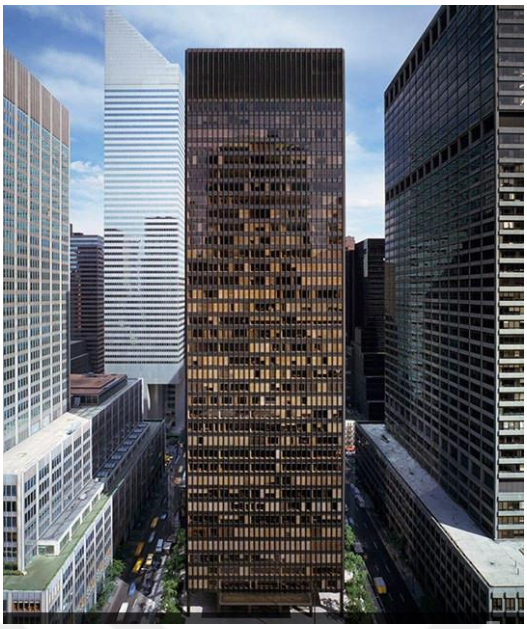


Figure 2.10. Seagram Building by Philip. Johnson 1958, New York, NY.USA.

Figure 2.11. Interior view of Seagram Building by Philip Johnson 1958, New York, NY. USA

The three principles that defined the International Style put forward by Gold (1997), are identified as emphasis on volume rather than mass, regularity as opposed to symmetry; and dependence on elegance of materials rather than ornamentation. The International Style seemed appropriate for use in a range of fields such as retail, commercial, domestic or industrial buildings, and it was possible for this style to be replicated as an expression of modernism. This replication was only possible because industrial production or political beliefs were not involved.

2.1.4. Principles of Modernism in Architecture

Paul Greenhalgh in his introduction to 'Modernism in Design' highlighted features important in modernist designs including function, advancement, rejection of tradition and socialism. These principles are evident in many of modernist buildings as visible realizations to their modernist ideals (Rowe, 2011). Some common themes that relate to modern architecture include:

- The notion that 'form follows function', as expressed by Louis Sullivan, meaning that the result of a design should be directly from its purpose.
- To eliminate unnecessary detail that includes clarity of form and simple designs.
- Materials should be at 90 degrees to each other.

- To include visual expression of structural elements as opposed to hiding them.
- The concept of ‘truth to materials’, meaning that the natural appearance of a material should be seen rather than concealed or altered to represent something else.
- Use of materials industrially produced and the adoption of the machine aesthetic.
- To emphasize visually on horizontal and vertical lines, particular in International Style modernism (Davis, 2014).

Rowe (2011) went further to state that in discussing the principles associated with the modernist movement; the phrase ‘form follows function’ is often used. What this simply means is that in architectural design, the purpose or function of a project should determine its form. Architectural forms kept simple and ornamentation not needed for the project to function. Prominent architects who play an important part in the history and improvement of the modernist movement include Frank Lloyd Wright, Ludwig Mies van der Rohe, Le Corbusier, Walter Gropius, Richard Neutra, Louis Sullivan, Gerrit Rietveld, Bruno Taut, Arne Jacobsen, Oscar Niemeyer and Alvar Aalto.

2.2. Organizations and Schools of the Modernist Era

Projects of the modernist era usually considered successful, gathered recognition from the public and became associated with prosperity and progress. In the post war era, the modernists had ambitions and a sense of social responsibility that architecture should be able to raise the living conditions of the masses (Rowe, 2011). Within the overall concept of modernism, there have been other sub-movements derived from this main body of movement. These sub-movements or schools of design or thought were peculiar in style, element and principle, having certain features that were unique to each period and exhibiting its characteristics, although they are deeply rooted in modernist principles. There were however varying opinions and nonetheless, conflicts arose between these schools of thought.

2.2.1. Bauhaus School

Bauhaus, was an art school first established in Weimar, Germany and operated from 1919 to 1933. Walter Gropius (1883-1969) who was the school's first director founded the school. Raizman (2010) wrote by stating the Bauhaus was formed from the consolidation of Weimar's Academy of Fine Arts and the city's Arts and Craft School, which both closed during World War I. In English, the German word, "bau" means building while "haus" means house, which for this school symbolized that in the design field, art and technology are considered together. The German term means, "School of Building" and it was a surprise that the school did not have a department of architecture, but rather explored this style through the use of artistic design and sculptures. Frampton (2010) stated that in 1927, the Bauhaus saw the formation of the architectural department under the leadership of Hannes Meyer. In April 1925, the Bauhaus school moved from Weimar to Dessau (shown in Figures 2.12 and 2.13), due to conflicts with the National Socialists (Chen & He, 2013). Students at the Bauhaus School of Design were taught by Walter Gropius, the purity of form and to design for a better world (Rowe, 2011), with an emphasis placed on the combination of both practice and theory, which was to develop observation, thinking and analytical skills of the students. The aim of this school was to create products that were both simple in design and which could be easily mass-produced, which at that time was of great importance. Students who experiment with different materials and methods exploring more possibilities inspired the design of these products. According to Chen and He (2013), Gropius encouraged the Bauhaus students to develop skills that were important in problem finding and innovation in order to actively explore their creative prowess.

Figure 2.12. Bauhaus School by Walter Gropius 1925, Dessau, Germany.

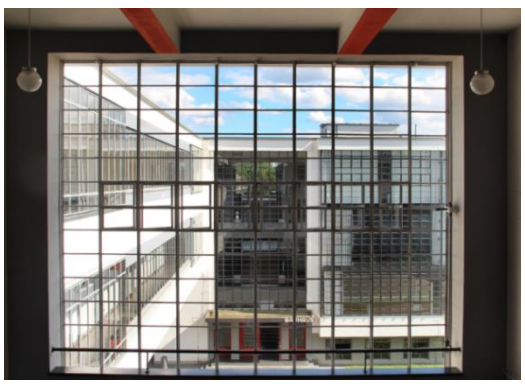


Figure 2.13. Interior view of Bauhaus School by Walter Gropius 1925, Dessau, Germany

In the book written by Gropius and translated by Shand, Gropius had a greater plan for the Bauhaus School, with his primary aim of teaching individuals the ability to grasp life as a single whole, which would form the basis of instruction in the school (Gropius & Shand, 1998). The Bauhaus was concentrated on how to avert the enslavement of humanity accorded by the machine in which its products were a content of reality, by evolving products designed specifically for mass production. The objective of the Bauhaus School was to eliminate every drawback of the machine and realize standards of excellence. Practical works and new designs were made in workshops in the school, to improve models for the purpose of mass production. According to Shand (1998), in order to actualize modern architecture, a building should be able to obtain its significance from its organic proportions, meaning it should remain true to itself.

To explain the guiding principles of the Bauhaus Proclamation in 1919, Frampton (2010) stated that Bruno Taut, who published in late 1918, had anticipated these principles in an architectural program. In this program, Taut argued that the only way a new cultural identity can be attained is through a new art of building; each discipline would contribute to the final form. Taut further wrote that all would be one: architecture, with no boundaries between sculpture, painting or crafts. To further buttress the oneness of the Bauhaus School, Ali Shahabi's views suggest that in establishing the Bauhaus, its primary aim was to combine design, art and technology, and a certain homogeneity was achieved in all products, which was considered an essential factor of the Bauhaus' collaborative work (Shahabi, 1965). One guiding principle in this school of design was that artistic design became an integral part of everyday living, and that the change in aesthetics brought about a different insight into what design is and what it entails. The teachings of the Bauhaus explain why its productions were uniform in design. The result of this was to supersede the aesthetics of previous eras by the Arts and Crafts Movement and not in any way propagate a definitive style but rather influence design (Gropius & Shand, 1998). Other designers adopted the Bauhaus ideals in the period that followed art schools, such that German industries began to produce in mass, Bauhaus models and seek collaboration for new designs.

Some of the designers trained in the Bauhaus tried to create a style that would be international, suitable for all regardless of country, culture or traditions. Chen & He

(2013) suggested that a classic example representing the international style due to its frame structure is the Villa Savoye by Le Corbusier. Explaining further the ideas of this school, the idealistic text of the Bauhaus manifesto is concerned with ideas that regard to the collaboration of artist craftsman, which point to the building as a model in order to overcome the opposition between fine and applied art, as was pointed out by Chen & He (2013). Gropius was of the belief that "group innovation" is the core of design that benefits both design and the development of industrial production. It however shows little interest in objective standards that are required for design or industrial technology. For example, the Bauhaus school insisted on using only primary colors, red, blue and yellow. This color palette, alongside very simple geometric forms, created a balance between visual composition, and materials such as wood, metal and glass, which instinctively led to a distinct ideology of what Bauhaus designs should take after (Covert, 2012). Figures 2.14 and 2.15 below are examples of Bauhaus designs that reflect their ideals; these forms of design are seen in today's world and time with different variations springing up also.

Figure 2.14. Nesting Tables by Josef Albers, 1926/1927

Figure 2.15. Barcelona chair by Ludwig Mies van der Rohe, 1929

The Bauhaus style later became one of the most influential feats in modern design, as well as modern architecture and art, with a great influence on developments in fields such as typography, art, graphic design, architecture, interior design and industrial design. This movement had ideologies that bought about a change in thought with the way items are used on a daily basis, thereby teaching how to get rid of the unnecessary, embrace efficiency, and design with mass production in mind. In discussing modernist architecture, the Bauhaus role is vital. It channeled design of furniture, buildings, fonts, products and the likes until this very day.

2.2.2 Bauhaus Influence in Architecture and Interior Design

The Bauhaus, a prestigious school of art, has its influence reflected in different design industries such as fashion design, architecture, graphic design and art, and its guiding principles continue to spread to designers and artists. The Bauhaus had a mission to provide new designs that were affordable and practical (Shahabi, 1965), that could be used by any person regardless of the area. Thus, the school had a huge influence on the history of design and style; easily seen to this this day not only in the area of architecture, but in art also. Chen & He (2013) expressed that minimalism which was popular during the 1950s embraced the Bauhaus' spirit. These writers also stated that in Walter Gropius's book "The new architecture and the Bauhaus", Gropius points out that instead of anchoring buildings into the ground with massive foundations, they are lightly, yet firmly placed upon the face of the earth. This bodies itself forth, not in stylistic imitation or ornamental frippery, but in those simple and sharply modeled designs in which every part merges naturally into the comprehensive volume of the whole. Thus its aesthetic meets our material and psychological requirements alike.

To explain further, how the Bauhaus has influenced architecture, Chen & He (2013) sited examples with two buildings by Le Corbusier; the Barcelona Pavilion (Figure 2.16) and the Villa Savoye (Figure 2.17). They went ahead to state that the Barcelona Pavilion is regarded as a German interpretation and aesthetics of modernism. In terms of space distribution and bearing structure, it breaks the concept of room; where pillars connected directly to the ceiling enlarge the space, whose inspiration comes from cubism painting, which reflects more consideration between social needs and physical demand. For the Villa Savoye, Chen & He (2013) also explained, that the most important parts that make up the simplicity of this building are the strip windows, deck area and flat roof, which also correspond to modern architecture characteristics. The Villa reflects the Bauhaus design philosophy in terms of aesthetics and ergonomics, whereby it meets the physical needs and visual enjoyment of man.

Figure 2.16. Barcelona Pavilion by Le Corbusier 1929, Barcelona, Spain

Figure 2.17. Villa Savoye by Le Corbusier 1929, Poissy, France

Likewise, the Bauhaus stressed that architects should assume the responsibility of exploring and solving the conflicts that exist between building function and its cost. Bauhaus kept the record of lowest price at that time due to its simplicity in design, costing only twenty cents per square foot (Chen & He, 2013). Under Bauhaus's influence, modern architecture becomes more profitable, as it maximizes the monetary value, while at the same time, breaking the traditional design concepts like heavy foundations and narrow windows. Furthermore, modern architectures made long-term adjustment to industrial age. The Bauhaus strived to unite all forms of creativity and practical artistic disciplines (Chen & He, 2013). However, the development of design aesthetics and new types of architecture are basic characteristics of modernism.

The Bauhaus School influences are visible in the area of interior design where color and furniture is used to express Bauhaus ideas. Johannes Itten (1888-1967) was a Swiss painter, designer, and one of the several teachers of the Bauhaus school (Shahabi, 1965). Itten believed in the importance of creating harmony through the sense of space, composition and the sense of colors, for this reason he created a 12-hue color wheel (Figure 2.18) that explained how to mix hues and shades, where he encouraged individual creativity (Frampton, 2010). Moreover, Itten was interested in discovering a social role of colors and in understanding how different tones could affect the psychology of people. From Itten's studies, it was evident that the Bauhaus school realized the importance of colors and its students were encouraged to experiment and make their own creation of palettes (Shahabi, 1965). The experimentation with colors used in interior design, creates spaces with different atmospheres, evoke feelings and have a way of affecting the mindset of man. Color has the ability to set the mood or ambience of any space.

Figure 2.18. Johannes Itten's Color Wheel, 1926

Figure 2.19. Side Chair by Marcel Breuer, 1928

The Bauhaus school taught its students to become well acquainted with paintings of contemporary cubist artists, such as Picasso and Gris, which shaped the way these students viewed reality (Bayer, 1999), which has in turn transcended to present day. In perspective, objects were broken down to their most raw geometric forms, while bearing in mind, that this technique was the best for the creation of new and modern items. Clean, simple and abstract forms were constantly used to produce new tools that could highlight the difference between the old trend and style of the Art Nouveau (Bayer, 1999). In 1928, Marcel Breuer, a member of the Bauhaus school, designed a new model of chair, called Side Chair (Figure 2.19), which is the first example of the use of tubular construction in furniture. This cantilevered tubular chair became the prototype of many variations seen throughout the world (Shahabi, 1965). This chair was made up of wood cane and steel tubes pleated in chrome, which give the chair a sense of both flexibility and fluidity when in use.

Marcel Breuer was the director of the furniture workshop, where he started to produce tubular steel, lightweight tables and chairs that were easy to clean, economical and at the same time convenient. Together with light fittings designed from the metal workshop, these were to furnish the interiors of the new Bauhaus buildings (Frampton, 2010). Another Bauhaus contribution to furniture is the Barcelona chair. Mies van der Rohe designed the Barcelona Chair and presented it at the German Pavilion in the 1929 International Exposition at Barcelona, Spain. This was the first chair to utilize the use of bent steel legs and saddle leather straps upholstered by a frame of solid steel bars. Mies van der Rohe's furniture designs are mass-produced in their original form in the USA by Knoll Associates, Inc., New York (Shahabi, 1965).

Shahabi (1965) further discussed how the Bauhaus has influenced the design world by siting an example of Bauhaus textile. Figure 2.20 shows an original Bauhaus textile, bought by the German textile industry and marketed under the trade name *Bauhaus Stoffe*. The effects of the geometric patterns and texture of these fabrics have widely influenced modern textile design to this day. Frampton (2010) also explained that in 1927, the licensed industrial production of Bauhaus designs was well under way. These productions included light fittings (Figure 2.21) and metal ware (Figure 2.22) by Marianne Brandt and Gunta Stadler-Stolzl textured fabric shown in Figure 2.23. The Bauhaus had ideas in respect to design, which broke away from European precedent and contributed new principles for improvement of design. These ideas were in the design of furniture and other household items, with tubular metals and highly polished surfaces that revealed textures rather than ornamentation. By varying their original products and creating contemporary prototypes, the Bauhaus influences design and the use of materials (Shahabi, 1965).

Figure 2.20. Original Bauhaus Textile by Gunta Stadler-Stolzl, 1920s-30s

Figure 2.21. Ceiling Lamp by Marianne Brandt, 1925

Figure 2.22. Water jug by Marriane Brandt, 1924

Figure 2.23. Textured fabric by Gunta Stadler-Stolzl, 1920s-30s

In the book entitled Walter Gropius - Work and Teamwork by Sigfried Giedion, a chapter explains Walter Gropius and the Bauhaus, therein; Giedion gave his account of the significance of the Bauhaus. He states that the Bauhaus was an attempt to bridge the gap between art and industrial production. The whole ideology behind the Bauhaus was to discover the similarities between these two conflicting fields and make them generally known. When these two worlds split, it leads to a division of human life (Giedion, 1992), and this is what Walter Gropius sought to deal with in the Bauhaus. In 1960, James M. Fitch published a biography of Walter Gropius, where he discussed the contributions the Bauhaus School had made. Fitch (1960), expressed this was the program which set the Bauhaus into the international scene, making it the most important single force in the design world between the period of both World War I and II. The Bauhaus had different fields of design such as architecture, typography, pottery, furniture, graphics, fabrics, painting, silverware, photography and advertising, whose influence was evident everywhere. Bauhaus School of Design had the capacity to regenerate design, which derives its analysis from the relation between design and production in an industrialized world (Fitch, 1960).

Shahabi (1965) expressed his views that projects designed and produced in the workshops of the Bauhaus School, became outstanding examples of functional design, in the 20th century, where many of the original projects display their history in museums of modern art. These projects were mass-produced, and several designs, particularly of furniture, are at present reproduced in their original form.

2.2.3. The CIAM Influence

The most effective organization that was responsible for actualizing the ideas of modernist principles was the International Congress of Modern Architecture (CIAM) (Bozdoğan 2001). According to Frampton (2010), twenty-four (24) architects representing signed the 1928 CIAM declaration: Belgium (1), Austria (1), Spain (2), Italy (2), Holland (3), Germany (3), Switzerland (6) and France (6). Kenneth Frampton went further to state that the CIAM emphasized that the elementary activity of man that is linked with the development of human life is building rather than architecture. Ernst May was a founding member and one of most important figures of the early years of the CIAM. The aim of May and his associates were to provide the masses with decent housing that would free them from the harsh living

conditions and alleviate the housing needs of the poor that were associated with the war (Heynen, 1999). The new houses constructed were to be an enhancement to everyday living and provide homes that would be comfortable, which came at an affordable rate.

The issues of pre-war CIAM congresses addressed were to deal with the urgent need for mass housing and urban infrastructure, as well as provide solutions to the issues of the industrial revolution. These housing issues put forward by Gold (1997) state that the foundation of the CIAM indicated the nature and scale of the ambitions of the modern movement. In England, the Mediterranean basin, Germany and Scandinavia, pre-war modernist cultures were revived and re-evaluated, with greater emphasis on the 'humane' qualities of the traditional city. Gold explained further that the reformist movements of the late 19th century formed western architecture and urban design that was viewed in relation to cultural and societal transformations. The theories and works of designers discussed were in relation to the major principles surrounding modernism, as they emerge out of the political, cultural, economic and industrial transformations. Frampton (2010) expressed simply that the emphasis of the CIAM was on the need for a planned economy and industrialization, denouncing the goal of maximizing profit. Rather, the CIAM advocated the introduction of efficient production methods as a means towards achieving rationalization of the building industry.

The La Sarraz Declaration in 1928 further explains the ideals of the CIAM in order to strive for modernity. This declaration states:

1. The idea of modern architecture includes a connection between the phenomenon of architecture and that of the general economic system.
2. The idea of economic efficiency implies production demanding a minimum working effort, rather than production furnishing maximum profit.
3. The need for maximum economic efficiency is because of the inevitable impoverished state of the economy.
4. The most efficient method of production arises from both standardization and rationalization, which act directly on working methods in modern architecture and the building industry.
5. That both standardization and rationalization work in three ways:

a. They demand architectural conceptions lead to simplification of working techniques both on site and in the factory.
b. They mean for building firms to have a reduction in skilled labor force as they lead to the employment of less specialized labor that work under the direction of highly skilled technicians.
c. They expect from the consumer/client a revision of his demands in the direction to the new conditions of social life (Frampton, 2010, p 269).

2.2. Modernism in the Modern Housing Interior

In discussions regarding the modern interior, Penny Sparke (2007) gave her own views regarding this topic. She suggests that the modern interior can be viewed from two points, either historical or contemporary. From a historical viewpoint, the term 'modern interior' may refer to an open-plan space from the 1920s that features large expanse of glass, chromed tubular steel and black leather chairs. From a contemporary point of view also, a modern interior can be an all-white living room furnished with hard-edged white sofas. A Le Corbusier chaise longue upholstered in white leather, low 'Japanese style' white coffee tables and a huge plasma screen television, as in an interior space in Montevetro; a riverside apartment building in Battersea designed by Richard Rogers as shown in Figures 2.24 and 2.25. The modern interior went beyond style and encompassed many more interior spaces other than those within the home alone (Sparke, 2007), as these interior spaces were not only restricted to house designs, but included interior of other building types such as religious, commercial and cultural buildings.

Figure 2.24. Living room view of 2 bedroom flat by Richard Rogers 2007, Montevetro

Figure 2.25. Kitchen view of 2 bedroom flat by Richard Rogers 2007, Montevetro

The modern movement was a technical and aesthetic program that became manifest in the years between both world wars, where a group of progressive architects and designers became committed to the idea that modern interiors are not only a reflection of modern experiences but that they also play a role in making the space (Sparke, 2007). Rowe (2011) shared views where the principle states that the house is a machine to live in by Le Corbusier, may not necessarily be true when applied to residential buildings or housing but to other building types. This is because it is considered as being a difficult feat for a family to operate with precision as precise as a clock. In some modernist housing units, they did go as far as dictating and including into their design, elements to keep an aesthetic in the building. Modernism has made important contributions to the growth and development of the modern interior. However, doing away with comforts achieved from the domestic interior may as well bring up something new and encourage purity within design (Rowe, 2011), however, this does not fully encourage, the creation of a home, but rather a house.

The home is among the few places where people can fully express, find themselves and form lasting relationships. Sparke (2004), in her article 'Studying the Modern Home' outlines her theory on what the modern home should be. Firstly she states that the 'modern home' as a concept can be viewed stylistically, secondly, as an attitude held by people who recognize and represent the impact of modernity in their everyday domestic lives, but do not necessarily need modern aesthetics to reflect this. The third concept of defining the 'modern home' is by referring to the role of modernization, that is, by the direct effects of technological developments (Sparke, 2004). This research mainly discusses modern housing interior from the approach or the view of the third category explained by Sparke, which is the modern housing interior as it pertains to modernist principles. According to Bech-Danielsen (2013), modernist architects got their inspiration from engineers that had developed new types of products: cars, bridges, airplanes, etc. These set of professionals; he states had taken the lead in designing these new products as they were more familiar with new materials and methods for mechanical production. Modernists based their design of new homes on similar considerations. Modernity in house designs is also understood as a set of ideological constructions made through different available

representations, where the products used in interior spaces were changed by availability through mass production (Sparke, 2007).

In the history of architecture, Adolf Loos (1870–1933) occupies an exceptional role. To explain modernism in housing interiors Heynen (1999) gives an account of a story by Loos. In the story, Loos narrated about a poor man who struggled to work his way up from the lowest point of the social ladder; through his hard work, he finally became rich and was able to furnish his own house and choose a famous designer. The results from the designer were appealing to the poor-rich man, who moved into his new interior with a sense of complete fulfillment. Later on, the designer came to inspect his work but noticed a number of irregularities and moved them to the attic. Irregularities like cushions that were not in harmony with the color of the sofa, hanging family portraits above the bookcase that the designer considered ugly.

The poor rich man faced much criticism from the designer that he had no other choice but to give into the critics, however, whenever the designer visited, more of his possessions disappeared. His home was perfect now that there was nothing needing changing; the only problem was that the poor rich man could no longer live in it because he thought, life was no longer meaningful (Heynen, 1999). Loos argued for a separation between architecture and dwelling, where architecture was not meant to reflect the occupant's personality but be kept separate from dwelling. The task of architecture was to make dwelling possible and not to define it. The term dwelling as used by Loos referred to personal memories (Heynen, 1999), where the expression of a house is in its furnishing, and provisions made for the occupants to include their own personal touch in the space, and change it whenever they choose.

In an account, Heynen (1999), went further to explain Loos's memories of the house he lived in as a child; a house void of interior furnishings. Loos, who did not grow up in a stylish home, described a piece of furniture, a table in the house, where they had great times together there as a family. In this house, every piece of furniture and object had a family history and a story to tell as the house grew along with Loos and his family. The experience of a space is determined by the way interior elements interact with each other and its users. Living in a house is a matter of personal choice and preference, where an interior designer alone does not dictate its spaces, but works with the inhabitants. In order to live properly in one's own home, one has to

separate between the public and private (Heynen, 1999). The architect is responsible for the work on the outside, while the richness and quality of the spaces that make up the house are disclosed on the inside. A style of the housing interior should not be imposed but rather try to impose on the volumes and layout.

In Loos's view, it is important to draw clear distinctions between different areas in the house and to set up definite boundaries between them (Heynen, 1999). The modern interiors of houses had an aesthetic that remained true to modernist principles. There was simplicity and clarity of forms, materials at 90 degrees to each other, the concept of truth to materials, meaning that the true nature of a material is to be seen and not disguised as something different, and the elimination of unnecessary detail. The most distinguishing feature of the modern housing interior was the lack of ornamentation. The design of interiors should be sensitive to historical background, as they are translations from the past. Technology however advances on a daily basis and changes demand, which creates avenues for change and growth of functionality. Tradition (modernism in this case) plays a key role in design of interior spaces, which in our modern day, should meet up with contemporary requirements of the ever-changing society.

2.3.1. Frankfurt Kitchen: A Pioneer of Modernism in Housing Interior

The Frankfurt kitchen is considered the most famous example, and forerunner of modern fitted kitchens in domestic architecture. In 1920, Ernst May had the task of building social housing in New Frankfurt, Frankfurt, Germany. Austrian architect Margarete Schütte-Lihotzky (1897–2000), who was part of the team working with May, developed this kitchen in 1926 (Bech-Danielsen, 2013), shown in Figures 2.26 and 2.27. A number of standard kitchens were designed by Schütte-Lihotzky, where the modernist ideals of kitchen design became a reality and were mass-produced as many houses used them. Heynen (1999) further explained how May and his associates saw themselves belonging to the modern movement, where Frankfurt traditional principles were broken with and a completely new course was followed in terms of architectural design. The Frankfurt Kitchen had realized for the very first time a kitchen built with a unified concept, designed to enable both efficient work and built at a low cost. 10,000 units of this kitchen were successfully installed in the late 1920s in Frankfurt (Gantz, 2015, p. 126).

Figure 2.26. Frankfurt Kitchen by Margarete Schütte-Lihotzky 1926, Frankfurt, Germany

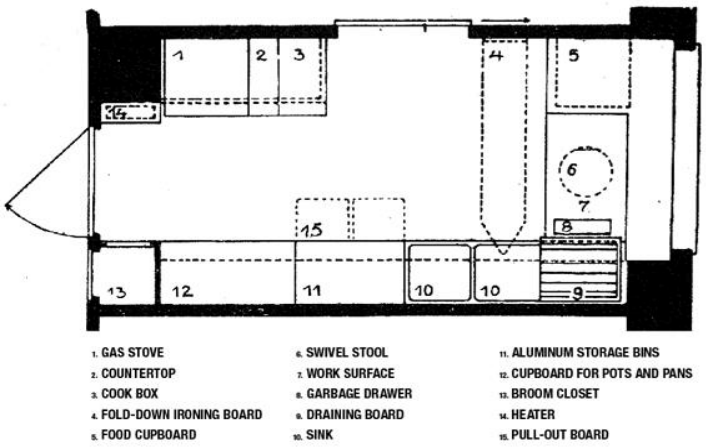


Figure 2.27. Plan layout of Frankfurt Kitchen by Margarete Schütte-Lihotzky 1926, Frankfurt, Germany

Coleman, Danze, & Henderson (1996) in discussing the Frankfurt Kitchen as a characteristic of modern architecture and everyday culture in the 1920s, stated, that this kitchen became one of the most acclaimed creations of the Weimar housing program. The writers also explained the features of the kitchen; with metal surfaces, technical fittings, the specificity of its interlocking parts, and its modular totality, all epitomized the transformation of everyday life in the modern age. Bech-Danielsen (2013), also in describing the features of the Frankfurt Kitchen stated that these kitchens were constructed based on an analysis of workflow and storage needs; they were also simple and cheap. Spatial dimensions were also determined in order to optimize workflow, where the kitchens were typically 1.90 m x 3.44 m.

According to experts, modernity in the domestic sphere would not have been realized if not through house designs that were made simple and also the introduction of appliances that were laborsaving. The guiding principles that operated in the modern industry enabled designers and reformers to reshape the household (Coleman, Danze, & Henderson, 1996). Coleman, Danze, & Henderson (1996), went further to state, in describing the layout of the kitchen, Schütte-Lihotzky arranged the positioning of certain elements like the metal sink, gas stove, and glass-door cupboards in relation to each other and in the order of tasks for making meals and cleaning up afterwards. The Frankfurt Kitchen was considered low-tech because of its tight budget restrictions and the use of laborsaving electrical appliances, which were not at that that time, easily available. Bech-Danielsen (2013) outlines that in modernism the

individual space in housing is set out in relation to a specific function, and efforts were made to dispel activities not related to traditional kitchen work, which include cooking and cleaning. In smaller houses though, this requirement was often compromised. Schütte-Lihotzky still had roots in the traditional use of the kitchen for more than just cooking where she developed a range of different functions, such as a wash-tub with a lid that could also serve as workstation when not in use.

The Frankfurt Kitchen was an expression of modernism in housing and paved way for its growth into the domestic interior. It shows how the advancement of technology is translated into the design of the house to make everyday living more comfortable.

CHAPTER THREE
COMPOSITION OF INTERIOR DESIGN IN MODERN ERA HOUSES

Interior architecture or design as a branch of architecture deals with the design of the inside space of any building. This design requires careful planning and consideration to certain characteristics that pertain to interior design which are fundamental in the composition of any space. The basis of the third chapter of this study is on the four criteria selected for the analyses of the modern housing interiors (discussed in the next chapter of this thesis). These interior design elements selected for analysis are plan layout, materials, furniture and interior colors. These integral elements are important in the design of any space as they are used as tools to set the whole atmosphere and function of the space. In this chapter of the study connections are made between how these interior design elements relate with the modern housing interiors. Establishing this relationship provides useful information on the relationship between modernism and the housing interiors of the modernist era. This chapter surveys the subject of interior design in the context of its design elements that relate to the modern housing interior.

3.1. Elements of Interior Architecture in Modern Era Housing Interiors

The term ‘interior architecture’ emerged in the 1970s, which was a term to describe a discipline that employs architectural history, theory and principles in interior design and creation of spaces (Coles & House, 2007). Upon entering a room or space, one experiences a response to the space through sensations, it is these sensations the designer uses to orchestrate the design of interiors and derive an experience when we enter them. Interior architecture is also concerned with the remodeling of existing buildings; that is the development of attitudes towards existing spaces and structures, building reuse and organizational principles. It bridges the practices of interior design and architecture (Coates, Brooker & Stone, 2009). It is the duty of the designer to create an environment that feels appropriate and functional in a way that supports the needs of its users.

While a building's structural system and the architectural elements constitute the basic fundamentals of an interior space, selection and arrangement of design elements (color, texture etc.) also shape other requirements needed for the interior spaces (Ergüden, 2012). In the design of a space, there are some key variables that bring the space to life; that give the space its character and a sense of identity. They have the ability to set the entire tone of any given space where an equilibrium or balance is to be achieved and maintained between the atmospheres of the space. The interior is a combination of different elements, principles and spatial formations perceived as a whole shaped by its use. Interior designers bring focus to the practice as one that addresses interiors (Brooker & Weinthal, 2013).

The manner an interior space is created will in turn affect the essence and purpose of the interior, where there should be a direct relationship between an individual's understandings of a space. In order to achieve this connection, experience or relationship in the design of interior spaces, important elements and principles shape the space in order to sustain the environment (Galle, 2002). Some of such elements include, and have been categorized into two, based on their relevance to the subject of this study. The primary elements regarded as fundamental and key to the design of an interior, are space (layout), texture (material), furniture and color. These elements in the modern housing interiors were the fundamentals for such designs. Since modern era houses were minimalist, these basic elements were the basic necessities for creating such spaces. The secondary elements, form, light and pattern, were not necessarily considered as playing as much a major role in modern housing interiors like the primary elements. However, their roles in any interior space should not be neglected.

Having considered other elements in the design of interior spaces, it can be stated that the most important, basic, foundational elements (which are discussed further below), selected for analyses, are required to create simple connections between the individual(s) and the space. Based on the above, four interior design elements selected will be the focus of analyses of the modern housing interiors, which are plan layout, materials, furniture and interior colors. The contributions of these elements are considered to play an important role in defining and experiencing a response to the space and cannot be overemphasized, as they are what shape the interior of any space.

3.1.1. Plan Layout

Floors cover the largest area in interior spaces and are considered more important than a ceiling, since this is the plane an individual has direct contact with (Pile, 1995). When it comes to interior design, space is one of the most important elements; this serves as the very starting point on which the entirety of the design interior comes along. The whole building is understood through the reading of the plan. The two-dimensional space forming the floor layout is the flat, horizontal level plane of any interior space (Ching & Binggeli, 2012), which is the main surface for creating a base and placing furniture. In modern times, Le Corbusier who explored the modernist possibilities of embracing new technology and the importance of function exploited the open freedom of the framed structure. This was referred to as plan libre' or free plan, which was at the heart of his five points of architecture (Brooker & Stone, 2007). The open plan concept developed in the modern era was widely adopted by designers and architects of this century, as it enabled them get the best out of any space. Architects were well aware of the space available for its purpose, dimensions and utilities, and able to plan accordingly.

Floors, which are the basic element in interior space on which other elements are constructed, are horizontal flat planes over which people move, and different activities take place (Alnasser, 2013). By the adoption of the open plan idea, it enabled the creation of a seamless flow and an interrelationship between spaces, which modern architects took full advantage of. The strategy employed in laying out the building plan involved organizing a space. Zoning of spaces was a common practice in the modern era houses; private spaces were usually zoned together and secluded away from other spaces where more noisy activities took place. It was also common practice among these designers to have a central part of the house. For most, common areas served this purpose, which allowed for communal living.

The modern era architects designed space by placing hierarchy, personality, details and individual components to the space. From the layout, an organized space is created; controlling visual and physical limits therein (Brooker & Stone, 2007). Elements include in the layout of modern houses were arranged to distinguish one space from another in order to achieve maximum functionality. These elements gave character, defined quality, provided the features of the space and determined the overall functionality of the space. Interior spaces were structured and developed with

architectural elements and were influenced by how space is planned and organized (Ergüden, 2012). Figure 3.1 shows the floor layout of Walter Gropius House, where the open plan concept is adopted. The layout also shows the relationship between different spaces, showing how each space in purposefully placed.

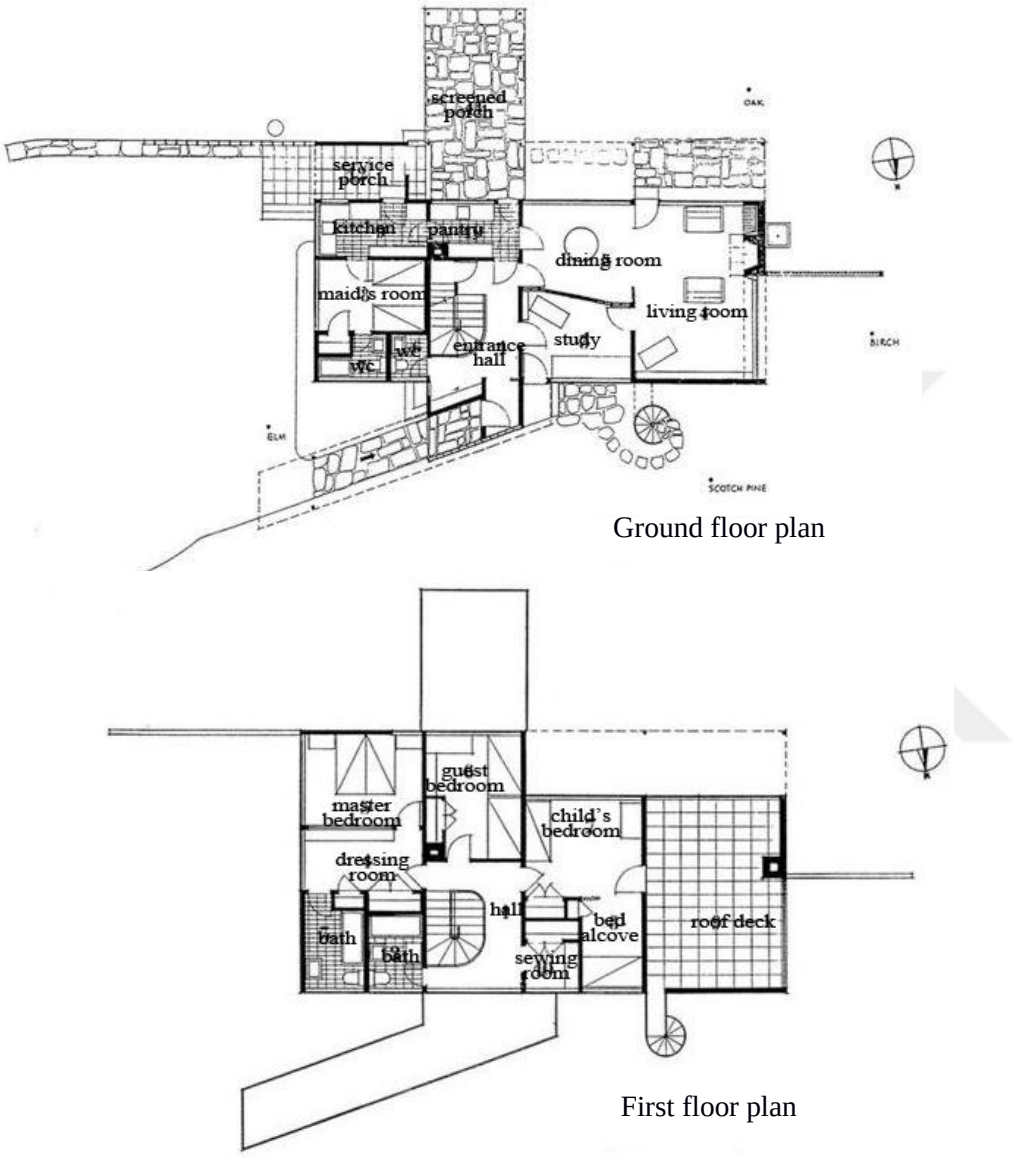


Figure 3.1. Plan Layout of Walter Gropius House 1938, Lincoln, MA. USA

3.1.2. Materials

What determines the experience of a space is primarily by the way that ceiling, floor, and walls are clad, that is, by the impact of the materials. A material should not leave one in doubt as to its true character or function, marble should not disguise plastering or brickwork treated as stone (Heynen, 1999). This agrees with one of the principles of modernism in architecture which is the idea of 'truth to materials', which implies

that the natural appearance of a material ought to be seen instead of hidden or altered to represent something else. The material should speak for itself and also be at 90 degrees to each other. The use of materials in an interior space has the ability to add texture which mainly deals with surfaces and determines their feel and appearance. Texture which is derived from materials in its own self adds depth to a space, from textiles such as curtains or finishes like wall paint. While there should be a dominant material to define a space, a contrasting material may be included to avoid monotony.

Building materials from the 20th-century were considered more complex than the years that preceded them. Materials in this century were traditionally industrial, and mass produced. They were often brick, metals and concrete (Jester, 2014). The European economic conditions after WW-I promoted the standardization of materials. With the introduction of the International Style, it highlighted 20th-century materials and simple forms, where the aesthetic preferences of modern materials gained popular acceptance. The military and economic outcome of WW-II left the USA as the dominant global power (Jester, 2014). This dominant power was able to expand the American economy and give rise to new materials: reinforced concrete, steel and glass, which were cost effective and easily mass-produced (Raji, 2013). New materials emerged as technology was being transformed. These new technologies made it possible to experiment with new materials especially in the USA, where modernism was interpreted to suit their society. Examples of such new materials and techniques were molded plywood, which was experimented with to make furniture; the experimentation with large panes of glass, used for external walls and the prevalent use of steel as structural support.

Choice of materials and finishes varied for every single aspect of an interior space. The interiors of modern houses had certain considerations in terms of material use by reference to the following three primary categories (Coles & House, 2007):

a. Aesthetic qualities: In aesthetic decisions regarding choice of materials, each surface had its ideal visual position in relation to every other surface. A hierarchy of materials served to give the space meaning and identity. At the height of the spatial hierarchy modern architects used a dominant material, to which every other in the space yielded to.
b. Sustainability: It was common practiced in the 20th-century for architects to use materials that were readily available, easy to handle, and maintain.

Ideally, materials being used were of minimum environmental cost, and easy to be adapted.

c. Performance specification: Modern building materials encompassed strength and damage resistance, workability and adaptability, in relation to the activities carried out from every space.

The recognition and choice of materials generates perceptual understanding in the space where its surface character is important (Brooker & Stone, 2010). It is worthy to note that modern architects took into account where physical contact with a material is involved. In such cases, they were detailed in ways that could easily be maintained. Some modern materials incorporated into design of modern housing interior spaces were:

a. Leather and textiles used in furniture to create a comfortable interface between the building structure and the human body. To introduce contrast and a sensuous quality to the interior, these materials were used.
b. Glass, in modern interior spaces, was used mainly for windows and door panels. In the 1940s however, advancement in technology made it possible to experiment with larger panes of glass, which were used for the structural element.
c. Metals with their machine-aesthetic appearance created a pleasing contrast with other materials. Its use provided appropriate harmony in interior spaces, where chrome for example was used in furniture.
d. Wood which was greatly versatile was used as a surface material for walls, floors and ceilings and also furniture pieces seen in the modern housing interior. This material gives a natural quality to a minimalist interior, creating a warm ambience of a simple space. The 1940s also saw the experimentation of bent wood used in furniture design.
e. Concrete, in 20th-century houses was the predominant building material used, which also fully represented the industrial aesthetic.

The very material the element comprises of determines the texture of a material; it is that which is touched, or felt. The choice of materials that are used in an interior space, imparts its character, and its surface establishes a direct relationship between human contact and the surrounding the space. The material should provide ergonomic and environmental strength when necessary and signal personality

(Brooker & Stone, 2007). In Figure 3.2 below, the use of different materials in this living space provides different textures, which give the space its own unique character. The stone fireplace adds texture and depth to the overall smooth interior, the wood dining table and chairs adds a natural element within the space, its glass walls allow maximum natural light into the space. Overall, the materials in this interior represent modern architecture of its decade, creating harmony and a balance in the space between materials.

Figure 3.2. A living space showing material use in Kaufmann House 1946, by Richard Neutra. Palm Springs, CA. USA

3.1.3. Furniture

Furniture refers to a product used to fulfill the fundamental necessities of people in a living space; it is important in creating a space that is habitable (Döngel, Çınar, & Söğütlü, 2009). Furniture which plays an important role in the design of any interior, defines the style and function of a specific space. A space or room without furniture is a void space, which makes it hard for human activities to take place. In furnishing a room, it is ideal for the principles of comfort and convenience guide the quality of these elements (lighting, tables, etc.) and supplements the interior space. In interior design of spaces, furniture is significant in that it makes interiors more habitable by providing comfort (Ching & Binggeli, 2012), and helps in sustaining the activities of the individual. The form, color, texture and the scale of furniture used in a space also affects the overall quality, circulation and usage of the space (Nielson and Taylor,

2007).

At the beginning of the 20th-century in the West, there was a division of furniture design into two main categories. The first category was revivals of past styles, and the second, expressions of changing modern life (Lassen, Wormley & Butler, 2017), which best describes furniture style of this era. At the end of WW-I, modern era furniture design was of three kinds: functionalist modern, which was progressive and adhered to the machine age aesthetic; transitional modern, which infused elements from the past; and commercial modern, which became associated with extra values offered by commercial furniture in the way it was advertised (Lassen, Wormley & Butler, 2017). Furniture design in the 20th-century took its influence from the social and economic trends associated with this era; trends such as a recovering economy from the wars, reduction in size of living spaces, and a decline in living standards.

The theories of the Bauhaus design school brought about new logic in furniture design, different from that of the art deco style that preceded the 20th-century. From about 1925, the Bauhaus design principles had greatly influenced 20th-century furniture design, as in seen in Figure 3.3. After WW-II, much of the furniture used in living rooms, kitchens, or bedrooms was inspired by original Bauhaus pieces. As ideals of this design school, furniture of this century was considered to be simple, clear forms, low cost, good quality, and maximize utility. Modern furniture, a product of functionalism, was in relation to the growth of architecture, which enabled furniture design to progress between the 1930s and1950s (Lassen, Wormley & Butler, 2017), seen in Figure 3.4 – 3.6, and towards the end of the century into something considered more stylish.

Furniture pieces designed in the 20th-century comprised mainly of tubular chrome-plated metals, wood, and planes of unframed glass. With the availability of wood in parts of Europe in the 1930s, this led to the utilization of a variety of techniques in production of modern furniture. Around 1940 in the USA, progressive experiments involving molding wood took place in furniture design (Lassen, Wormley & Butler, 2017). Forms, colors, new materials and techniques in furniture design were in celebration of modern technology available during this era, making furniture smaller, lighter, and easier to maintain.

Figure 3.3. Walter Gropius Armchair D51, 1922/33.

Figure 3.4. Bruno Mathsson Model 36 Chair, 1936

Figure 3.5. Charlotte Perriand & Pierre Jeanneret Bookcase, 1945

Figure 3.6. Arne Jacobsen Rosewood table, 1955

What characterize modern style furniture are simplicity, practicality and flat lines. The modern approach focuses primarily on function and brings a sense of refinement and purity to the space (Sandeva et al., 2013), create division or enclosure, and also alter or redefine circulation in and around a space (Booth & Plunkett, 2014). The ability to provide information about the function or purpose of a space is possible with furniture because they provide context clues as to what kind of activity takes place in the space. The function dictates the most necessary furniture needed, which is almost similar to the 'form follows function' principle in modernism. In addition to defining the function of the space, furniture determines circulation or flow of movement (Ergüden, 2012), as is suggested on the floor layout. Modern houses designed by architects of this century played on furniture pieces to break down large rooms or spaces into smaller ones. The furniture that fills up a space is an expression of individual sense of style that tells about personalities, tastes and trends. The design of modern furniture was a reflection of either the designer or its client.

3.1.4. Interior Colors

Color is a powerful tool in the design of any interior space, as it establishes an aesthetic connection between objects and sets the entire atmosphere of the space. It is strong and has the ability to evoke emotions or feelings, taking for example the color green for a bedroom, as it is the color of tranquility and health. It is ideal for an interior designer to be well aware of these color characteristics in order to perform various combinations. Modern architects took these characteristics into consideration especially in their housing interiors. Color varies in its application and can be seen in floor coverings, ceiling tiles, wall finishes, and other elements in the space such as furniture, doors, and other accent pieces.

Color which is instantly recognized gives the individual a sensual visual perception of the space (Alnasser, 2013). Colors also reflect moods which are considered one of the means individuals are able to understand their surroundings; they have the ability to provide the right (or wrong) atmosphere. The use of colors in interior spaces is a means used to pass across a message to the user from its designer, and is thus considered an important element of space expression. When dealing with color combinations for any space, modern architects considered the relationship between color with color (green with yellow) and the relationship between the color with the whole (blue with purple, white and pink). It is important to achieve balance and harmony in the space in order to send across the right message to its users.

The 19th-century saw color palettes that were limited and restricted by the slow pace of development, however, 20th-century color originated from the prior era and was derived from an improvement of color theories and development of producing new colors (Jean, 2013). Certain colors became synonymous with an era, and technology revolutionized the way color is experienced in daily lives (Greenwood, 2015). Not all colors in the 1900s were derived from nature as some were derived from imagination (Greenwood, 2015). Modern architects experimented with color, its effects and techniques in their projects, as color of this era was not established to be a theory, but rather a concept. The concept of color in architecture is shaped by factors such as visual perception, material, geography, and culture (Jean, 2013).

The color palette of the Arts and Crafts Movement of the first decade of the 20th-century included a variety of intricate earthy tones (Eiseman & Recker, 2011). This

decade in turn saw a shift to the expressive use of color (Greenwood, 2015); as world events and aesthetic innovations led to a shift in visual consciousness. The rich neutral tones from nature (greens, browns, greys and blues) formed a base for interiors of residential buildings (Eiseman & Recker, 2011), as seen in Figure 3.7. The 1920s saw an era that resulted from chaos of WW-I. Domestic architecture saw color palettes that became occupied with freedom, which included strong use of colors that were exotic, vivid, and bright (Figure 3.8). As the century progressed, in the 1930s, rich colors emerged that were darker than those of the 1920s (Greenwood, 2015), classifying housing interiors to be earthy and homely (Figure 3.9). After WW-II, in the 1940s, the first half of this decade was dominated with military tones, but by the end of this decade, color began to fade, brighter tones emerged, and saw the abundant use of color especially in fabric used in interiors (Figure 3.10). For the 1950s, it was a transition from war to peace, which also reflected in brighter color choice. With new materials also came different shades of colors that were bright combined with primary colors (Greenwood, 2015). The latter part of this decade was characterized by having fun with colors, creating spaces that were vibrant and exuded style with class. Such examples of the colors are shown in Figure 3.11.

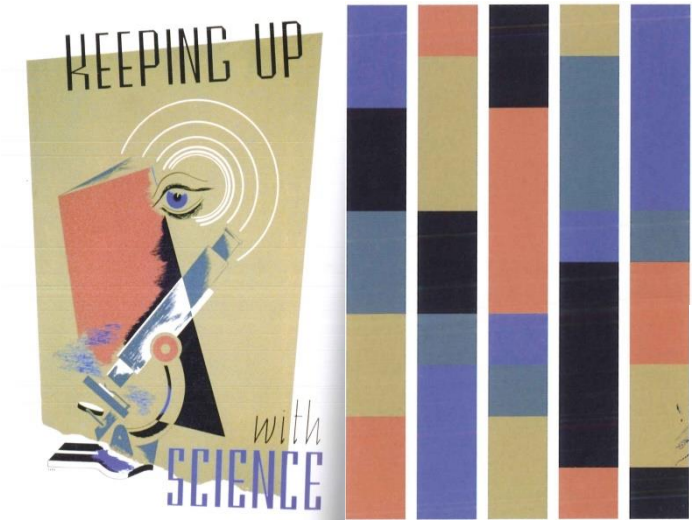
In modern housing interiors, colors were used together to create simple, minimalist spaces. Color formation, which is grouping colors together in a harmonious or a contrasting pattern, provides balance and comfortability to its users (Ching & Binggeli, 2012). Modernist architects applied the tactful skill while combining colors together, as color comes in a variety of elements such as materials or components of ceilings, walls, furniture and floors. Form, mass and space is defined by color and texture, which is derived from the use of materials or furniture. With every form of matter having its own texture, the property of color is closely connected to texture (Alnasser, 2013). Modern housing interiors were not void of texture or dimensionality, making interiors wholesome, by careful color choice in order to create a suitable housing environment considered emotionally and psychologically sound (Alnasser, 2013). Modern housing interiors created an atmosphere in interior spaces that was exciting and enjoying for its user.

R	G	B
47	45	62
128	109	51
189	32	93
252	226	195
195	192	176

Figure 3.7. 1900s Color palette-1904

R	G	B
74	31	60
204	50	69
158	40	29
224	195	91
143	158	173

Figure 3.8. 1920s Color palette-1922



R	G	B
63	113	183
25	28	59
73	122	147
192	177	125
213	132	106

Figure 3.9. 1930s Color palette-1936

R	G	B
42	37	45
76	67	84
210	94	21
254	213	74
230	53	19

Figure 3.10. 1940s Color palette-1948

R	G	B
135	123	99
241	224	109
173	191	137
242	121	139
241	72	70

Figure 3.11. 1950s Color palette-1956

3.2. Modern Housing Interior Characteristics

The reflection of modernist principles on the interiors of the home can be referred to as modern interior design in housing. Modern design was meant to be the opposite of design styles that preceded it using heavy textures, carvings and wood tones throughout the home (Asaff, 2000). In this way, most components of modern design, from the furniture to the form of the rooms, incorporate lines that are clean and straight, with no extra detailing added. The approach to modern home interiors was increasingly associated with characteristics peculiar to modernism; such as, simple, abstract, geometric and undecorated spaces. These features present in the house design denoted a high level of functionality, seen by many as modern interior aesthetic of the 20th century house (Sparke, 2007).

For the modern interior, the design of the house should be from the inside out, rather than from the outside in (Sparke, 2007), which allows spaces both interior and exterior, to flow smoothly between each other. This strategy became one of the lasting legacies of architectural modernism. The plan of the housing interior determines the façade, where the elements within the plan are given practical definitions (Sparke, 2007). Therefore, functionality in modern housing interiors is an important feature. Majority of homes that are designed in the modern style make use of neutral colors and different shades of black and white exclusively throughout the home. To break up the neutral tones and provide a focal point, bold accents are often used (Asaff, 2000). For example, bold colors in modern design may include an accent wall or a piece of furniture in a bold color that stands out.

When it comes to the modern design of the housing interior, minimalism plays an integral part, where the basics includes a "less is more" approach in the design of the space. This means there are no unnecessary details such as openings, walls, or even excessive use of materials, colors, and textiles. Minimalist designs may be thought of as conceived with much ease, however, a lot of planning is involved to ensure that only necessary details are included in the over design of the home. One way to obtain simplicity is achieved through the simplest manner of thoughtful reduction (Maeda, 2006). Due to the way minimalist homes are designed for efficiency, they are often far more comfortable than what meets the eye.

CHAPTER FOUR
CASE STUDY ANALYSES OF MODERN HOUSING INTERIORS

In this study, the previous chapters have been able to provide a background knowledge surrounding the concept of modernism in architecture and its principles as it relates to interior design. Having discussed its importance, it forms the foundation or the backbone for this next chapter of the study. Chapter four of the research has its basis on findings from case studies. Eight modern houses that span between the 1920s and 1950s are selected from Europe and the United States of America. The houses studied in this part of the research include, Schröder House by Gerrit Rietveld, Villa Savoye by Le Corbusier, Villa Aalto by Alvar Aalto, Jacobs House I by Frank Lloyd Wright, Eames House by Charles and Ray Eames, Glass House by Philip Johnson, Farnsworth House by Mies van der Rohe and Miller House by Eero Saarinen.

Each house is analyzed, with further discussions on a brief background of the architect, design principles or philosophies, and their reflections in interior design of housing. For better understanding of the interiors, focus is on private spaces (living room, kitchen or dining), with four main characteristics selected for detailed analysis: plan layout, material, furniture and interior colors. Table, maps and pictures support, and form part of the method used in analyzing these key four interior characteristics, to show the relationship between spaces in these modern houses. Selected images of the interior spaces are chosen for analysis; as a result, findings made are based on these images. Material selection, furniture and RGB color codes, given in discussing interior spaces are to establish an idea of the interior and create a notion or perception of the space. These codes are approximate values as interior visuals change according to light and printing quality.

The selection of houses described in this research illustrates the modern housing interior from its ultimate expression in its beginning eras to something more comfortable and acceptable as the century progressed. Figure 4.1 shows a timeline

with the modern houses selected for the study and key events of modernism.

Figure 4.1. Timeline showing selected houses and major events surrounding modernism

4.1. Modern Housing Interiors in the 1920s

Considering that the modern house is a product of a century's change, modernism as a style came into the world of architecture and instantly changed the modern tradition norms. It was in the 1920s that European modernism came to the United States (Allaback, 2013), and dominated the architectural scene. This modernism brought about diverse changes and along with the idea that architecture could bring about social transformation in societies. For the Europeans, modernism was a response to the housing crises caused by the aftermath of the war. To provide housing solutions for the masses, European architects designed efficient houses that were low-cost, where they experimented on prefabrication and large apartment complexes. In the United States, modernism did not have any cause to be concerned with social transformation like the Europeans, though devices were made to construct prefabricated homes and low-income defense housing. In the world of architecture, this era was a time where architects and designers had the idea that interior spaces of the modern house should form a complete design. Both designers and clients saw the need for a design to depict the style of the middle class that showed off newly refined

taste for modern things (Bayer, 1999). The 1920s interiors were characterized by an improvement in living standards. To examine the 1920s housing interiors, the Schröder House and the Villa Savoye are chosen as examples for analysis.

4.1.1. Gerrit Rietveld

Gerrit Thomas Rietveld (24 June 1888 – 25 June 1964) was born in Utrecht, Netherlands. He was a Dutch furniture designer and architect, who together with Theo van Doesburg, Piet Mondrian, and other artists, founded De Stijl in 1919. In this group, Rietveld later became one of the most influential ("Gerrit Thomas Rietveld biography," n.d.). The De Stijl style was one of the driving forces behind the modern movement in Europe after World War I, and it was this style that Rietveld identified with. The De Stijl movement involved neo-plasticism which influenced Rietveld to design the Red and Blue chair (Muino, 2016), inspired by Mondrian's use of primary colors. Piet Mondrian's belief was against the complexity of the world, and thereby tried to reduce its complex nature by constructive means in his plastic art (Al-Saati, 1990). Gerrit also shared this same thought that influenced his designs greatly; where a balance should be achieved between content and form. Gerrit Rietveld is famous for both the Schröder House, which is a UNESCO World Heritage Site (UNESCO, 2013) and his Red and Blue Chair.

Gerrit Rietveld grew up as a student working in woodwork and production of furniture in his father's workshop, which helped him later on in his architecture. His knowledge of architecture was spread into the educational scene by being a professor of architecture in Amsterdam between 1944 and 1955, and become a member of the Dutch Federation of Architects in 1964 (Muino, 2016). He designed many buildings and interiors, some of which are: Project Row Houses in Utrecht (1931-1934); Dutch pavilion in Venice Biennale (1954), and his biggest project, the Van Gogh Museum in Amsterdam, which was not completed until nine years after he died in 1964 ("Gerrit Thomas Rietveld biography," n.d.).

Rietveld was the first to apply the principles of the De Stijl movement, neo-plasticism to architecture, which was evident in his 1924 work, the Schröder House (Muino, 2016). The General Principles of Neo-Plasticism according to Mondrian are:

1. Primary colors (red, blue and yellow) should make up the flat plane which is the plastic medium. This medium should be in non-color (white, black, and grey).

In architecture, empty space counts as non-color, whereas the material is color.

2. There must be an equivalence of plastic means, different in size and color, and not have equal value. In general, equilibrium involves an uncolored or empty space.

3. Required in the composition, is the duality opposing elements in the plastic medium.

4. To achieve equilibrium is through opposition and is expressed by the straight line in its principal opposition, i.e., the right angle.

5. The balance that counteracts the plastic means is accomplished through the sizes within which they are positioned, and which create the living rhythm.

6. All symmetry shall be excluded. (Al-Saati, 1990).

The language of the De Stijl movement was one where their works are non-representational, and a color palette that consisted of primary colors (red, yellow, and blue) with the addition of black and white. These principles were applied to both architecture and furnishing. The De Stijl had an aesthetic that involved joining vertical and horizontal elements bypassing each other (Al-Saati, 1990) which Rietveld adopted in his famous chair. Mondrian's principles of Neo-plasticism had great influence on Rietveld, which led him to contribute to modern architecture by means of plasticity, seen in the Schröder House. In studying the modern house of the 1920s, analysis is on the Schröder House in terms of its interior characteristics.

4.1.1.1 The Schröder House

The Schröder House was designed by Gerrit Thomas Rietveld for Miss Truus Schröder-Schräder, who occupied, and treated the house as a monument for more than 60 years until her death. The house is located in Utrecht, Netherlands (Figures 4.2 & 4.3), built in 1924, ("Gerrit Thomas Rietveld biography," n.d.) and is at the end of a row of houses, against the wall of a brick house adjacent to it.

Figure 4.2. Map showing location of the Schröder House

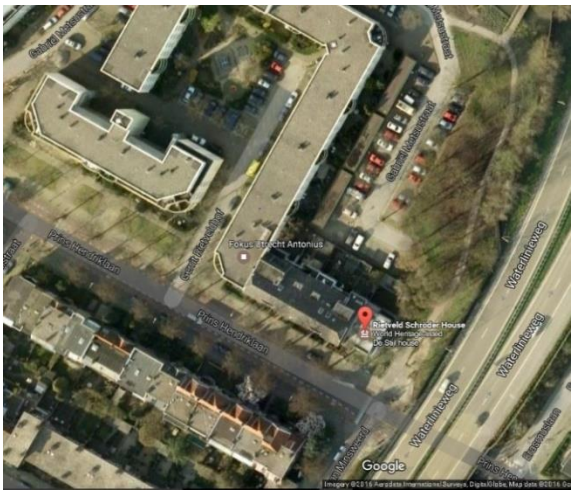


Figure 4.3. The Schröder House Location

For Rietveld, his interest was in the social role of architecture. He carefully studied how to improve on this role with ideas of low-cost production methods, new materials, prefabrication and also standardization (Muino, 2016). The Schröder House was one of such ideas, designed as a small 111.5 m^2 one-family house. Gerrit followed the De Stijl principles in the design of this house by making divisions and arrangement of surfaces on the two floors of the house, its colors (red, yellow, blue, black and grey), interior and flexible spatial arrangement, add to the unique qualities of its interior spaces. The Schröder House was a manifesto of the ideals of the De Stijl movement in the Netherlands in the 1920s, and has since been considered one of the icons of modern movement in architecture (Friedman, 1998).

The exterior of the Schröder House had a cube-like volume, which is broken down and reassembled into primary elements by the use of simple lines, and planes, that expose transparency in its interiors. The rich quality of the Schröder House lies in its design concepts that were developed at a certain moment in time it was not thought of as achievable (UNESCO, 2013). Two of the fundamental objectives of modern architecture: the free plan and formal separation between structure and enclosures are executed in this house.

Built in materials such as concrete, steel, brick and glass, the Schröder House is an asymmetrical composition of horizontal and vertical planes that simultaneously achieve balance. The careful selection of materials such as wood and rubber allowed for flexibility of its interior spaces and the possibility of rearranging the planes to suit

the function needed (Munio, 2016). Rietveld also made his own contributions to the world of furniture design, with the Red and Blue Chair, also known as Rietveld chair. His idea behind this chair was to create something simple from parts, derived from the same wooden board. Rietveld however admitted later, he never thought it could become a design icon to influence architecture (Munio, 2016), as the chair is being reproduced today.

Color characterizes the entire Schröder House, from the exterior to its interior components. Each component is separated visually by color, which allows for determining and accentuating the identity of each plane. The house broke away from social and architectural traditions to create a modern environment. To Rietveld, painting and architecture complement each other (Munio, 2016). Just as the neo-plastic principles influenced Rietveld, he considered architecture to be colorless, and constructive, enclosing space but painting he thought of as colorful and destructive with the ability to open up a space.

The Schröder House once called 'a cardboard Mondrian' (Al-Saati, 1990), is an important landmark of modern architecture today that perfectly represents the ideas defined by the movement. Based on the criteria set for evaluating the interior spaces of these modern houses; layout, materials, color and furniture, the tables below analyze these four characteristics of the public space of the Schröder House.

The pictures below are used in analyzing the plan layout of the Schröder House. Figures 4.4a-b are exterior views of this modern house, from which is seen the variation and asymmetrical planes. Figure 4.5 are the respective floor plans where different colors indicate common, private, and semi-private spaces.

Figure 4.4. Exterior views of the Schröder House

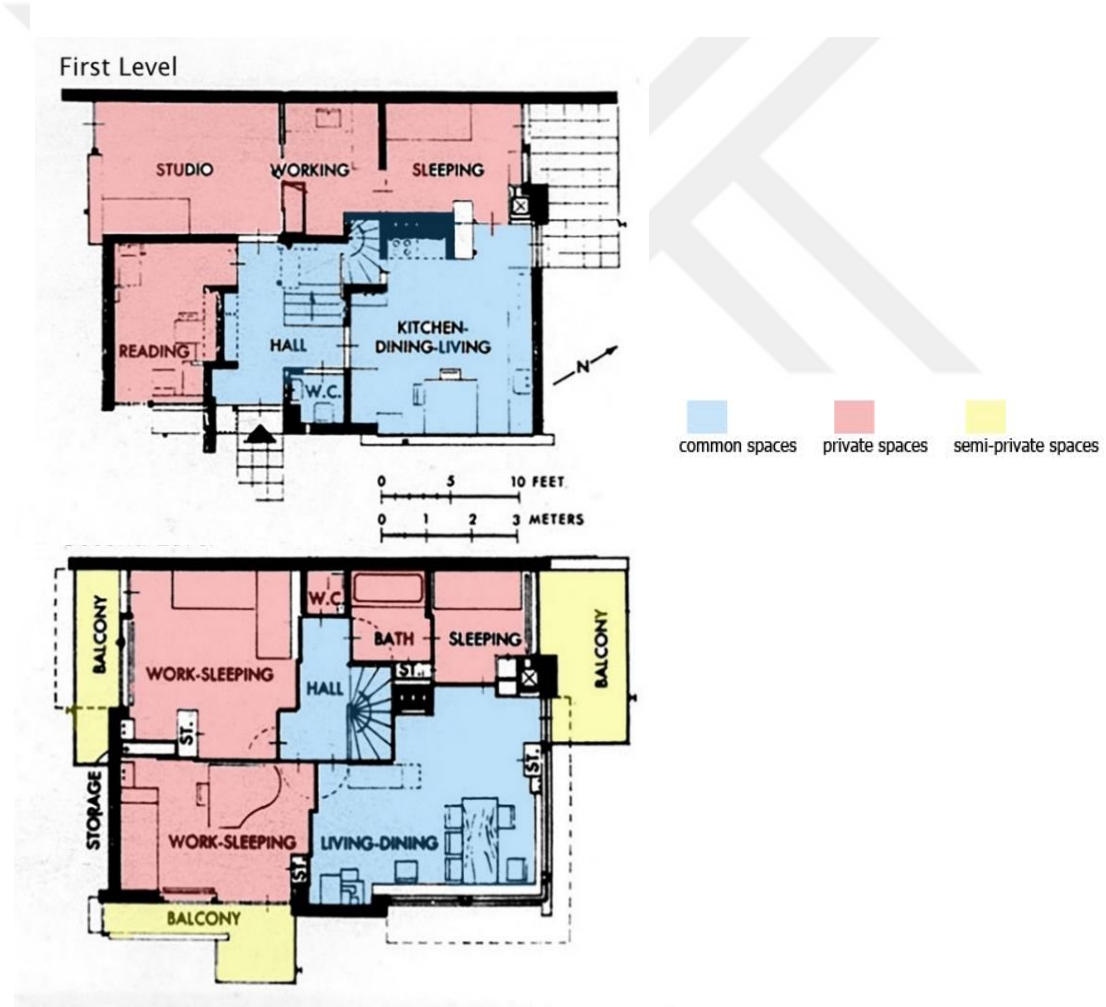


Figure 4.5. The Schröder House floor plans

Table 1: Layout Analysis of the Schröder House

Drawings/Images	Description
Architectural features (Figures 4.4a-b)	The design of the house uses the De Stijl principles, is compact in design and located at the very end of a row of houses. This house is in contrast in its environment and stands out due to its unique form. The Schröder House exterior consists of simple straight lines, geometric forms, primary colors and asymmetrical balance. From the exterior, the Mondrian colors can also be seen on the straight plane façades.
Interior characteristics (Figure 4.5)	The Schröder House has two floors: The ground floor of the house has a studio, a library/ reading room, a workroom that doubled as a maid's room, and a kitchen, dining and living area. A centralized core that consists of a spiral staircase connects both levels of the house together. On the first floor is the main living room, which has a panoramic view of the beautiful landscape outside. This second level of the house also has the dining area and the main bedrooms. There are sliding partitions (adjustable walls) to create either large open spaces or smaller private enclosed ones especially for the bedrooms. The unique layout of this house creates flexible spaces that are suited to different functions. Since spaces have dual functions, each bedroom is equipped with basic features like sink, cupboard, and electrical outlet so that family members could prepare their own meals. These features were expected to encourage more independent living between family members.

Further analysis is the interior materials that define this space. Figure 4.6 is the image of the living-dining and working-sleeping areas on the second level, which is the primary area of focus for the interior. Figure 4.7 highlights the materials of certain elements of the space, while Table 2 gives a description of these materials. Generally, Rietveld was able to keep this interior very clean by using simple materials, giving the room a fresh atmosphere.

Figure 4.6. Living-dining and working-sleeping areas of the Schröder House

Figure 4.7. Analysis highlighting materials in living-dining and working-sleeping areas of the Schröder House

Table 2: Material analysis of the Schröder House

No.	Element	Material	Description
1	Ceiling	Concrete	The fundamental structure of the house comprises reinforced concrete slabs and steel profiles. Its ceiling is concrete finished with plaster, giving the horizontal element an industrial feel.
2	Foldable Walls	Wood	Rietveld introduced and inserted a series of wood panels that were foldable. These foldable panels which divide the spaces change the interior according to needs or function of the area, lighting and privacy. Part of the unique quality of the house is the flexibility of its spatial arrangement, which allows gradual changes over time in accordance with changes in functions.
3 & 5	Window and door	Wood and glass	The basic and clear house was made utilizing durable, moderate and standard materials like glass and wood. Windows and door frames are wood with glass pane inserts. The utilization of glass permits natural light into the spaces.
4	Cabinets	Wood	The main living/dining interior incorporates the use of materials that were kept to a minimum; the use of simple wood for the storage cabinets was employed. This adds texture to the space and also allows for smooth working surface.
6	Floor	Rubber	Floors are made from rubber and even some small cork areas in the bedrooms, to enhance functionality.
7	Chair	Wood	The famous red and blue chair by Rietveld is made of wood with steel frames. The chair sits facing windows with views of its surrounding.

Gerrit Rietveld was well known for his artisanship and attention to detail in design. His background as a furniture student in his father's workshop proved important in his design for the famous red and blue chair. Figures 4.8 and 4.9 highlight different furniture in the living area of this modern housing interior.

Figure 4.8. Analysis highlighting furniture in living-dining and working-sleeping areas of the Schröder House

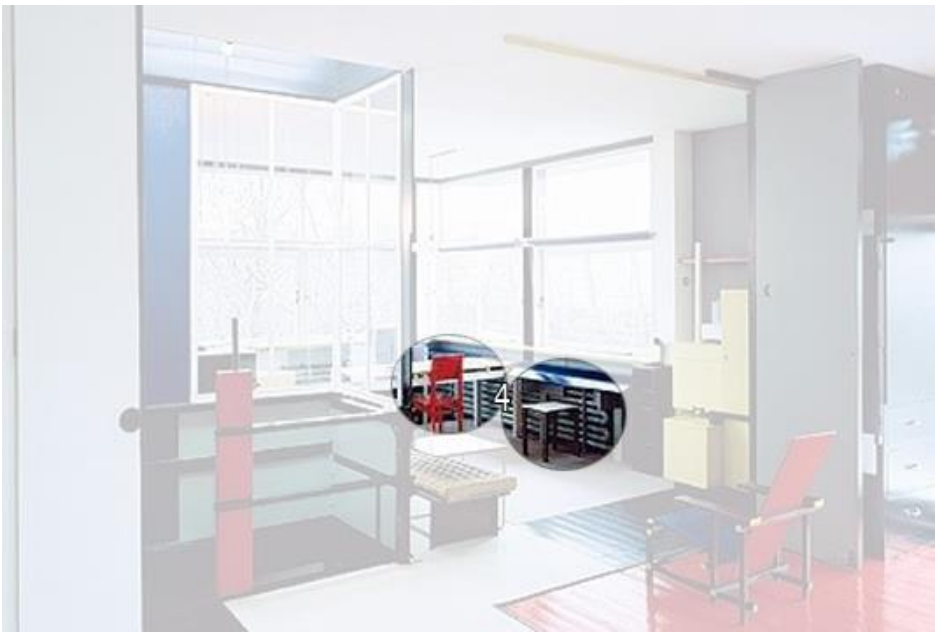


Figure 4.9. Analysis highlighting furniture in living-dining areas on second level of the Schröder House

Table 4: Furniture analysis of the Schröder House

No.	Furniture	Description
1	Red and Blue Chair	Rietveld started out as a furniture maker which shows in a lot of the details in the house. The design of the flexible wall partitions, the window screen, and many more of the details show his ingenuity. Featuring only essential beautiful items like the Red and Blue Chair, items designed around the house were intended for functional living. The Red and Blue chair consists of straight boards and battens; the seat is finished in blue and the back red. The cut surfaces of the frame battens are yellow, but the battens themselves black. This chair reflects simplicity in design and is also a statement piece in the interior.
2	Storage cabinets	The view of the living-dining area on the second floor shows openness in design, and this can also be seen in the storage cabinets. The design of these cabinets by Rietveld also incorporates the use of simple geometric forms, which keeps stored items within reach. These functional cabinets are painted a bright yellow only where they would get dirty.
3	Bed	Since the spaces in this house are multi-functional and interlinked, the living space flows to a bedroom. So a small simple sleep bed is positioned at the end of the space. The bed is compact in design, with straight lines, and fits its dual space functions
4	Dining table and chairs	The flexibility of the spaces allows for furniture to suit its diverse functions. The living-dining area of the house is minimal in furniture also with simple wooden tables and chairs. These pieces of furniture represent Rietveld's use of simple geometry.

One of the visual representations of the Schröder House is Rietveld's skillful use of color. Piet Mondrian influenced Rietveld's color use this house both exteriorly and internally. His smart use of color opens up the space and keeps the interiors vibrant, as highlighted in Figure 4.10. In the multi-function space used for analysis on the second level, a color scheme bar is used to depict interior colors (Figure 4.11). Table 4 describes these colors and where they are applied within the space.

Figure 4.10. Analysis highlighting interior colors in living-dining and working-sleeping areas of the Schröder House

Figure 4.11. Interior color scheme in living-dining and working-sleeping areas of the Schröder House

Table 4: Color analysis of the Schröder House

No	Element	Color	Description
1	Ceiling	White RGB (250,249,254)	The colors used around the house were not just randomly placed; the ceiling area was kept fresh with light colors, which also toned down the strong use of primary colors in the entire house.
2 3 4 5	Walls	Grey RGB (137,141,144) White RGB (250,249,254) Black RGB (4,5,9)	Rietveld used specific paint colors to distinguish different spaces. A case of this is the utilization of dark paint in places where Rietveld expected frequent use and would therefore get dirty easily. Places that was less likely to be easily dirtied where in lighter colors such as tones of grey and white. These lighter colors in elements represent freedom and choice.
6	Storage cabinets	Yellow RGB (249,237,93)	The storage cabinets are a bright yellow color which does conceals dirt with regular contact. This color is also in line with Rietveld's color scheme of the house.
7	Chair	Red RGB (166,26,13) Blue RGB (77,98,137)	De Stijl's principles of harmonious order incorporate bold primary colors; red, yellow and blue which are the main colors in the design of the Rietveld chair.
8	Floor	Red RGB (182,38,38) Beige RGB (233,219,201)	Rietveld used darker colors in places that were prone to get dirty easily, the floor in the living/dining areas on the second floor use red, black and brown colored rubber flooring. The use of bright colored

4.1.2. Le Corbusier

Le Corbusier (October 6, 1887 - August 27, 1965) was born Charles-Édouard Jeanneret in the small French-Swiss town of La Chaux-de-Fonds (Dalrymple, 2009). While growing up, Le Corbusier had a strong artistic ability, which later shaped his design prowess as he proceeded on in life to become a designer. He was an architect, designer, painter, urban planner, writer, and a pioneering member of modern architecture. He was a founding member of the Congrès International d'Architecture Moderne (CIAM), and dedicated himself to providing better living conditions for residents of crowded cities (Frampton, 2010). In his designs, Le Corbusier related his buildings to their surroundings and needs taking into account conditions of climate and culture of its environment, and the function of the building (Sullivan, 2014). Some of Le Corbusier's other notable works include, but are not limited to: 1931: I2, Geneva, Switzerland, 1951: Mill Owners' Association Building, Villa Sarabhai and Villa Schodan, Ahmedabad, India, 1957: Unité d'Habitation of Meaux, France.

Le Corbusier came to maturity in an era where it was possible for a completely different architecture to be built, due to the availability of new industrial materials and methods. Social conditions in Northern France deteriorated during World War I, which necessitated its rebuilding on a large scale in the quickest time possible also (Dalrymple, 2009). The domestic clutter Le Corbusier grew up around was the driving force behind developing solutions to improve social living conditions. As an urban planner, Le Corbusier was also influential on his ideas about city planning. He proposed cities zoned by use, buildings with green spaces interlinked by roads, keeping pedestrian and vehicular traffic completely separate (Sullivan, 2014). This idea of planning by Le Corbusier later became an ideal for other designers and planners to emulate.

One of the famous modernism principles by Le Corbusier is the five points of architecture, illustrated in Figure 4.12. These principles were evident in the Villa Savoye, which will be discussed further. He developed these principles, which influenced his designs and later the works of other architects and designers. Le Corbusier formulated the five points of architecture in 1926, and these principles are:

1. The pilotis (reinforced concrete stilts) elevating the mass off the ground.
2. The free facade, (non-supporting walls) that could be designed as the

architect wished.

3. The use of long horizontal windows that provided extensive light, and allowed views of its surroundings.
4. The open plan that allowed the floor space to be configured into rooms without concern for supporting walls.
5. The roof garden, restoring, supposedly, the area of ground covered by the house (Le Corbusier & Jeanneret 1926).

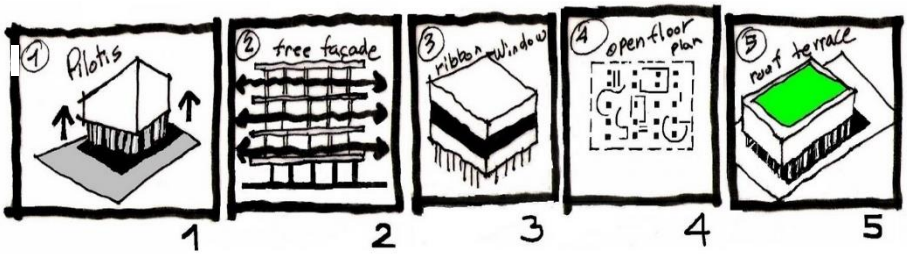


Figure 4.12. Illustration of Le Corbusier's five points of architecture

Le Corbusier stated his design language as he revealed in his most influential book, *Towards a New Architecture* (Le Corbusier & Cohen, 2007):

> We must create a mass-production state of mind:
> A state of mind for building mass-production housing.
> A state of mind for living in mass-production housing.
> A state of mind for conceiving mass-production housing. (p. 254).

Le Corbusier wanted architecture to be a universal language because his belief was there was a correct way to build and only he knew what this correct way is (Dalrymple, 2009). He often employed the use of rough, poured-in-place concrete, deep windows and dramatic shapes to create intellectual forms (Sullivan, 2014). The individual architectural style of Le Corbusier was with the industrial, where he believed in having a structured way of life; as he was famously known for his statement 'a house is a machine for living in' (Le Corbusier & Cohen, 2007a). Architecture had a role, purpose, and was responsible for bringing about values especially in houses, and the society at large. His philosophies are practiced across the world in various designs and modern architecture history cannot be mentioned without the name Le Corbusier.

4.1.2.1. The Villa Savoye

Lying on the outskirts of Paris, France in Poissy (Figures 4.13 & 4.14), and completed in 1929, the Villa Savoye was designed by Le Corbusier as a private country house. This villa was quick to become one of the most influential buildings in modern architecture and cemented Le Corbusier's reputation as one of the most important architects of the 20th century (Sbriglio, 1999). Le Corbusier ensured that the design of the villa would fully represent physically, his totalitarian ideals according to the five points of architecture he formulated. The primary design principles for this villa were clear: the building would occupy a center position of the site with maximized views by means of pillars, which would raise the house by one level (Curtis, 1992).

Figure 4.13. Map showing location of the Villa Savoye

Figure 4.14. The Villa Savoye location

Villa Savoye was built for a married couple who had no idea of the concept modern architecture (Gans, 2000). It was Le Corbusier's Villa Savoye that summed up his five points of architecture. The first point was the stilt structure whereby the building was raised off the ground, supported by *pilotis* (Curtis, 1983). The pilotis were reinforced concrete stilts, which formed a driveway on the ground floor. By lifting the structure off the ground, Le Corbusier was able to achieve the other principles. The second was the open-plan layout, meaning the total floor area was free to be configured into rooms without any concern for supporting walls. Thirdly, was the open façade, created by non-load bearing walls which allowed the possibility of endless openings (Sullivan, 2014). In achieving his fourth point, the ribbon of windows, Le Corbusier created a horizontal strip of windows on the façade of the

villa. Since Le Corbusier was not bound by any structural restraint, he was able to use any shape for these windows. He also designed a curved and glazed façade in order to bring as much light as possible to the rooms. The fifth point was the roof garden, which replaced the green area of the ground below, since the entire building was raised off the ground. There was a ramp leading from the ground level to access the third floor roof terrace (Curtis, 1983).

For the plan of the interior, Le Corbusier made use of right angles, as he thought; the right angle is the basis of human thought. By using these angles, he was able to manipulate spaces that were void, and create a reflection of natural light to the spaces (Wogenscky, 2006). The layout is therefore described as open-plan and free forming. Le Corbusier was able to design an 86 m² living room that opened out onto the external space, with three full-length windows on three sides and a single window panel that measured 9 x 3 meters. Le Corbusier was able to design all four sides of the villa in response to the view and the orientation of the sun. The design of this villa shows the open plan interior with no ornamentation, making it ideal for social living and communication (Rowe, 2011). The Villa Savoye is a clear indication of form following the intended function of the house.

The villa has two flat roofs on different levels, each a separate living space. The first is a hanging garden on the first floor and a solarium on the second floor. The second floor has horizontal strips of windows that allow views of its surrounding. These windows enable the play of shadows and natural light in the interior, and guarantee the idea that each morning Le Corbusier's architecture comes to life (Wogenscky, 2006). Le Corbusier also had an expressionist approach with curves, whereby he added curving elements to the rather basic rectilinear shape of the villa (Sullivan, 2014). One of such use of curves is the interior ramp, an abstract sculpture that winds up from the entrance and leads to the roof terrace.

Le Corbusier also uses surface materials and their different textures to create a response that allows the user participate in the space by the creating a relationship between visitor and sculpture. Both rough and smooth surfaces are used to bring the building's interior to life. Concrete, brick, glass and wood are some of the materials used by Le Corbusier in this villa to express his ideas. The use of different materials allowed him to make differences between interior spaces, allowing one to visually experience and hear the volume (Morrissey, 2010). Hearing the volume of the space

is achieved by the way echoes come off different materials that lend a feeling which leads to a sensual and personal experience with the space.

Furniture design was one of the primary means Le Corbusier used to engage the human body (Morrissey, 2010). In his designs, he took into consideration the nature of the human body and designed his furniture to conform to the shape of body and provide maximum relaxation to its user. Le Corbusier had collaborated with Charlotte Perriand on the interiors and furniture design for the villa (McLeod, 2014). His original furnishings for this Villa were designed to complement the building and also enhance the integration of the visitor with this building. Le Corbusier was concerned with how the body would interact with the building in a meaningful way, and incorporated certain details into his design that would envelope the body allowing maximum engagement and experience (Morrissey, 2010).

One of Le Corbusier's preferred methods of visual interaction is through the use of color. In this villa, he uses neutral colors to capture the eye into the depths of a room. Combined with lighting, the colors are able to create a richness that is refreshing and pleasing to the eye (Morrissey, 2010). The stark white exterior wall has a remarkably smooth and fresh quality, which stands in contrast to its exterior surrounding.

Villa Savoye was designed as a machine to amplify recreation in the machine age during its era. The villa genuinely indicates how a stunning combination can be accomplished between modern architecture and its surrounding, standing out and becoming one of the most influential buildings. This masterpiece continues to be a true architectural composition. The tables below categorize the four interior design characteristics, based on the public interior space selected from the Villa Savoye.

Figure 4.15 is the exterior view of the modern housing with a view of its ramp that runs from the ground floor to the third floor in Figure 4.16. In terms of the layout, Figures 4.17 - 4.19 are the respective floor plans for the Villa Savoye. Different colors have been used on the floor plans to indicate the zoning of spaces into private, public and semi-public. Table 5 describes the layout of the house.

Figure 4.15. Exterior view of the Villa Savoye

Figure 4.16. Interior ramp of the Villa Savoye

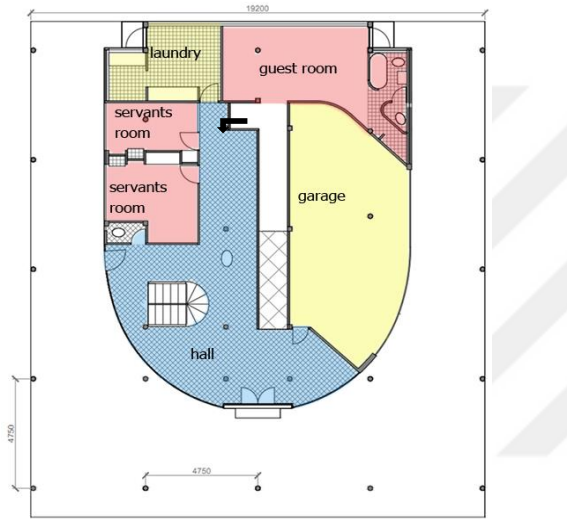


Figure 4.17. Ground floor plan of the Villa Savoye

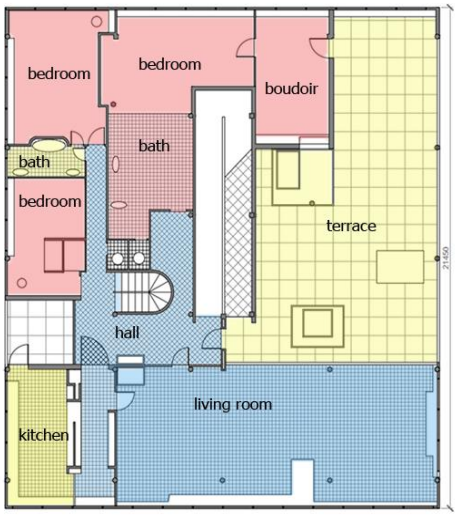


Figure 4.18. First floor plan of the Villa Savoye

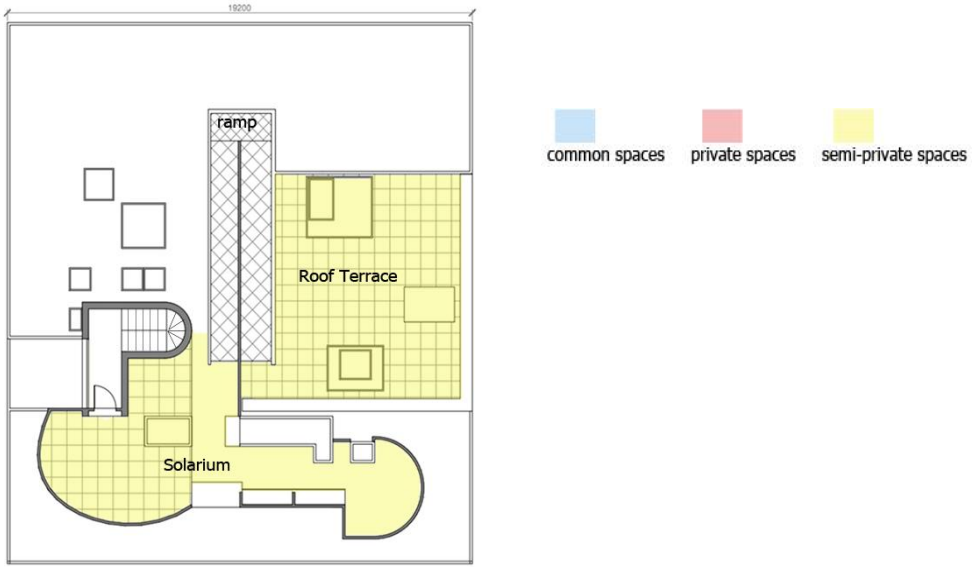


Figure 4.19. Second floor plan of the Villa Savoye

Table 5. Layout Analysis of the Villa Savoye

Drawings/Images	Description
Architectural features (Figure 4.15)	The white villa raised above the ground on stilts creates a unique integration between the villa and its surrounding as it appears to float mid-air. The villa has its entrance through the glass and white-walled hall. Four columns seem to coordinate visitors towards the double-flight ramp visible from almost anywhere within the house.
Interior characteristics (Figure 4.17 – 4.19)	The ground floor of the house serves as the maintenance and service floor. On this level, Le Corbusier placed the main entrance hall, the ramp and stairs, the garage, and rooms for the servants and chauffeur. This level is based off an open plan arrangement that incites the occupant to freely move between spaces. On the first floor is the master bedroom, two other bedrooms, a kitchen, living room and external terraces. Typically, the living spaces in the villa are private, closed off, and secluded from the other common areas within the house. These spaces are situated around an outdoor terrace which is separated from the living area by a glass wall. Upon entry from the ramp are doors that lead to a terrace and the living room. A slender hallway leads to the bedrooms, which are zoned together for privacy. A kitchen is accessed through a slim corridor housing cabinets. The last floor of this house has the solarium and roof terrace, which makes up the garden. By providing the roof terrace above, it replaces the ground the building is raised from and allows an outdoor space for relaxation from the living spaces.

The materials Le Corbusier incorporated into his design for the interiors of this house were used to define the space by creating depth and enhancing the users experience in the movement made through the spaces. The interior view of the living area is shown in Figure 4.20, with highlights on materials in Figure 4.21. Below are descriptions of some of these materials used in the living room of the house in Table 6.

Figure 4.20. Living area on first level of the Villa Savoye

Figure 4.21. Analysis highlighting materials in living area on first level of the Villa Savoye

Table 6. Material analysis of the Villa Savoye

No.	Element	Material	Description
1	Ceiling	Concrete	The use of concrete is the main structural material used in this building. In its ceiling, concrete is left to show for its self, reflecting a machine-like aesthetic. Concrete ceilings also provide strength for the other floors above it.
2	Walls	Concrete Paint	Le Corbusier uses surface materials and their texture to create responses for the user. Using a combination of rough and smooth surfaces. Walls are made of reinforced concrete and plastered masonry and painted white in the living area.
3		Glass	Glass walls provide uninterrupted views of its surrounding landscape and the roof terrace on the second level. The use of glass also allows maximum penetration of light into the spaces, creating well-lit and airy interiors.
4	Floor	Wood	Wooden parquet floor tiles provide dimensionality to the living room space. This material adds pattern and texture to the rather plain interior.
5	Fireplace	Brick	The use of brick was also used by Le Corbusier as an accent material in the living area, where the fire place is situated. The textures from the brick add an earthy feel to the living space.
6	Chairs	Leather	Leather, considered a soft material is used as upholstery for the chairs. This adds to the user comfort as the chairs take on the shape of its user.

It is clearly evident that in the interior of this house, it lacks every element of ornamentation. The space demonstrates the machine aesthetic in accomplishing the desired task of the human. When considering the form and structure of Le Corbusier's furniture, they are altered to fit the needs of the comfort of the human body. Figures 4.22a & b of the living area are given to show his furniture which demonstrates Le Corbusier's inspiration by nature and the human. The furniture used in the living space is explained in the Table 7.

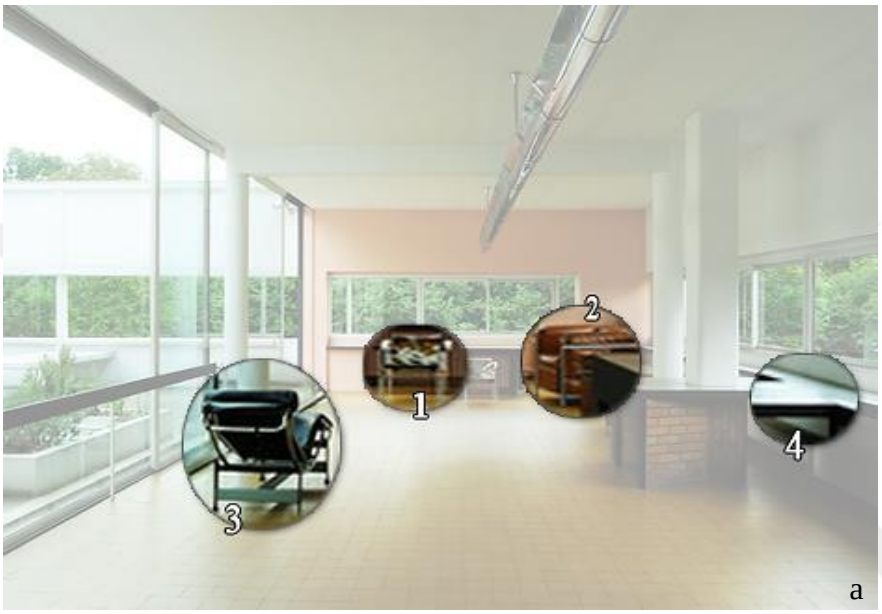


Figure 4.22. Analysis highlighting furniture in living area on first level of the Villa Savoye

Figure 4.22. Analysis highlighting furniture in living area on first level of Villa Savoye

Table 7. Furniture analysis of the Villa Savoye

No.	Furniture	Description
1 2	Chair (LC2 Petit Modele Armchair)	Le Corbusier had collaborated with Charlotte Perriand on the furniture design for the villa. These furniture pieces were mostly made of chrome and fabric, and were also of solid colors. His original furnishings were designed to complement the building and enhance the integration of the visitor and the building.
3	Chaise Lounge chair	The Chaise Lounge (1928) is a chrome-plated steel and leather chair designed by Le Corbusier and Charlotte Perriand. When considering the form and structure for the LC4 Chaise Longue Chair it becomes evident that this form is designed to fit the needs of the comfort of the human body. As seen in the image provided, the elongated curve of the chair fits the natural curvilinear form of the human body.
4	Fireplace Table	This fireplace has a table top like feature that extends to the wall and goes one length of the wall. This table-like framing sits just under the lower level of the windows that can form a sitting platform with views to the outside. It is a perfect synergy that serves multi-function usage.
5	Table	Towards the end of the living room in this house is a free standing table. This simple piece of furniture made of glass and steel legs is atypical example of machine-aesthetic in this space.

Color in the Villa Savoye interior is stark. The predominant color used by Le Corbusier was white. This gives the interior a sense of freshness, which contrasts, but is in harmony with the green color from its surrounding. To add texture also to the spaces, Le Corbusier used heavy colors for his furniture. In all, he was inspired to achieve balance. Figure 4.23 highlights objects in the interior where color is applied. A color scheme bar in Figure 4.24 indicates an idea of the overall color scheme of this interior space, with Table 8 describing the colors in this selected interior.

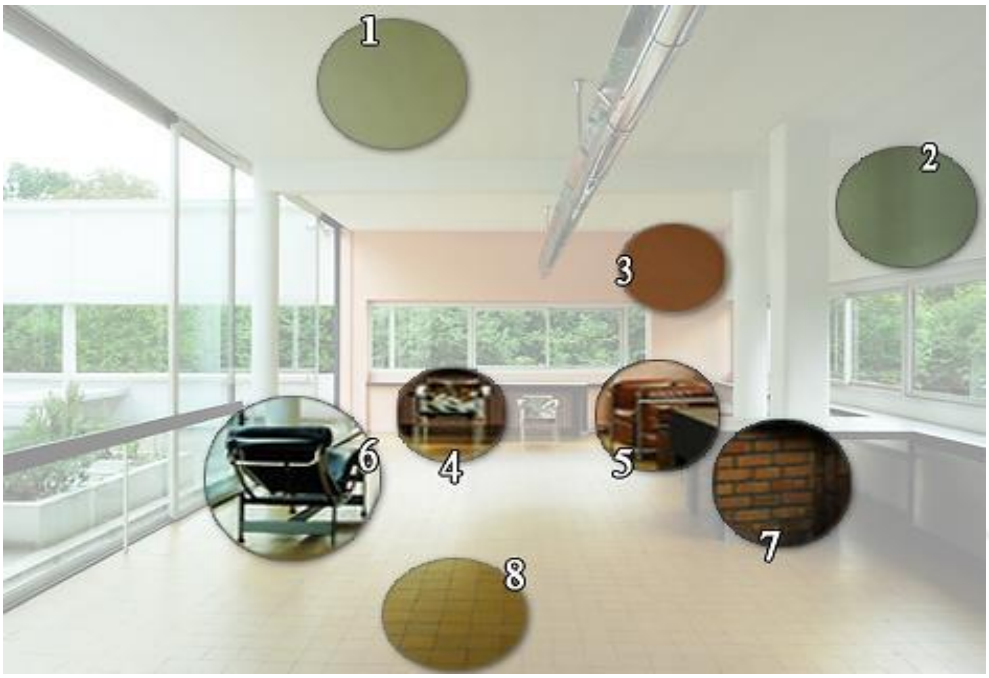


Figure 4.23. Analysis highlighting interior colors in living area on first level of the Villa Savoye

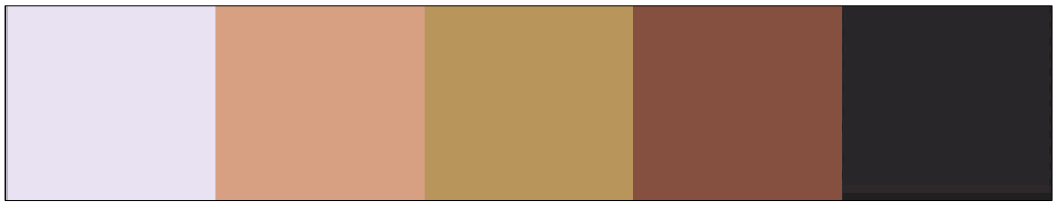


Figure 4.24. Interior color scheme in living area of the Villa Savoye

Table 8. Color analysis of the Villa Savoye

No.	Element	Color	Description
1 2 3	Ceiling Walls	White RGB (233,226,242) Peach RGB (215,160,130)	Le Corbusier was not a fan of mixing colors, so he kept to the barest minimum in his choice of interior colors. Though most parts of the villa are white; walls and ceilings, an accent wall in peach (3) is used in contrast, and to tone down the airiness from the white interior.
4 5 6	Furniture	Black RGB (40,38,41) Brown RGB (133,80,64)	The use of solid colors comes into play through furniture pieces. A solid black table and brown leather chairs enhance the living room. These dark rich colors compliment the light feel of this interior, and blend with other shades to create a pleasing space.
7	Fireplace	Brown RGB (121,75,34)	The effect of the continuous white finishes and brown from the brick fireplace accentuates the fresh but stark feel of this living space. The brown represents nature, adding warm to the earthiness of a fireplace.
8	Floor	Brown RGB (184,149,91)	Despite being true to architectural purity, Le Corbusier was not a strong supporter of polychromy; the art of combining colors. Man, does however need color in his life, which is the immediate, spontaneous expression of life. A lighter tone of brown is seen in the floor tiles which create a harmonious space with the other tones of brown.

4.2 Modern Housing Interiors in the 1930s

During the 19th century, there was a variety of different architectural styles that was made available for imitation by others, but at the turn of the 20th century, a neocolonial vernacular began to emerge that would become popular by the 1930s (Allaback, 2014). In an attempt to develop the housing industry and bring it up-to-date, houses of 1930s had features like the use of modern materials, building methods and also new home appliances and efficient manufacturing practices. During the 1930s as much as 15% of the urban population lived in poverty with makeshift settlements. The clearance of these slums was one of the many social problems of this decade (Rowe, 2011). A solution to these problems was modernist planning which was welcomed as a popular idea. The 1930s was an era dominated by functionalist idiom that was based on the five points of architecture developed by Le Corbusier (Makkonen, 2012). By the 1930s, Le Corbusier's form follows function idea had become common for other modernist architects whose belief that they were approaching design from a functionalist approach (Sullivan, 2014). Buildings were thus made to suit its intended use, without unnecessary detail. Within a short time during the 1930s, a generation of architects and planners embraced modernism as the most progressive rational expression of modernization (Bozdoğan, 2001). In studying the interiors of this era, two modern houses from modernist architects; Alvar Alto and Frank Lloyd Wright, will be taken as examples.

4.2.1. Alvar Aalto

Hugo Alvar Henrik Aalto, (3 February 1898 – 11 May 1976) was not only the most important Finnish architect, but also a designer, sculptor and painter, where his work includes architecture, furniture, textiles and glassware ("Alvar Aalto biography," n.d.). In the span of his career, from the 1920s to the 1970s, Aalto's style of work, ranged from a rational style of modernism in the 1930s to an organic modernist style from the 1940s onwards. Aalto was also a member of Congrès International d'Architecture Moderne" (CIAM) (MoMA, 1938), which was a source of inspiration in approaching architecture as a living space. For Alvar Aalto, he was not just an architect, but he also designed objects and furniture pieces that played an important role in his practice. What summed up the principles for his entire career is Gesamtkunstwerk, which is design as a 'total work of art'. Aalto and his first wife Aino did not just design the building, but also gave special treatments to the

interior elements such as furniture, lamps, and glassware (“Alvar Aalto Biography”, 2016). His travel around Europe as an exhibition designer helped in acquiring knowledge of trends in architecture and art. His works cover a variety of different building types and some include: Villa Mairea (Noormarkku, Finland: 1939), Baker House (Cambridge, USA: 1946), Wolfsburg Cultural Center (Wolfsburg, Germany: 1962), and Finlandia Hall (Helsinki, Finland: 1971).

The concept of Gesamtkunstwerk, or total work of art, was an approach to music-theatre, and this concept originated in the 1850s by the Bavarian composer Richard Wagner (Barnes, 2009). From an architectural stand point, Gesamtkunstwerk involves the architect being in charge of the whole design or overseeing its entirety which includes the shell, its furnishings, and landscape. The realization of architecture as a total work of art was a collaboration between the members of an artistic community, organized in the Vienna Workshop and Vienna Secession (Barnes, 2009). Architecturally, Gesamtkunstwerk takes advantage of materials and with sensitivity to beauty. Aalto treated both his buildings and furnishings with functionalism which he determined on his own. His approach to design was to create his own way of bringing together different forms, materials and purpose of his buildings in relation to aesthetics, comfortability and functionality. Aalto had an interest in taking materials and exploring them for beauty in the context of the most modern manufacturing techniques.

In achieving this ‘total work of art’ ideology, it comes by intersecting materials with industrial processes on one hand, on the other, achieving a sense of beauty alongside it (Barnes, 2009). In his furniture designs, Aalto rejected the use of artificial materials such as steel, for him wood was a material that was form inspiring. The organic formal language used by Alvar Aalto inspired many designers after him (“Alvar Aalto Biography”. n.d.). Alvar Aalto's designs show a complete fusion of his functionalist's principles with a personal sensibility (MoMA, 1938); a sensibility that demands skill, imagination and a knowledge of technical means. His personal style is evident in his use of materials and choice of form. The Aalto House is further discussed as an example of Aalto’s House with focus on the interior elements as explained in the beginning chapter of this study.

4.2.1.1. The Aalto House

The Aalto House is located in Riihitie in Helsinki's Munkkiniemi, Finland (Figures 4.25 & 4.26). Alvar and Aino Aalto started the design of their own house in 1935 and completed it in 1936 (Makkonen, 2012).

Figure 4.25. Map showing location of the Aalto House

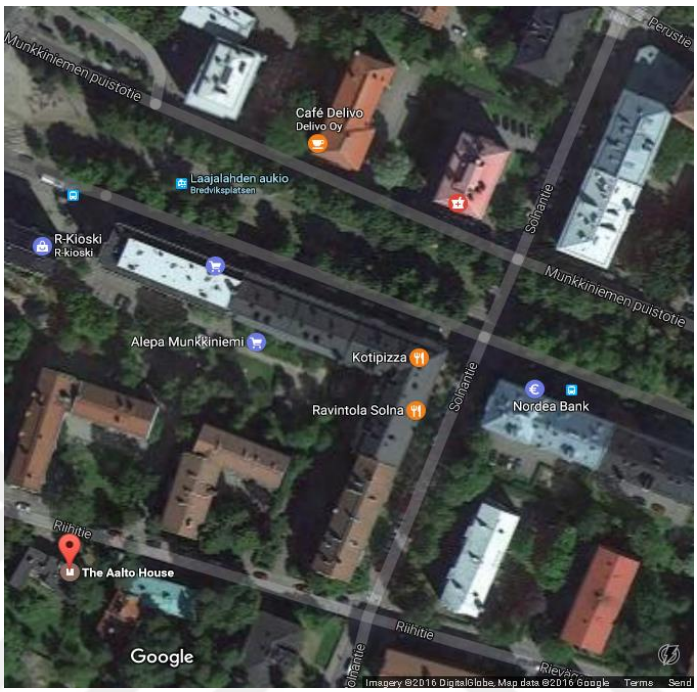


Figure 4.26. Location of the Aalto House

This house was the very first building Aalto designed in the current Helsinki area, and became the permanent home for the family, where the Aalto's lived for the rest of their lives (Makkonen, 2012). Architecture of the Aalto House reflects the basic principles of functionalism that inspired the designer. The house was designed to face away from the street; its façade that faces the street counterbalances the openness and design facing the private courtyard (MoMA, 1938). The side of the house facing the street is closed-off, but softened by wall plants and a slate path that leads to the front door (Makkonen, 2012). The house was designed to serve two functions; a family home and an office, on the ground floor of the house are the living room, kitchen and Alvar Aalto's office, which continues on to the first floor. The front door on the ground floor is through which these rooms are accessed, with an internal connection between the living room and the office. The first floor has the private interior spaces, with a large roof terrace. The design of this house connects

indoor and outdoor spaces together with large-sized windows. The layout of the building took into account the direction of the sun and wind, when designing each room and the outdoor spaces.

The interior of this home brings a warm feeling with organic designs by using bent wood elements and a wide variety of wall coverings and fabrics (MoMA, 1938), with reference still to functionalism. The Aalto's made sure to use materials that were simple within their home where Alvar Aalto had developed a new method for bending and joining wood. Wood was one material this designer liked to work with, as it gave him the ability to play with form. The extensive use of this material is seen all through the house alongside others like concrete, brick, wood and even fabric (MoMA, 1938). To tie in the hard materials in this housing interior, the Aalto's used soft materials too, like curtains instead of walls, to separate the living room from the dining room and the entrance hall. The long wall of windows in the living room made of glass; provides lighting and a clear view of the garden; which was one way the Aalto's saw of bringing the outside, inside.

Alvar and Aino saw the need to both contribute to the design of their home. When it came down to the furnishings in the home, majority of them were designed by the Aalto's themselves (Makkonen, 2012), with a combination of form and function. Straight lines, smooth and clean surfaces, simple proportions and pure color were also applicable to the furniture pieces within (MoMA, 1938). Furniture in the Aalto House is simply designed to incorporate softness and be capable of adapting to the form of human. The Aalto's were the founders of the furniture company Artek (MoMA, 1938). These pieces harmonize with the modern house for daily use, and make the Aalto House a building that is rich and warm, suiting living and working needs comfortably. When it comes to the use of color in this housing interior, rich warm and dark colors were used against the brown from the wood. Natural light that enters the space through the windows also play on the different textures and colors of materials, creating an inviting atmosphere.

The tables below under the selected four categories; layout, materials, furniture and interior colors, are used to examine and discuss the interior features of the Aalto House, and to see how modernism comes to play in the interior of this house.

The building is almost cube-like, with a stark whit exterior, as is shown in Figure 4.27. This house does not follow the strict lines of the movement's language of design, but Alvar Aalto discovered his own personal form of expression while the design of the house was executed. The images below show the exterior view of the house, and the floor plans (Figures 4.28 & 4.29) respectively. Table 9 uses these floor plans to describe the layout.

Figure 4.27. Exterior view of the Aalto House

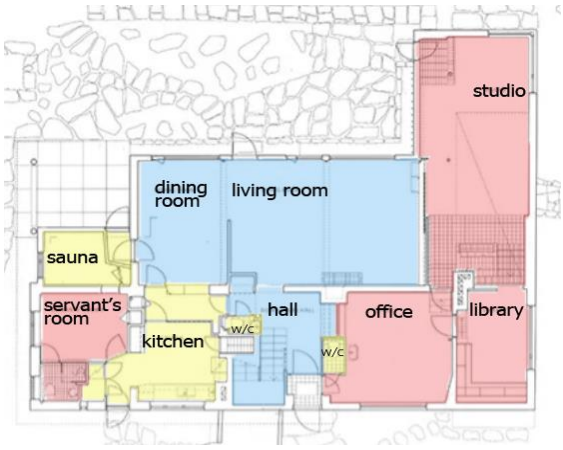


Figure 4.28 Ground floor of the Aalto House

Figure 4.29. First floor of the Aalto House

Table 9. Layout analysis of the Aalto House

Drawings/Images	Description
Architectural features (Figure 4.27)	The Aalto House depicts modern language of form and tradition, which makes use of the natural surroundings, giving nature a different position in a new way. From the exterior, the building has a striking contrast for its two main functions; living and working. The white painted part of the building which is lightly rendered with brick serves as the office. The slender cladding material of dark-stained timber battens is the residential part of the building.
Interior characteristics (Figure 4.28 & 4.29)	This private house was carefully thought of in terms of its layout as the Aalto's were able to highlight features for both living and work spaces. These spaces are separated from each other through materials which are seen in the interiors. On the ground floor of the house are the living room, the kitchen, the servant's bedroom and additionally the office, part of which continues up to the second floor. The entrance to both the living and working space is through the front door. There is also an internal connection between the living room and the office, which eases movement/circulation. On the first floor are the bedrooms, a common area and a balcony overseeing the office. There is also a large roof terrace which commands a broad view of its surrounding. In the design of each room the direction of the sun and wind was important.

Materials in this housing interior are predominantly natural materials the Aalto's used in expressing their designs ideas. The interior view of the living area for analysis is shown in Figure 4.30, with highlighted materials in Figure 4.31. The use of wood is considered the predominant choice of material in this interior, as other materials support the use of wood. Some of these materials are described in Table 10.

Figure 4.30. Interior view of living area of the Aalto House

Figure 4.31. Analysis highlighting materials in living area of the Aalto House

Table 10. Material analysis of the Aalto House

No.	Element	Material	Description
1	Ceiling	Concrete	The interior brings a warm feeling with a wide variety of materials. Concrete which is the main material in this house still gives the space a solid industrial feel.
2	Wall	Brick	Part of the wall in the living area has a surface texture of white brick. This material adds depth to and dimensionality to the room.
3	Wall/door	Wood	The use of timber-clad sliding walls separates the living room from the office space, making it a cozy environment for both living and working.
4	Window	Glass, wood	The use of glass for natural light is used in windows with wood blinds that serve to screen out vision and sunlight.
5	Floor	Wood, Rug	The horizontal element of this space; floor, is treated with wood tiles which is used to create pattern and add texture to the room.
6	Furniture	Wood	The use of wood as a natural material is eminent around the house and also used in simple furniture pieces. The use of this natural material softens the language of modern architecture.
7	Couch	Fabric	A softer element is being added to this space in the form of furniture, by upholstering the chairs in fabric, maximizing comfort to its user.

The Aalto's not only designed the house, but the furnishings, which was a reflection of their design principle of approaching architecture as a total work of art. Pieces were carefully designed with human comfortability in mind, which are highlighted in Figures 4.32a & b. Descriptions of furniture pieces is carried out and explained in Table 11 that follows.

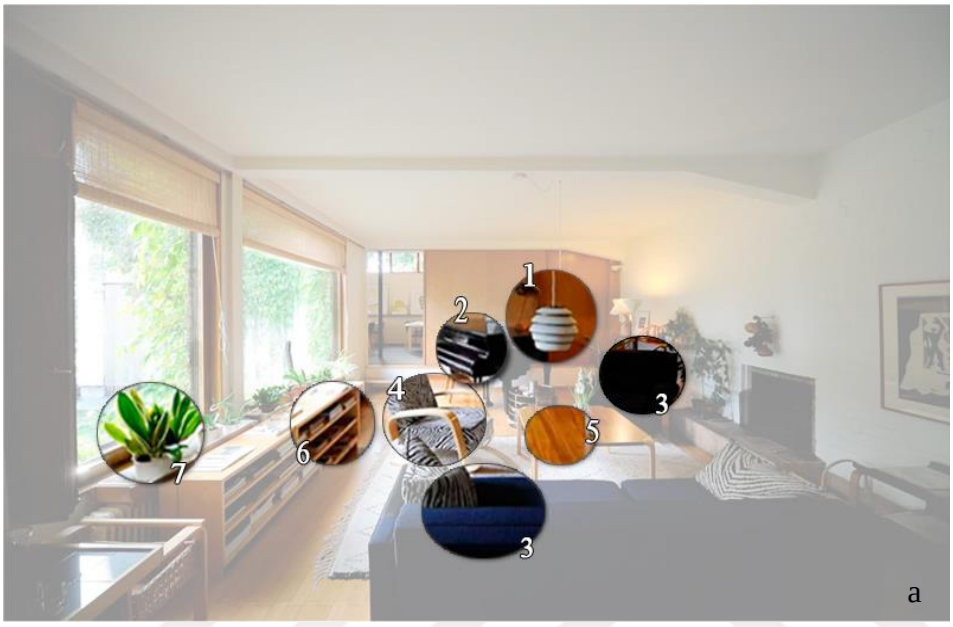


Figure 4.32. Analysis highlighting furniture in living area of the Aalto House

Figure 4.32. Analysis highlighting furniture in living area of the Aalto House

Table 11. Furniture analysis of the Aalto House

No.	Furniture	Description
1	Pendant light	Many of the lights are prototypes and experiments designed by the Aalto's. These lights are simple in design adding a 3-dimensional form to the interior.
2	Piano	A grand piano is situated in the corner of the living area, which creates a more relaxed and informal setting for family activities.
3	Couch	Soft fabric chairs occupy the living area and provide its users with comfort. They have a frame of wood and are upholstered in fabric which gives a soft feel to the room. Many of the furniture and textiles were later to become classics available to the public. The functions that are paramount in terms of furniture around the house are humanity and comfort.
4	Tank Chair	
5	Fan leg table	Aalto and his wife designed functional furniture to fit in this house, such as the fan leg table in the middle of the living area and the low-rise bookshelf. These furniture pieces were kept simple and clean and were made of wood.
6	Bookshelf	
7	Indoor plants	Indoor potted plants are seen along the window sill in this part of the house. This brings nature from outside, to the inside of the space, tying landscape with the housing interior.
8	Dining Set	Just across the living is the dining area that is separated by curtains or drapery. The dining chairs are covered in fabric that looks like animal skin. In its design, the chair exudes simplicity to accommodate the human form.

Colors of interior spaces have a role in giving the room its unique atmosphere. This was considered carefully by the Aalto's who wanted to create a warm inviting atmosphere with their living room space. Colors are dark tones that offset the white which is the main color (Figure 4.33). In the living area of the Aalto House, a variation in color comes from additional interior elements used to furnish its space. To give an idea of the color scheme of the interior space, the main colors make up the color bar in Figure 4.34. Table 12 gives a description of the colors and the areas they are used.

Figure 4.33. Interior view of living area of the Aalto House

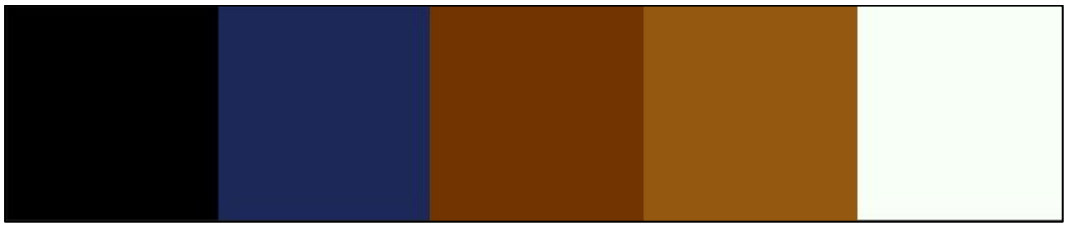


Figure 4.34. Interior color scheme of living area of the Aalto House

Table 12. Color analysis of the Aalto House

No.	Element	Color	Description
1	Ceiling	White RGB (248,255,247)	An overall white ceiling generally tones down this heavy interior. Its white color adds a refreshing touch and feel to this space.
2 3	Walls	White RGB (248,255,247) Brown RGB (151,84,17)	The atmosphere created by Aalto in this iconic house was created by the use of bold colors. A navy-blue couch sits in the living to break up the lightness, with a rich black piano that sits in the corner. To add some texture and break up monotony of plain colors, Aalto use a black and white striped chair with bent ply pieces.
4 5 6	Blinds Floor Table	Brown RGB (169,131,74) Brown RGB (151,84,17) Brown RGB (179,98,16)	The warm timber and brick colors of the interior are used to complement the light and airy space of the house. Different shades of brown can be seen in the living area by the use of wood on floors, walls and furniture pieces. Browns generally tend to nature and its use in this space gives the interior a warm aura.
7	Chairs	Blue RGB (28,40,88) Black RGB (0,0,0)	The interior brings a warm feeling with a wide variety of bold color fabrics seen in the blue couch, the black chair and the white & black throw pillows. These darker heavier colors ground the lighter tones in the space to create harmony.
8	Piano	Black RGB (0,0,0)	There is a solid black piano located in the living room corner which adds to the heavy feel of this space.

4.2.2. Frank Lloyd Wright

Frank Lloyd Wright (born Frank Lincoln Wright, June 8, 1867 – April 9, 1959) was an American architect, interior designer, writer, and educator ("Frank Lloyd Wright Biography", 2016). An influence into Wright's creative mind was from an early childhood through a set of educational blocks his mother bought, created by Friedrich Wilhelm August Frobel (Riley & Reed, 1994). Wright did not have any formal training as an architect, but his works and talent were quickly appreciated (MoMA, 1994). In his designs, Wright believed that structures should be in harmony with humanity and nature. Wright as an architect not only concerned himself with designing structures, but also designed many of the interior elements of his buildings, such as the furniture and stained glass educator ("Frank Lloyd Wright Biography", 2016). In the catalogue 'Frank Lloyd Wright: Architect', Anthony Alofsin an architectural historian wrote that in the development of modern architecture, Wright was a key figure, though still being at odds with some of its ideologies (MoMA, 1994). His works influenced the design thoughts of European modernists, but he rejected the International Style they developed, and maintained his own independent practice throughout his career (MoMA, 1994). In 1991, the American Institute of Architects recognized Wright as "the greatest American architect of all time". Architect Philip Johnson described Wright as America's greatest 20th century architect (Riley & Reed, 1994).

Frank Lloyd Wright's work with nature and construction possibilities had an effect on the design of his buildings. He developed an architectural style that was uniquely American, which in his residential buildings reflected principles he developed. The introduction of certain features helped to form a new language in domestic architecture, which is:

1. The development of the plan of the house which was called the open plan, which meant spaces were separated from one another by simple architectural elements instead of partitions, walls or doors.
2. The integration of the building with nature or its surrounding.

This development was Wright's own concept of organic architecture (Riley & Reed, 1994) that would later on influence other designers.

Organic architecture is a reflection of nature, and as Wright expressed does not imitate nature but is concerned with materials that are natural, the site, and the people who occupy the buildings. For Wright, the purpose of art and architecture was not to copy nature, but to use it as a raw material awaiting transformation (Riley & Reed, 1994). Wright combined his creative qualities of exploring new technologies, inventing new styles and his strive for maximum expressive effect, with a remarkable playfulness. Wright's works are innovative examples of different building types, such as offices, churches, hotels, schools and museums. Some of his notable buildings are Larkin Building, Unity Temple, Fallingwater, Guggenheim Museum, Prairie houses and Usonian houses. Wright was a leader of the Prairie School movement of architecture, where he developed the concept of the Usonian home (Wright, 1970), which was his unique vision for urban planning in the United States. The Usonian concept will be the focus of study for Frank Lloyd Wright's modern interior.

Usonia was a word used by Frank Lloyd Wright to refer to his vision for the city planning, architecture and landscape of the United States. These homes were designed between 1936 and 1943 to meet tight budgets (Hoffman, 1977). The term Usonia usually refers to a group of approximately sixty middle-income family homes beginning in 1936 with the first being the Jacobs House. The Usonian Homes were designed with economy in mind, though this did not mean a lack of architectural innovation by Wright. Instead, Wright saw this as a means to explore new ways of conserving energy (Hoffman, 1977). These homes are typically small, single-story houses without much storage, and often L-shaped to fit around a garden terrace on sites that are inexpensive. Characteristics of these houses include natural materials, clerestory windows providing natural lighting, flat roofs with cantilevered overhangs large enough for passive solar heating and natural cooling, and radiant-floor heating (Sergeant, 2005). An important characteristic of Usonian homes is their strong visual connection between the interior and exterior spaces. Wright also devised carports to describe an overhang covering a parked vehicle in these Usonian houses. The typical characteristics of these houses were, free-standing with horizontal windows, a free plan and a broad roof ("Frank Lloyd Wright Biography", 2016). The Herbert Jacobs House I best represent Wright's immersion in projects that embodied his vision of a landscape extended by the automobile (MoMA, 1994). This house is taken as an example to be studied, and is discussed further.

4.2.2.1. The Jacob's House I

Also known as Herbert and Katherine Jacob's first House, this house was built for Herbert and Katherine Jacob as a single-family home located in Madison, Wisconsin, USA (Figures 4.35 & 4.36). It was constructed in 1937 and is considered by most to be the first Usonian home (Hoffman, 1977).

Figure 4.35. Map showing location of the Jacob's House I

Figure 4.36. Location of the Jacob's House I

The Jacob's House is a 139.6-meter square house, built at a cost of $5,500 (Sergeant, 2005). This single family home followed a modular grid pattern, board and batten wall construction, and radiant heating provided by hot water pipes sealed into a concrete floor. There were no radiators, basements, attics, gutters, and no plaster or paint (Hoffman, 1977). In the design of this house, Wright wanted the occupants to also be part of the design process by building as much of the house as they could. By simplifying his design, Wright was able to achieve efficiency. The Jacob's House sits a small site adjacent to the street. The house is an L-shaped floor plan laid out on a grid of 0.6 by 1.2 meter units with a total measurement of 144 meter square (United States Department of the Interior, National Park Service, 2003). The L-shaped plan enabled Wright to zone spaces according to their functions; private spaces (bedrooms, study) were at one wing while common areas (living, dining and kitchen) were on the other wing. The services (kitchen and bathrooms) were located centrally for ease of use. The private spaces of the house also had views to the garden through glazed windows. The building does not consist of the roof and the walls alone but the space that is to be lived in.

The interior of this house is a true reflection of natural materials. Some of the walls within the house are of layered boards, some solid brick and in other places glass

doors. These are used in simple ways to enhance the character of the house through texture and color. Every material remains true to itself and is not disguised as another. Wright gave the house an organic touch especially using wood. The house opens up to the outside through glass walls on two sides at the rear of the house (United States Department of the Interior, National Park Service, 2003). These materials used by Wright were readily available, and were also good for both heating and cooling (Sergeant, 2005). How a building comes together and how different materials join each other should be an expression of the nature of the materials used.

A fitting environment for human comfort is achieved by simple architectural masses that reflect the uncluttered spaces (United States Department of the Interior, National Park Service, 2003). These are an integral part of the building but are not added on. Sculpture and painting have to become elements of the total design and furniture should be built-in as much as possible. Organic design aims to include furniture into architectural designs. Wright was able to design pieces of furniture for this Usonian home. They were designed with simplicity in mind to maximize human comfort and ease of work. Built-ins pieces such as the dining room table, a fireplace, chairs, a desk and bookcase in the workspace, were added as part of a total design.

Nature is an architect's school. The creative possibilities of form, color derived from pattern and texture is demonstrated in nature. Since organic architecture does not copy nature but is concerned with natural materials (Sergeant, 2005), this plays a huge role in the interior color of the house. Rich tones of brown derived from wood, are displayed all through the house. This creates an atmosphere of nature within the interior. The overall interior color of the Jacob's House is closely related to the natural materials used, and because no material is disguised to look like another, it gives the spaces an authentic, rich and warm feel to its atmosphere.

The Jacob's House I exemplified Wright's Usonian concept and set the tone for other such houses to follow. As this study is based on the modern housing interior, the following tables are descriptions of the selection criteria for the study of the Jacob's housing interior.

In the layout of the Jacob's House, the L-shaped open plan concept creates interiors that allow the users comprehend and experience spaces as one moves through the house. The interior space determines the exterior form of the house (Figure 4.37) with spaces that flow freely from each other shown in the layout in Figure 4.38, and explained in Table 13.

Figure 4.37. Exterior view of the Jacob's House 1

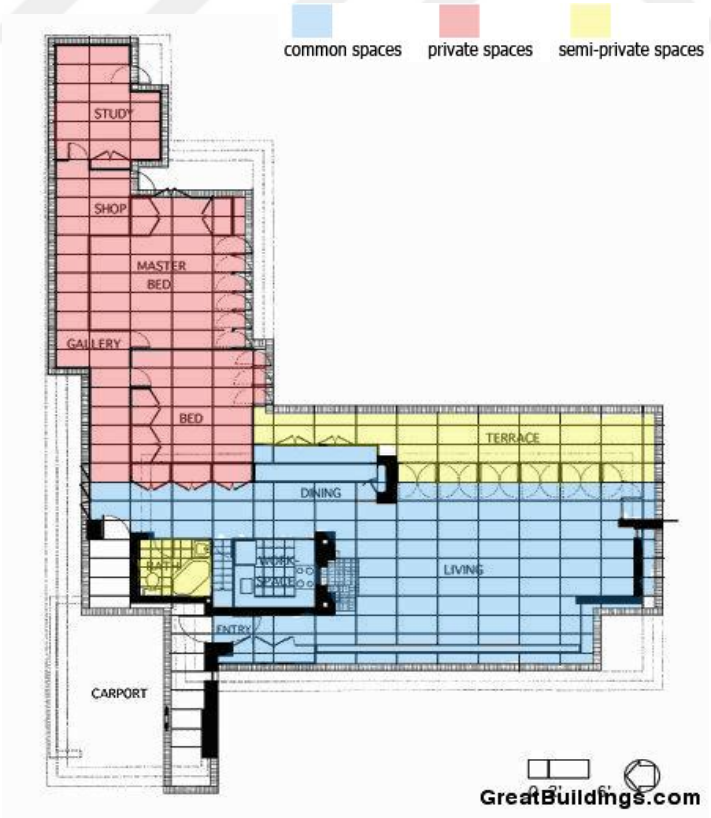


Figure 4.38. Floor plan of the Jacob's House 1

Table 13. Layout analysis of the Jacob's House 1

Drawings/Images	Description
Architectural features (Figure 4.37)	The L-shaped house is a true reflection of Wright's design principles. The Jacob's house blends in with nature or its environment and is not in competition with it. Nature served as the inspiration for this house.
Interior characteristics (Figure 4.38)	The house is accessed from outside through a hidden entrance that leads from the cantilevered carport roof. The form used for the layout of this house provided the opportunity to zone functions properly. Common areas on one side and the more private spaces towards the other side of the house. Between these two, is a service core which comprises the kitchen, bath and hearth. The direct relationship between the eating area and the kitchen eliminates a separate dining room. The rooms in this house are not just simple rectangles but are broken up vertically and horizontally through alcoves, L-shapes, lowered ceilings, and decks. This forms different levels providing the eye something delightful and mysterious to enjoy. Focus on this house is in the largest interior space; the living room which has a fireplace. At one of the ends of the living room, there is a reading alcove which is accompanied with a built-in writing table accommodated by a long wall of book shelves. Opposite this wall of shelves a wall of window doors opens to a graciously outlined garden. This terminates at the end of the bedroom wing by a corner, picnic patio. The layout achieved in this house allows a free and simple flow from one space to another and also provides a link between indoor and outdoor space.

The main inspiration for this house both interiorly and exteriorly was nature, its environment and surrounding. This played a major role in the selection of materials as is seen in the interior of the living room shown in Figure 4.39, with materials of its interior highlighted in Figure 4.40. Table 14 describes some of these materials that give this space its warm, earthy feel.

Figure 4.39. Interior view of living area of the Jacob's House I

Figure 4.40. Analysis highlighting materials in living area of the Jacob's House I

Table 14. Material analysis of the Jacob's House I

No	Element	Material	Description
1 5	Ceiling Floor	Wood	The use of materials has been kept to a minimum to be in harmony with nature. Wood tiles have been used for the ceiling and floor covering which creates balance in the interior.
6	Alcove		The alcove in the living houses a long bookshelf that is also made of wood. Above the alcove are clerestory windows framed in wood for structure and support. This horizontal element adds a sense of depth into the space.
2	Doors	Wood, Glass	A bank of glazed doors along the opposite side of the alcove provides light to the interior and opens onto a terrace. This also provides views to the outside and ties both interior and exterior together. The windows and doors have been framed using wood.
3	Fireplace	Brick	The use of brick has been used in the living area of the house as well as a partition wall between the kitchen and living area. A brick fireplace located in the living area is used to keep the interior airy and simple.
4	Furniture	Wood, Fabric	The furniture in this space is also in harmony with other elements around the house. Design is kept simple and construction is of wood while fabric is used as a softer element for upholstering the chairs.

This living room interior of this modern house truly exemplifies being one in tune with nature as is seen even to the furniture. Wood is the main material used here, from the bookshelves, to tables, to dining chairs. Their design is simple with elimination of unnecessary details. These furniture pieces are highlighted in Figures 4.41a & b, and also described in Table 15 below.

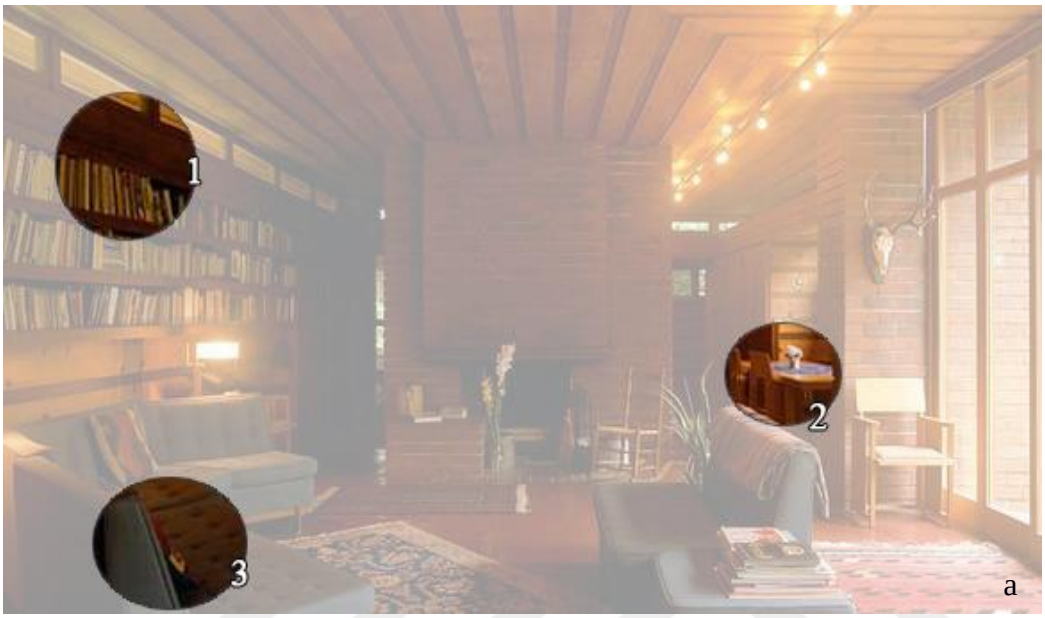


Figure 4.41. Analysis highlighting furniture in living area of the Jacob's House I

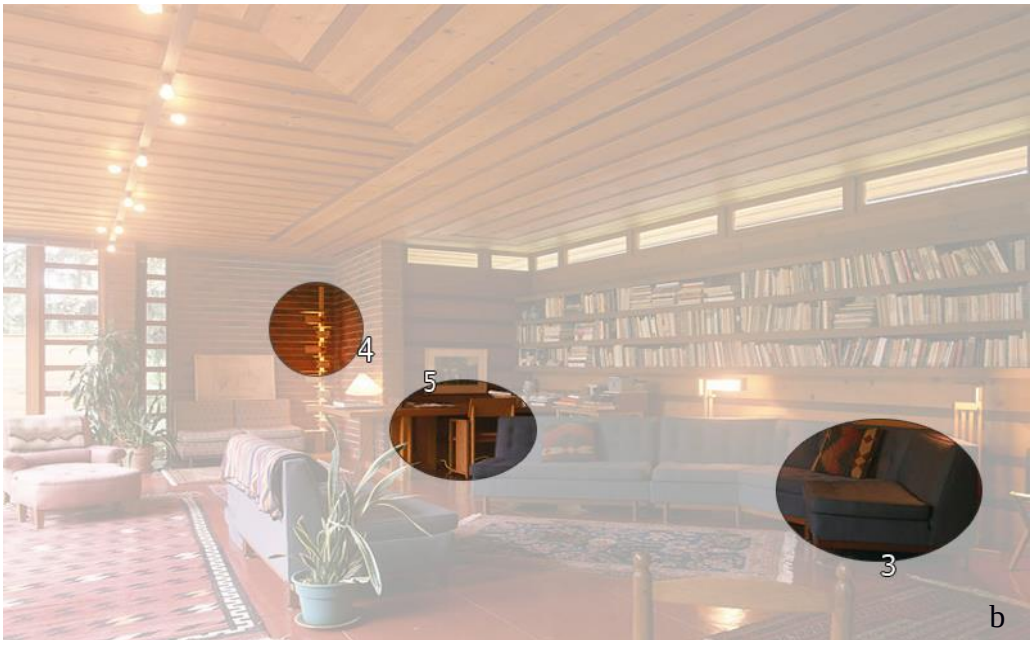


Figure 4.41. Analysis highlighting furniture in living area of the Jacob's House I

Table 15: Furniture Analysis of Jacobs House I

No	Furniture	Description
1	Bookshelf	Wright as an interior designer, integrated furniture from the conception of the house design, and one way he achieved this was creating an alcove along one wall of the living room. This alcove houses a bookshelf that sits behind a long couch. It ties the space with the couch creating a connection between the users when on the sofa, thereby increasing user experience of the space.
2	Dining Table and chairs	The built-in furniture likewise makes effective utilization of space, enabling a compact house to liberally serve various functions. A recess in the living room space houses the dining area. The dining table and chairs made of wood are positioned with a view to the outside terrace. These pieces of furniture also serve as a kind of separation between the living area and the kitchen.
3	Heritage Henredon Sofa	The living room is a space that is warm and welcoming, that enhances family activity. A long and low built-in sofa designed by Wright himself runs the length of the wall. The sofa is positioned behind a series of books behind it for the user to reach out easily for use. The sofa is simply designed for maximum comfort of its user and eliminates unnecessary details.
4	Taliesin floor lamp	This two tiered floor lamp made of wood resembles a sculptural piece in this space and was an innovation by Wright for this home.
5	Reading table and chairs	Forming part of the bookshelf alcove is a reading table and chair made of wood. This piece forms a relationship with the bookshelf and provides a station for comfortable work on.

Wright believed in the moral and political values exemplified by home ownership and believed that well designed, tasteful dwellings would produce a happier, more harmonious environment. As in the design of the Jacob's House I interior, colors were kept to a minimal brown (Figure 4.42), which in turn reflected the surrounding nature. The overall color tone used in this interior creates a rather earthy feel in the space. Figure 4.43 gives an idea of the color scheme for the selected space and further explanations of these colors are done in Table 16.

Figure 4.42. Analysis highlighting interior colors in living area of the Jacob's House I

Figure 4.43. Interior color scheme of living area of the Jacob's House I

Table 16: Color Analysis of the Jacob's House I

No	Element	Color	Description
1 2	Ceiling Floor	Brown RGB (137,55,9) Brown RGB (13,58,36)	The living area is where one can fully appreciate Wright's technique of combining elements to achieve a harmonious interior space. There is really no play on color in this space. Color in this space sticks to the nature brown theme and creates a rather uniform interior. The red wood flooring and the brown wood ceiling made from Redwood plywood create a horizontal reddish brown plane.
3	Fireplace	Brown RGB (96,44,17)	The true nature of materials used was let to shine in their natural state, for example the brick fireplace. This gives the interior a more naturalistic feel in terms of color choice. This adds rich tones of a reddish brown to the entire atmosphere of the living room.
4	Furniture	Brown RGB (142,89,50)	Generally, brown in different tones makes up the rest of the furniture pieces. In staying true to the nature of materials, these pieces made of wood are not disguised to look like another. Therefore, it is safe to say that the color from furniture comes from the natural brown the pieces are made of which in this case is wood.
5	Sofa	Blue-grey RGB (101,109,124)	The sofa in the living room is seen to be raised above the floor, which falls in line with modernist principles. The choice of the fabric cover is just one bold color, which also blends with the environment or said to be like the color of the sky. The choice using color here breaks away from the general 'brownish' interior.

4.3 Modern Housing Interiors in the 1940s

At the beginning of the 1940s, architecture and design characteristics were still in the style of the 1930s until the end of World War II in 1945 (Allaback, 2014). The years after the war in the 1940s can best be described as a period where recovery was made for the need of new housing due to the mass destruction of buildings. The modern era European designers who were immigrants had then begun to make their mark and influence in art, architecture and culture. At the turn of a new decade and the growth of modernism in architecture, vernacular features quickly modified the stark modern characteristics of the 1920s (Allaback, 2014) following World War II in the mid-40s. The modern houses of the 1940s exemplified the search and exploration of new ideas for comfortability in design, building and stable living conditions. A shortage in housing was created and single-family homes in sub-urban areas became the ideal especially in the USA. These houses had certain characteristics where function and economy of scale were of great relevance, houses also embraced open floor plans and indoor/outdoor living. The availability of new forms of technology made it possible for creation of new features within the house to emphasize layout and efficiency.

The architectural style introduced in the 1920s and 30s became more evident in the 1940s after World War II. With reference to the European designers migrating to the USA, the two cases selected for study in this era are both located in the USA. The examples of the modern interiors are to provide information as to how the European modernist principles were translated to the American society.

4.3.1. Charles and Ray Eames

American designers Charles Ormond Eames, Jr (1907–1978) and Bernice Alexandra "Ray" Eames (1912–1988), were a husband and wife duo who made significant historical contributions both in the development of modern architecture and furniture design (Kirkham, 1998a). They both grew up in a school system where its ideas were based on arts and crafts, which would later on influence their design approach. Charles Eames however was able to learn about engineering and acquire practical skills from the jobs he did. From the beginning of their collaborative partnership, both Charles and Ray Eames focused on creating multifunctional modern designs. They both are best known as orthodox modernists for their pre-fabricated steel and

glass home and perhaps the most famous of all designers that worked in the USA after World War II (Kirkham, 1998b). In the design of furniture in the early years, their ideas were in line with the modernist ideals, which were low cost, high quality, and industrially mass-produced. Among their well-known furniture designs is the Eames Lounge Chair. Alongside being designers and architects, the Eames's also worked in the fields of industrial and graphic design, fine art and film.

When it came to approaching their designs, both Charles and Ray Eames took a playful attitude toward their work with an attempt to make work more enjoyable and harmonious. They both were of the opinion that one of the main objectives of life was to get as many of the rewards out of it; from the work one engages in (Kirkham, 1998b). They were also a part of a new movement of designers who were turning away from modernism's idea for the machine-aesthetic, moving towards forms that were more simple, organic and natural. Part of what made the Eames's so unique was their approach to design process. They believed that hard work was the only way consistency in creativity could be achieved, rather than inspiration (Kirkham, 1998a). Their views towards design stemmed off the idea that one starts with a couple of ideas from a problem, and gradually work towards achieving a solution. The pride in design for the Eames's was in their understanding of modernism fundamentals, where the form of an object was solidly rooted in its function. The Eames's believed in the concept that a good design is a tool that brings about an improved life, and that social progress was due to technology. They not only tried to revolutionize design but also establish a relationship between design and everyday living. In doing this, they tried to bridge the gap between work and fun, and make them have the same experience.

Charles and Ray Eames sought out ways to produce affordable, high quality designs for the expanding middle class in America. They approached their designs by making use of new technologies and materials to bring to life the minimalistic designs of the dominant International Style of that era (Bradley, 2014). The Eames's also experimented with molded plywood and through the creative use of this industrial material; they sought a strong, flexible product capable of taking on different forms, which they applied to domestic furniture. The Eames's also promoted the importance of visual image and throughout their career became skilled in the use of images to communicate messages. Much of the works by Charles and Ray Eames was aligned

to a particular kind of American glamour associated with domestic architecture (Bradley, 2014). The husband and wife team greatly influenced the visual character of daily life in America and transformed the way homes were furnished by introducing functional, affordable, and often highly sculptural objects (Kirkham, 1998b). Famously known for their house design, the Eames House will be the focus area of study.

4.3.1.1. The Eames House

The Eames House located in the Pacific Palisades neighborhood of Los Angeles, California, USA (Figures 4.44 & 4.45), is a landmark of 20th-century modern architecture. Charles and Ray Eames designed and constructed the house in 1949 to serve as their home and studio (Kirkham, 1998b).

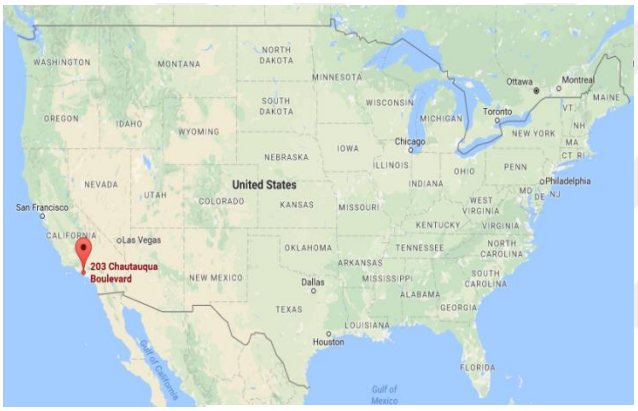


Figure 4.44. Map showing location of the Eames House

Figure 4.45. Location of the Eames House

The Eames House is part of a project called the Case Study House Program that was launched in 1945 and sponsored by the California Arts and Architecture magazine, a magazine that portrayed California's luxury homes. However, John Entenza shifted focus of the magazine to low-cost houses (Bradley, 2014). This project came to be to provide solutions to the problem of shortage in housing in America, due to the return of World War II veterans (Kirkham, 1998a). When the Eames House also known as Case Study House No. 8 debuted in the Arts & Architecture magazine in 1949, it was immediately embraced for its domestic ideals that it created for modern America (Bradley, 2014), and portrayed middle class ideals of domestic design and modern lifestyle after World War II. The house which served as a tool for the Eames's experiment in the use of prefabricated and mass–produced materials was a public representation of their personalities. The Eames House sits on a 5566-meter square

piece of land which overlooks the Pacific Ocean and is mainly constructed from prefabricated steel and glass (Bradley, 2014). Architecturally, the house consists of two separate rectangular buildings; one serving as a residence and the other a working studio, both connected by a small patio. They located the building into a hillside, backed by a 2.4 meter by 61-meter long concrete retaining wall aligned along a central axis with an open court on the ocean side of the house between the two structures ("Eames House", 2017). In the design of their house, the Eames's took full advantage of the surrounding with the open court or link between the two buildings, which creates a direct relationship between the inside and the outside. The entire structural steel frame of the Eames House is painted black, which creates a division in the façade of each building into smaller rectangles that are either large windows and doors or stucco painted in Mondrian colors (red, yellow, blue, white and gray) (Bradley, 2014).

The interior layout of the house is a true reflection of the way the Eames lived. The domestic area presents itself with simple open plan spaces that replaced fixed rooms, which creates a free flow from one space to another. On the ground floor, the large double volume living room is the focal point of the house interior, with a small nook adorned with a couch; it creates a cozy space in the living area. The small kitchen counters and cupboards forming a U shape (Bradley, 2014), allows a hall to run along the building before opening up to the living area. In the hall on the ground floor, a spiral staircase leads to the second level that has the Eames's bedroom. The second floor of the residence also has a mezzanine floor at 5.2 meters that overlooks the living area ("Eames House", 2017). The two-story office building contains an open workspace and dark room on the lower floor and on the second floor; it contains a storage space and a small sleeping area for employees (Bradley, 2014).

The Eames House was meant to be an expression of man's life in the modern world, both Charles and Ray believed in the honest use of materials and straightforward connections. In the domestic space, the northern wall comprises of wood paneling (Bradley, 2014), a natural material whose texture adds a warm and inviting feeling. Glass panels allow light to flow into the house, and other materials such as concrete walls, linoleum tiles, wood block floors and wooden staircase within the house as organic materials, provide a warm and comfortable atmosphere. Windows and doors are made of industrial aluminum framing, and the walls are a mixture of glass, stucco,

wood, asbestos, metals and synthetics (Kirkham, 1998a). The new plywood and plastic materials that the Eames's developed, was used for their furniture in this house ("Eames House", 2017). This new material experimented by the Eames's was later adopted by other designers.

By providing an open floor plan for this house, it allowed the Eames's to move furniture and objects freely throughout the space as they desired. The house was designed plain, to work as the Eames's called functioning decoration. This term the Eames's used to describe their carefully arranged objects in interior spaces (Kirkham, 1998a). The furniture, art, and objects in the house were from the Eames's interests ("Eames House", 2017). They looked at life as an act of design and filled their residence with items that reflected their living and told the story of their interests. The house though modern, has individual pieces strategically positioned and helps in telling the experiences derived by the Eames. As furniture designers also, some of their pieces such as the famous Lounge chair and the Eames chair make up part of their home (Bradley, 2014) and create an environment welcoming to its visitor.

The interior is primarily of white walls that the Eames's decided to use as blank canvases to illustrate their ideas (Bradley, 2014). The facades are black-painted grids with different-sized inserts of glass (clear, translucent, or wired), grey cemestos panels (both painted and natural), stucco (off-white, black, blue, and orange/red), aluminum (silver or painted) and specially treated panels (gold-leafed or with a photographic panel) ("Eames House", 2017). The transparency and translucency of the glass consolidates easily with the colors and wood finishes. Color was a key tool used strategically as part of the house to capture the viewer's mind and eyes, by employing the use of a brilliant palette laying emphasis, and capturing certain areas it wanted to convey.

The residence was a showcase of the Eames's' tastes and design priorities. To understand easily the interior of the house, the living area is selected for analysis. The tables that follow below are descriptions under the four criteria; layout, material, furniture and color, which are the focus points in the study of the interior.

The Eames House is a fusion between architecture and its surrounding as Figure 4.46 shows. This American modern house has views from its exterior that makes the house look like colored boxes of steel. Its application of materials by the designers gives this house an industrial like feel from its exterior. In describing the layout shown in Figure 4.47, different zoning of each room/space is made. The analysis of its floor layout is explained in Table 17.

Figure 4.46. Exterior view of the Eames House

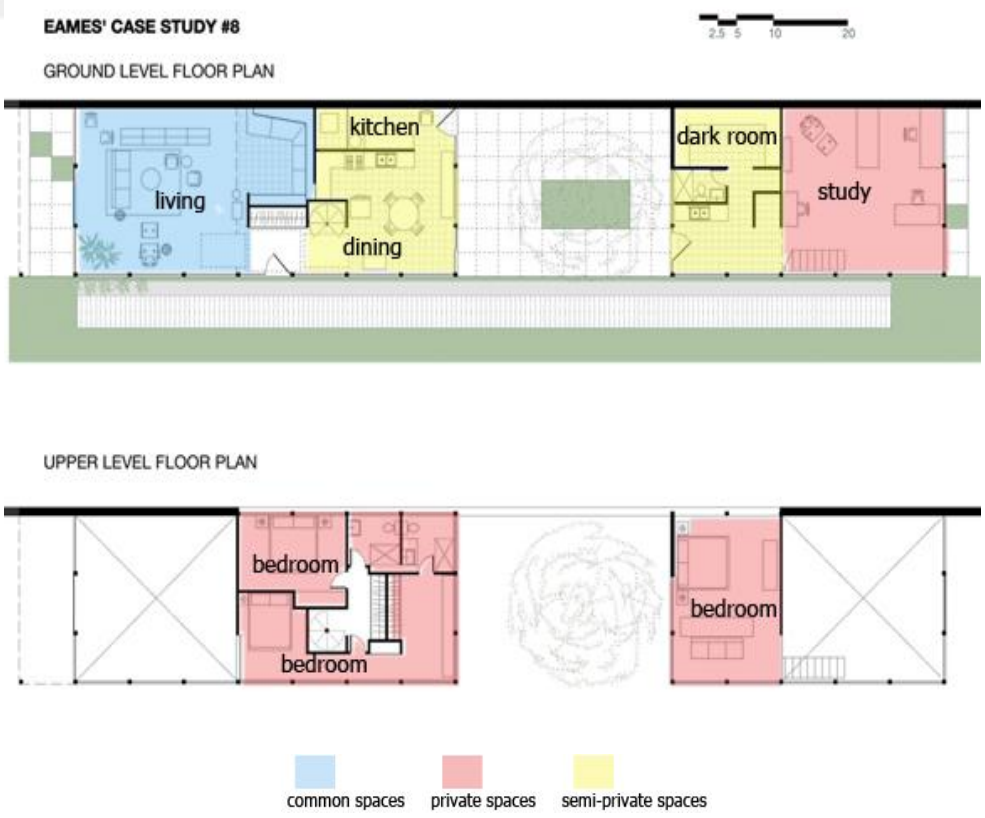


Figure 4.47 Floor plans of the Eames House

Table 17. Layout analysis of the Eames House (Case Study House #8)

Drawings/Images	Description
Architectural features (Figure 4.46)	The Eames House stands out in its surrounding because of its unique façade. The rectangular building is split into two parts; the living area and the working. The facades are essentially black-painted grids with glass pane inserts (clear, translucent, or wired), of different sizes, grey panels (both painted and natural), stucco (off-white, black, blue, and orange/red), aluminum (silver or painted) and specially-treated panels.
Interior characteristics (Figure 4.47)	The two-floor Eames House is a simple, yet beautiful continuation of space that flows seamlessly. The floor plan is simple, open and loft like. On the ground floor, the living room is double height with large windows that overlook the landscape. Just off of the living room is a smaller space or an alcove. The kitchen is completely open to the family room and the two spaces additionally have various windows that provide views of its landscape. The studio which is a separate building on its own is also double volume. The rooms flow into one another even between floors through the double-height spaces. Neither private nor common areas are entirely isolated. The private spaces (bedrooms) are semi enclosed so that those within the rooms can have privacy within their own house. The upper floor has three bedrooms, one overlooking the living room below. This loft size bedroom has its own private bath making it a good master bedroom or a study/guest room. Continuing to the upper level is also the study, which provides a large open space conducive for working.

The materials used in the interior of this house are a reflection of its surrounding, and the Eames's remained true to the ideology that 'truth to materials' is key in any design. In exploring some of these materials that add texture to a space, the living room of the Eames House is taken as an example, shown in Figure 4.48, and highlights in Figure 4.49 of the materials are made. Table 18 explains these materials.

Figure 4.48. Interior view of living area of the Eames House

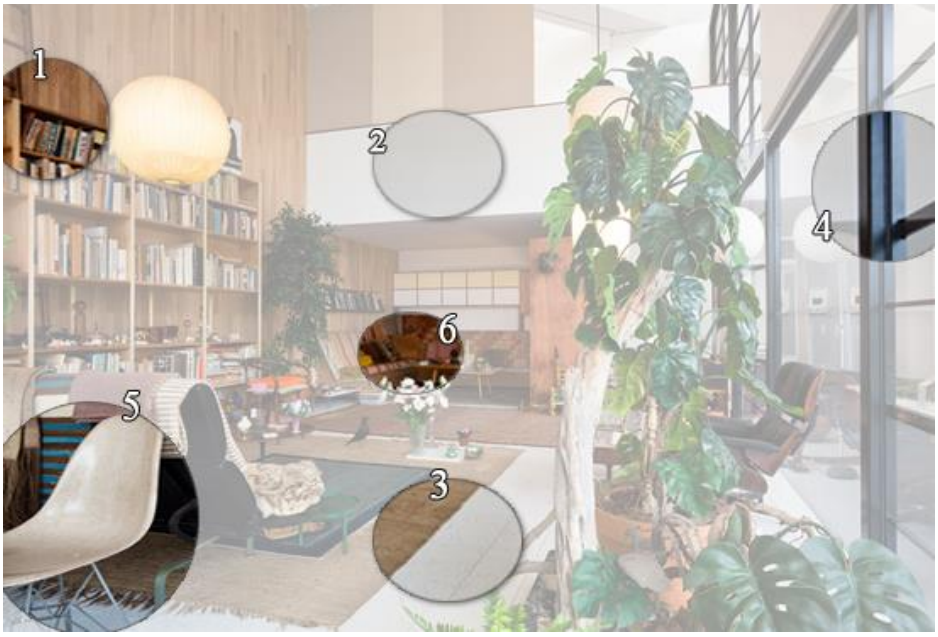


Figure 4.49. Analysis highlighting interior materials in living area of the Eames House

Table 18. Material analysis of the Eames House (Case Study House #8)

No	Element	Material	Description
1	Wall & Bookshelf	Wood	The Eames's furnished the house by using materials and techniques from World War II. The use of the off-the-shelf components can be seen around the house particularly in the large wooden bookshelf in the living room.
2 3	Floor	Linoleum tiles	The floor covering on the ground level is of white linoleum tiles which add to the openness of this space. Also, these same tiles are used in the balcony overlooking the living area. The use of area rugs is also exemplified in the space.
4	Windows	Glass	The windows in the living area are large windows that are almost ceiling height. Glass panels are used to allow light to flow in to the house freely.
5	Chair	Plastic	In terms of furniture, the use of new plywood and plastic materials that the Eames's developed was used. This is evident in the Eames molded chair which has become popular to this day in terms of its use.
6	Couch	Plywood	The Eames's loved to experiment with wood as this material could be shaped into any form dimmed fit and also because wood, a natural material blended with its environment. The couch which sits in the alcove has a wooden frame covered in upholstery. This wood gave the couch a base and did not fight other materials in this interior.

When it came to furniture design, the Eames's were well known to make curvilinear pieces used in their home. These pieces defined the space and the activities carried out there in, which Figures 4.50a & b depict. Some of the famous pieces by these designers that sit in the living area are the Eames Chair (4) and the Lounge Chair (6). Other furniture that makes the living space of this house welcoming, are described in the Table 19 that follows.

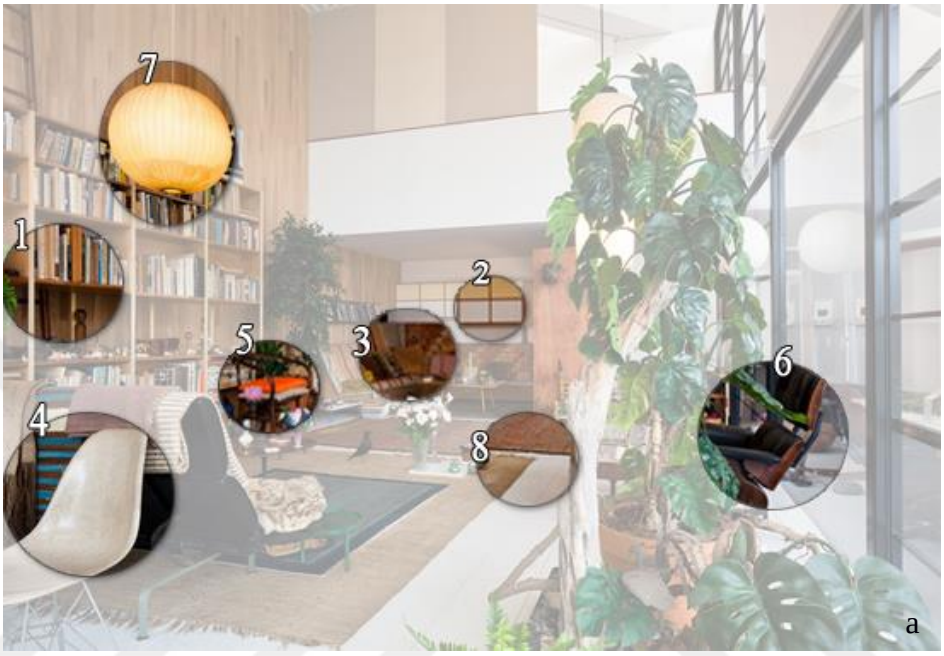


Figure 4.50. Analysis highlighting furniture in living area of the Eames House

Figure 4.50. Analysis highlighting furniture in living area of the Eames House

Table 19. Furniture analysis of the Eames House (Case Study House #8)

No	Furniture	Description
1 2	Bookshelf Cabinets	The furniture consists of various volumes and forms which are rooted in the Eames's learn-by-doing process and their experimentation with a broad range of materials in their furniture designs. Consequently, the furniture also represents their philosophy of honest use of materials.
3 8	Couch	The design of the house matches the furniture made by the designers themselves. Under the alcove which is the corner of the living room, is an L-shaped couch which in itself provides sitting comfortability for its user.
4 5	Eames Chair Arm Chair	The Eames molded chair (4), is a side chair made from a fusion of craftsmanship and available technology in the 40s. This chair combines wired metal legs, molded plywood and epitomizes human comfort in its design and application. The arm chair (5) is also designed from molded plywood and gives its user a rather natural and relaxing feel to the human body.
6	Lounge Chair & Ottoman	The Lounge Chair & Ottoman is one piece of furniture famous to the Eames's. The Lounge chair has a relaxed form, reclined back and soft, round lines that indicate warmth and comfort to its user. Made of metal, leather and molded wood, this chair is a beautiful expression of the Eames's timeless design.
7	Rugs	Fabric use is a common feature around this space. The living area is adorned with two brown area rugs on the floor which add a different texture to surfaces in this space.
8	Pendant Lights	Lighting was not left out in the living room. Hanging from the double volume ceiling are two spherical pendant lights. They give the space color and also add a different dimensionality of form to the rectangular space.

The colors of interior elements in the Eames House set a tone for a house that is warm, airy and refreshing. Taking a look into the interior colors of the living room, they create a space that is vibrant, refreshing and very much in cohesion with its outside. In analyzing the colors for this interior space, a color bar (Figure 4.52) indicates the overall colors, with reference to Figure 4.51. The estimated values of RGB codes for these colors tones are given, while Table 20 explains the colors and the objects in which they are applied.

Figure 4.51. Analysis highlighting interior colors in living area of the Eames House

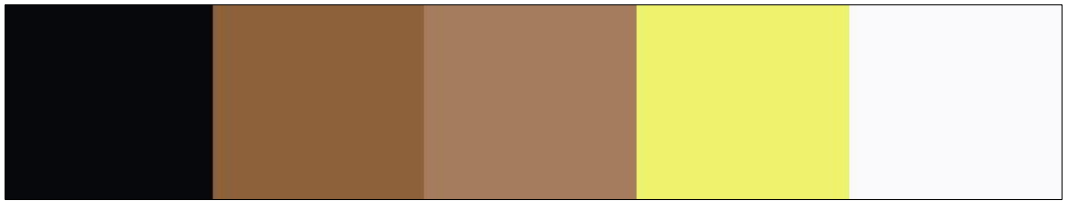


Figure 4.52. Interior color scheme for the Eames House

Table 20. Color analysis of the Eames House (Case Study House #8)

No.	Element	Color	Description
1	Bookshelf	Brown RGB (165,124,94)	The transparent and translucent nature of the glass effortlessly blends with the colors and wood finishes. Color was a strategic tool; capturing both the eyes and minds of viewers. Different tones of brown can be seen in this exciting interior in the bookshelf, the wood cladded wall in the alcove and the brown area rug in the living area.
2	Wall	Brown RGB (141,97,58)	
3	Floor	White RGB (250,250,252)	The interior of the house is warm and comforting with the use of white used in floor and the balcony wall. This gives the room an added freshness with the use of the clean color, lacking ornamentation, and is kept free
4	Balcony		
5	Cabinet	Yellow RGB (234,242,109)	The Eames also made minimal use of Mondrian colors not only in the exterior but also interior of the house. Black, orange, yellow and blue colors are seen in little details of the house; the blue blanket on the black couch, the orange chairs that sits facing the window, and the yellow shelving units.
6	Chair	Orange RGB (237,88,13)	
7	Lounge Chair	Black RGB (7,8,12)	The Eames Lounge chair is a combination of leather and wood. The dark rich black leather compliments the brown wood frame and gives it a warm receptive look. The chair also offers comfort and style to this interior space.

4.3.2.1. Philip Johnson

Philip Johnson (1906-2005) was born in Cleveland Ohio, USA, and known to be a historian, author and the first director of the architecture department for the Museum of Modern Arts ("Biography: Philip Johnson", 2017). Philip's fascination with architecture was influenced through his travel around Europe which would later shape his architecture style and appreciation for modernism. In 1932, alongside Henry Russell Hitchcock, together, both authored the book 'The International Style', which presented the European modern movement as a set of formal rules (Samson, 2004) that American architecture and life style was adapted to. When speaking on the history of modernism in America, Philip Johnson is a name that plays a key role in its establishment. worked alongside other famous designers of the 20th century and collaborated with Mies van der Rohe in the 50s, to design America's finest high-rise building in New York, the Seagram Building ("Biography: Philip Johnson", 2017). Some works by Philip Johnson include: 1949 Glass house, Connecticut, 1958 Seagram Building (with Mies van der Rohe), in New York, 1980 Crystal Cathedral, California and 1984 Transco Tower, Texas, among others. The procession from one pavilion to the next is what gives this estate a remarkable feature.

Johnson curated an exhibition titled 'The International Style: Architecture since 1922' as an introduction to modernism in modern day America ("Biography: Philip Johnson", 2017). The International Style as modernism was referred in America had its own style adaptive to the American culture though it still shared some similarities to European modernism that it came from. Johnson however was under criticism for de-radicalizing modernism and reducing it to something that was value-free in the history of style or taste (Samson, 2004). He was not deterred by these critics but rather took his stance on architecture by looking at it from an art perspective. His approach to design was based on three principles:

1. Procession, enclosures and revelations, which is created by the way a person experiences a person encounters while walking through a space.
2. Treating buildings like caves, thereby insisting that each space be comfortable and secure for its user (s).
3. That architecture is sculpture and an art, where buildings are expressions of the artist's views or ideas (Bevk, 2008).

Johnson's approach to design was to accept modern building technology through art. His strongest personal style in design was achieved from a history of art, comprehended as the history of form and the artist's place in society (Samson, 2004). The knowledge of art played a significant role in shaping Johnson's career and his fusion of art and minimalism made him take architecture to new heights. During the 1950s and 1960s, Johnson began to challenge modernism and embrace his love of history thereby experimenting design in new ways (Bevk, 2008). He tried to make connections between architecture and sculptural form, with his greatest influence as an architect being his use of glass.

4.3.2.2. The Glass House

In 1949 for his master thesis, Johnson designed his own residence in Connecticut, USA which is now famously known as the Glass House ("Biography: Philip Johnson", 2017). Figures 4.53 and 4.54 are maps showing location of this house.

Figure 4.53. Map showing location of the Glass House

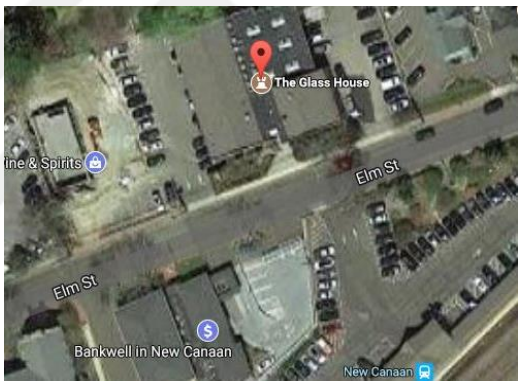


Figure 4.54. Location of the Glass House

The Glass House ushered the International Style to residential American architecture ("The Glass House", 2017), where its mission by Philip Johnson was for it to become a basis for the preservation of modern architecture, landscape, and art. The Glass House was part of a series of buildings the architect designed to be part of an estate in New Canaan. The first building completed on the property was the Glass House in 1949, and the brick guest house in 1949, which was remodeled in 1953. Over the years, Johnson added to the estate, the 1962 lake pavilion, the 1965 painting gallery, the 1970 sculpture gallery, the 1984 studio, the 1985 Lincoln Kirstein Tower, and the 1985 ghost house (Lewis & O'Connor, 1994). The Glass House which was Johnson's own residence is a classic example of modernism in America. The house

is serene and basic, and an architecture that engages its surrounding. In his first attempts for the design of this house, Johnson came up with twenty-seven designs, where he finally settled on a design similar to Mies van der Rohe's Farnsworth House, who was Johnson's influence (Bevk, 2008). The design of the Glass House features simplicity, clarity in structure, continuous space, lack of ornamentation, and the latest building technologies such as radiant coils in the floor and ceiling for winter heating (Lewis & O'Connor, 1994).

In Johnson's design of the Glass House, he considered the house a platform to provide a view of the landscape. The minimalistic house is 16.8 meter-long and 10.1 meter-wide ("The Glass House", 2017). It is 166.5 meter-square in area, and a perfect rectangular form constructed of quarter-inch sheets of glass with a frame of steel painted black (Bevk, 2008). The floor plan of the Glass House is a traditional living space with no internal walls. There are spaces for a living room, dining room, kitchen, bedroom, fireplace, bathroom, and an entrance area ("The Glass House", 2017). The layout for this house follows a very straightforward and clear pattern void of any obstructions. Upon entrance, the perimeter of the house has a round brick column which forms half the fireplace and the bathroom, extending beyond the column is the sleeping nook (Bevk, 2008). The focal point of the house is the living room which is the center from which the site is occupied: living room, house, courtyard, and landscape ("The Glass House", 2017).

The overall arrangement and planning this housing interior was based off a simple Miesian arrangement. Materials mainly used in this house are industrial materials; glass, steel, concrete, brick, earth and stucco. Located at the center of each glass wall is a door that opens to the exterior. There are no windows in the house and ventilation is created by opening the doors within spaces (Bevk, 2008). The transparent glass panels were the largest in size at that time (Lewis & O'Connor, 1994), its use in the house creates reflections of its surrounding and clear views of the inside. The built-in storage cabinets that separate the bedroom from the living room is made with walnut veneer ("The Glass House", 2017), which unifies landscape with the interior. A large cylindrical column made of brick adds dimensionality to the rather open interior. The brick floor laid out in a herringbone pattern is raised 234 millimeters off the ground (Bevk, 2008).

Most of the furniture pieces in this house made of wood, leather and chrome were designed in 1930 by Mies van der Rohe and came from Johnson's New York apartment ("The Glass House", 2017). The furniture is in contrast with the surrounding landscape and its placement throughout the house is precise and well thought out. The living room is defined by seating around a low table, which anchors the space ("The Glass House", 2017), and depicts specific placement of other furniture designed by Mies van der Rohe over a white rug. Other furnishings in the living room are two pieces of art, a Poussin landscape on an easel and a sculpture by Elie Nadelman (Bevk, 2008). The kitchen corner is created by a stretch of free-standing cabinets, and dining table and chairs that make up the fourth corner. The room with the greatest privacy is the bedroom, which has a small desk and is separated from the living room by built-in storage cabinets ("The Glass House", 2017).

Design of the Glass House reflects space, light, and flexibility. Color was not considered a major component of design in the interior spaces. Additional pieces of furniture are what add color to this house. The dark rich tones of brown come from the use of brick and the chairs that sit in the living room.

In analyzing the interior of the Glass House based on the four section criteria for this study, the tables that follow describe these with reference to layout, materials, furniture and interior colors. This analysis describes the features in the space, providing information as to how the interior reflects modernist ideologies.

Philip Johnson's Glass House is an architecture that is harmonious. The design of this house is similar to a simple glass box, exhibiting clarity, with an indoor-outdoor relationship, as Figure 4.55 shows. The landscape surrounding the house gives it a sense of calmness. In analyzing the floor layout of this house, Figure 4.56 is the floor plan of this house, with spaces differentiated with different colors in order to clearly define each function of the space. Table 21 further goes to describe the floor layout.

Figure 4.55. Exterior view of the Glass House

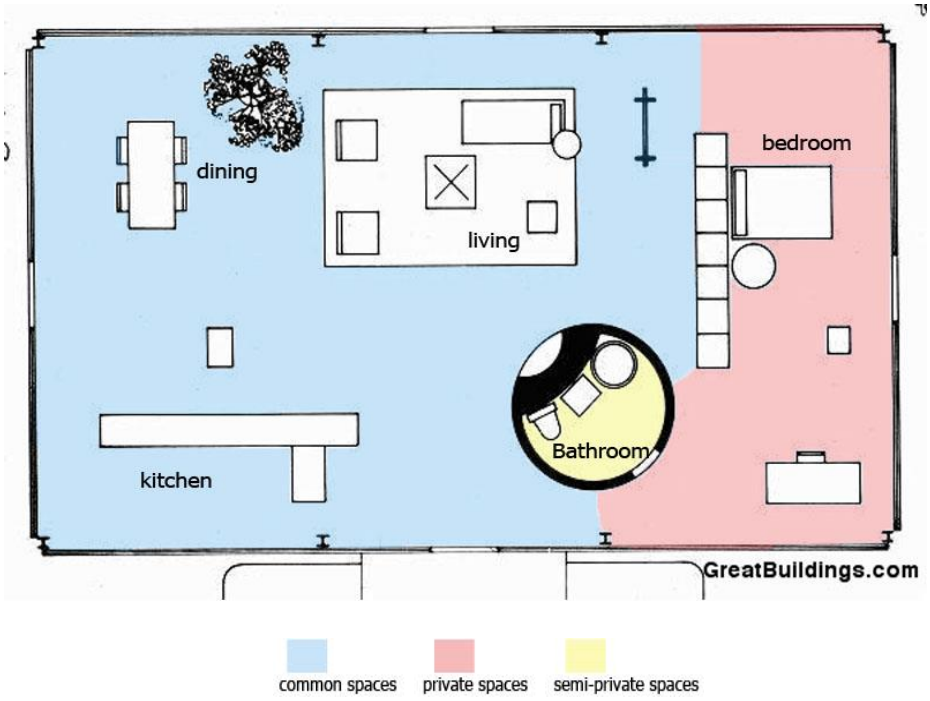


Figure 4.56. Floor plan of the Glass House

Table 21. Layout analysis of the Glass House

Drawings/Images	Description
Architectural features (Figure 4.55)	The concept for the Glass House started because of the land present; its landscape influenced its design. The idea for this residence was conceived to enable its users view the surrounding landscape hence his use of glass for the shell of the structure. Johnson considered the interior-exterior relationship which was paramount in its design and saw the landscape as a means to visually extend the interior space. Like furniture, landscape was an important part of the interior. The Glass House had no exterior walls and its glass shell transforms the house into a transparent structure.
Interior characteristics (Figure 4.56)	Johnson created a continuous expanse of space along with functional usage, a scheme that was not commonly practiced during its time. He defined compact spaces for relaxing, entertaining, cooking, sleeping and bathing. The layout of this house shows that there are no internal separation walls, only for the bathroom that is a closed off space. Every space in this house consists of highly functional areas identified and defined by arrangement of furniture. This feature, which was also very unusual in 1949, had no enclosed or private areas, except for the bathroom. The plan is a rectangle that enables views of its surrounding from any point in the house. There are no defined windows or doors in this house, but the main entrance is from an opening in the glass wall at one end, and windows at opposite ends of the house to provide sufficient ventilation.

Industrial materials present at the time were used in the construction of this house and some of its interior elements also, which Figure 4.57 depicts with this interior. Highlighted materials are also shown in Figure 4.58. Table 22 lists some of the materials found in the living space, and gives a description of their application in the interior.

Figure 4.57. Interior view of living area of the Glass House

Figure 4.58. Analysis highlighting materials in living area of the Glass House

Table 22. Material analysis of the Glass House

No	Element	Material	Description
1	Ceiling	Concrete	This horizontal element provides the entire house with an uninterrupted solid feature that embraces an industrial atmosphere. The concrete ceiling is bold and gives the space a warehouse-feel above.
2	Walls Doors Windows	Glass Steel	This all-glass house is made up of transparent walls, with steel frame window and door openings made in the glass walls. These openings are also used in providing ventilation in the house. The use of glass panels allows views of the outside into the interior and creates open and well-lit spaces.
3	Fireplace	Brick	This fully enclosed cylindrical room, which is part bathroom and fireplace, is made of bricks and its curved shape stands out in the rather box design. This brick element adds an earthy feel to tie in the spaces.
4	Storage cabinets	Wood	Wood minimally used in storage cabinets, is also a material that is in cohesion with its surrounding. It provides the decorative note to the living and bedroom spaces.
5	Rug	Wool	The rug in the house adds an element of softness to the living area. The combination of this material gives a smooth feel to the human touch.
6	Barcelona Chairs	Leather Chrome Steel	These chairs designed by Mies van der Rohe are ideal in strength, durable and perfect in a scale which imports a feeling of elegance and lightness.
7	Floor	Brick	The floor in the Glass House is of brick in a herringbone pattern, adding texture to the rather open space, giving this horizontal element dimensionality. The brick floor conducts heat well and under the floor the house has a hydronic radiant-heat system in which hot water flows through pipes.

When it comes to the furniture of this 20th century house, the pieces reflect simplicity but eloquence in design. The pictures below are different views or the Glass House. These images (Figures 4.59a & b) are used in describing the furniture in this interior and also how they define the space, with Table 23 giving descriptions of these pieces.

Figure 4.59. Analysis highlighting furniture in living area of the Glass House

Figure 4.59. Analysis highlighting furniture in living area of the Glass House

Table 23. Furniture analysis of the Glass House

No	Furniture	Description
1 2 3	Barcelona Chair Daybed Ottoman	The Barcelona Series designed by Mies van der Rohe, are placed to form an intimate seating area for easy conversation and the lounge option. The chairs of steel and leather are simply designed to give its user comfort and exude a sense of rich style.
4	Painting	The painting by Nicolas Poussin overlooks the sitting area and shows a landscape that evokes a view similar scene to that when viewed from the windows inside the house. It sits on an easel so that its base meets the horizon line outside. The easel is an ideal solution in hanging art in a house with no walls to hang things on.
5	Storage cabinets	Johnson used a long wooden storage cupboard that separates the bedroom and the living room. The cabinet, also serves as a headboard for the bed, holds beddings, and household supplies.
6	Dining Set	The seating area overlooks a dining table, where the dining chairs of steel and leather are in scale which complements this space in the house. The table is simple in its design with clean and straight lines.
7	Kitchen cabinets	The kitchen cabinets Johnson devised involved a compact but extremely functional galley, where he figured out a way to hide appliances. A wood countertop folds over the sink and stove, tucking them neatly away.
8	Sculpture	A large sculpture piece of 'Two Circus Women' by Elie Nadelman is positioned towards the entrance to the house. This personal piece Johnson bought reflected his taste and value for art. It added a sense of beauty to the space, making it feel comfortable and beautiful.

Color did not play a defining role in the design of Philip Johnson's Glass House. However, colors were derived in their true nature from the materials used. Variations of different tones of browns come from brick and wood used. A color bar code (Figure 4.61) gives an idea of the overall colors for the living room interior. In order to establish the interior color palette, estimated values of RGB codes are given from the image provided (Figure 4.60). Table 24 briefly describes these colors and where they are used.

Figure 4.60. Analysis highlighting furniture in living area of the Glass House

Figure 4.61. Interior color scheme for the Glass House

Table 24. Color analysis of the Glass House

No	Element	Color	Description
1	Ceiling	Grey RGB (155,152,135)	The overall color of the living area is made up of colors which have darker tones. These tones tie in the light interior of the house. The ceiling is of a grey color which is in harmony with its outside surrounding.
2	Wall Frames	Black RGB (16,19,21)	The glass panels which form the walls for the house are supported by a steel frame painted black. The dark color helps form demarcations in the walls for openings.
3	Fireplace	Brown RGB (95,37,2)	The earthy tones of a dark and rich reddish brown continue around the house with the bricks used for the fire place and bathroom. Since the space is rather open and airy, this vertical structure in these colors act as a visual barrier to the viewer and provides a contrast away from the monotonous interior.
4	Floor		
5	Chairs	Brown RGB (90,67,38)	Varying tones of brown can be seen I the storage cabinets and the leather seats. The brown color which add texture to the open space.
6	Storage Cabinets		
7	Rug	White RGB (253,250,250)	The white in this interior comes from the rug placed in the living area. The white is a vibrant and refreshing color which breaks away from the rather darker and heavier colors.

4.4 Modern Housing Interiors in the 1950s

The International Style was still wide spread in America, and an architecture of ideas, created by modern architects who had fled the war. They believed this style could be a vehicle to bring about social change to create a better society. By the 1950s, modern architecture had become a popular phenomenon that had lost its shocking newness; designers critiqued domesticity by removing solid walls, extending views and opening up floor plans (Allaback, 2014). The modern architects of this era experimented with new materials like wood composite, steel, reinforced concrete and larger sheets of clearer glass (Lubell, 2016). The extensive use of glass and open plan design concepts was a feature designers used to tie interior spaces with its surrounding, thereby creating a connection with nature. Interior spaces were opened up to landscapes through glass doors, clerestory windows, and seamless porches, merging indoor and outdoor living into a whole. Architecturally, the domestic space enjoyed interiors that were considered a luxury at that time (Allaback, 2014) having flat planes and changes in elevation (split levels). The architects and designers of the 1950s had created something different; an industrial-inspired styled that was lighter, straightforward and more appropriate to its time and place (Lubell, 2016).

In order to discuss the 1950s characteristics of the modern housing interior, two examples are chosed; the Miller House by Eero Saarinen and the Farnsworth House by Mies van der Rohe. These interiors which are the focus point in this study provide views as to how these designers approached their housing interior during the modern era.

4.4.1. Ludwig Mies van der Rohe

Ludwig Mies van der Rohe was born Maria Ludwig Michael Mies; (March 27, 1886 – August 17, 1969) in Germany and was a German-American architect (Johnson, 1978). Growing up, he learned the trade of masonry construction from his father a master mason, and also gained some experience of wood construction working as an apprentice with Bruno Paul (Schulze & Windhorst, 2012). His architectural career started as an apprentice at the studio of Peter Behrens from 1908 to 1911 (Cambra 2014), where he became exposed to the design theories of German culture. In 1929 for the International Exposition at Barcelona, the architect designed the German

Pavilion, one of the most influential masterpieces of modern architecture. It was for this pavilion that he designed the famous Barcelona chair (Johnson, 1978). He had a talent that was quickly recognized and he soon began independent commissions. He served as the last director of Berlin's Bauhaus School, and together with Le Corbusier, Alvar Aalto and Frank Lloyd Wright, he is widely regarded as one of the pioneering masters of modern architecture (Cambra, 2014).

Mies van der Rohe, with a talent and self-taught education, established his roots and an early architectural career in Germany and became a leading architectural representative in his home country. However, a world economic crisis and the rise of German National Socialism destroyed the modernist program in central Europe. By the mid-1930s he could no longer afford to ignore invitations by academic institutions outside Germany (Schulze & Windhorst, 2012). The architect left Europe and all he knew; his family, colleagues and an architectural practice of about 20 years he was accustomed to. He then moved to the USA which would be the beginning of another architectural chapter in his life. Shortly after putting down his roots in the United States, Mies van der Rohe was building with artistic freedom and emerged an architectural force in America.

During his second career, this architect believed he had developed a new architectural language; a set of principles that reflected the realities, values, and possibilities of what he called ‘the epoch’ (Schulze & Windhorst, 2012). His architecture was characterized with a minimal structural framework balanced against the freedom of free-flowing open space. It is generally acknowledged that Mies van der Rohe was the most influential architect in the years following World War II, and one of the great pioneering architects of the modern movement (Johnson, 1978). He called his buildings ‘skin and bones’ architecture, and is often associated with his quotes, ‘less is more’ and "God is in the details" (Schulze & Windhorst, 2012, p. 205). Mies van der Rohe’s works include, among others: Barcelona Pavilion Spain (1929), Farnsworth House (1953), Tugendhat House Brno (1940), Toronto Dominion Centre, Toronto (1967) and IBM Plaza and Office Tower, Chicago (1972),

The architect, in the same way as his peers after World War I, looked to create a new architectural style that could speak to modern times similarly as classical and gothic styles represented their own eras (Cambra, 2014). Ludwig Mies van der Rohe described his philosophy of architecture as Baukunst (the art of

building); ‘bau’ meaning the construction and ‘kunst’, a refinement of the building (Schulze & Windhorst, 2012). The refinement this architect referred to meant that for sound architecture to emerge, it is dependent on its structure, therefore, laying great emphasis on the structural aspect of his buildings. Pioneering architectural modernists, like Mies van der Rohe, sought to solve functional problems within a pre-determined building skin (the glass curtain wall according to the architect). It is classicism stripped of its traditional ornament, but also takes a skin and attempts to fit function into it (Kornblatt, 2011). Mies van der Rohe created an influential 20th century architectural style, which stated buildings with extreme clarity and simplicity, made use of modern materials such as industrial steel and plate glass to define interior spaces (Cambra, 2014).

The architect characterized his architecture by the simple use of structural elements taking the composition of geometry as a key point. The proportionality of objects takes an important role of basing its dimensions on the absence of ornamentation. He employed stone, marble, steel and glass in its absolute purity and used concrete (Cambra, 2014) as either a structural element or as an exterior material. In 1912, Mies van der Rohe met Theo Van Doesburg whose abstract paintings had an influence on the architect’s designs, by reducing forms and cleaning (refining) up the designs of the buildings (Schulze & Windhorst, 2012). The architecture resulted of this inspiration is based on rooms that are never closed, always looking for integration with the environment

Mies van der Rohe’s architecture was personal and his works a product of his own searching solitude. His architecture insisted on objectivity and the central role of a clear structure; his projects and professional influence remain a legacy. One of his residential buildings, the Farnsworth House, well known in the USA, is the focus of study for the housing interior.

4.2.1.1 Farnsworth House

The history of Mies van der Rohe's architecture in the United States involved the development of highly rationalized building types based on the design of structure (Johnson, 1978). Among his residential buildings in the USA, the architect designed the Farnsworth House completed in 1951, as a weekend retreat in Plano, Illinois (Figures 4.62 & 4.63) for Dr. Edith Farnsworth an unmarried woman in her mid-

forties (Friedman, 1998a).

Figure 4.62. Map showing location of the Farnsworth House

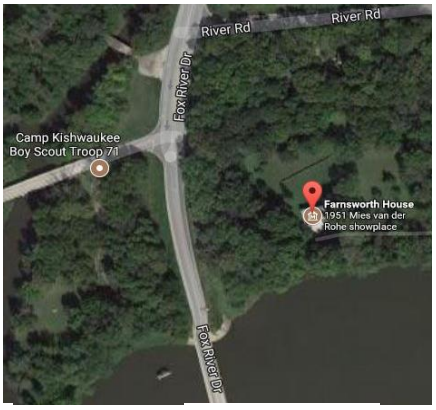


Figure 4.63. Location of the Farnsworth House

The Farnsworth House is located 80.5 kilometers west of Chicago, in the middle of a grassy meadow on the bank of the Pox River (Friedman, 1998a). The house is a true embodiment of Mies van der Rohe's 'less is more' principle, and the exploration of the relationship between people, building, and nature. The Farnsworth house is a transparent box of glass and steel, 1.5 meters above the ground, with an easy distribution that makes the house seem to float above the garden (Cambra, 2014). The perimeter wall of the house is all-glass with no partitions touching the surrounding enclosure; that is, there are no solid exterior walls. The roof and floor of the house are connected by eight columns of steel (Cambra, 2014) with a suspended staircase that connects the house with its surrounding. Partitions are created in the house with draperies on a perimeter track that allow provision of full or partial privacy (Friedman, 1998a). The house is encased in glass with the only openings being a door on one short side of the residence serving as the entrance, and two small windows on the opposite wall of the house.

The layout of this house is completely free, as Mies van der Rohe used the open-plan system in its floor layout. This created a seaming-less free flow within the interior of the house and tied the interior to exterior, creating views of the latter from within the house. The interior is one large room 23.5 by 8.5 meters, subdivided by a freestanding wooden core, which encloses two bathrooms, a fireplace, and a kitchen. This block at the center and a lower bank of cupboards at the far end of the house screen and subdivide the space to some degree, but the living areas remain essentially open and unbounded (Friedman, 1998a). A fireplace is positioned within

the open space to suggest living, dining and sleeping spaces without using walls (Schulze & Windhorst, 2012). The free flow of space within the Farnsworth House was an expression of Mies van der Rohe's idea to create an inside space that was reminiscent of its outside; just like surrounding that had no confinement.

This small masterpiece is evident to the world of architecture that exposed industrial steel and glass where materials were capable of creating architecture with emotional impact. What makes up the most used material in this residence is the use of glass. On all four sides of the living box, a thin membrane of glass forms the boundary between inside and outside, and allows views of the outside (Friedman, 1998a). The structural frame and all-glass walls define a simple rectilinear interior space that freely allows nature and light into its interior. Travertine floors, wood walls and cabinets, leather and chrome furniture give this house a luxurious ambience. Wood, a natural material is used in a paneled fireplace (Schulze & Windhorst, 2012), which houses mechanical equipment, kitchen, and toilets.

Modern furniture pieces designed by the architect, involved the use of new industrial technologies that have over time, become popular; such as the Barcelona chair and Ottoman, the Brno chair, and the Tugendhat chair. His pieces are known for fine craftsmanship and a mix of traditional luxurious fabrics like leather combined with modern chrome frames (Friedman, 1998a). In the design of his pieces used in the Farnsworth house, his furniture shows a distinct separation of the supporting structure and the supported surfaces. Mies van der Rohe employed the use of cantilevers to enhance the feeling of lightness created by delicate structural frames. During this period, the architect collaborated closely with interior designer and friend Lilly Reich (Schulze & Windhorst, 2012), to work on its interior.

The building influenced the creation of other modernist glass houses, especially the New York Glass House by Philip Johnson. His minimal framework structures state clarity and simplicity, and the use of materials that express their own individual character. The iconic Farnsworth House is considered among the architect's greatest works and an embodiment of his vision for modern architecture. To understand the modernity of interior characteristics of this house, tables are used to describe its features based on the selection criteria for this study.

The Farnsworth House is an architecture that embodies building with nature (Figure

4.64). Its design is a true reflection of minimalist architecture both in its interior space and its exterior. The floor plan shown in Figure 4.65 is given to analyze the interior layout of this house. Spaces are indicated by different colors to indicate how zoning was made. Table 29 summarizes the features of this house in terms of its architectural features and its plan layout.

Figure 4.64. Exterior of the Farnsworth House

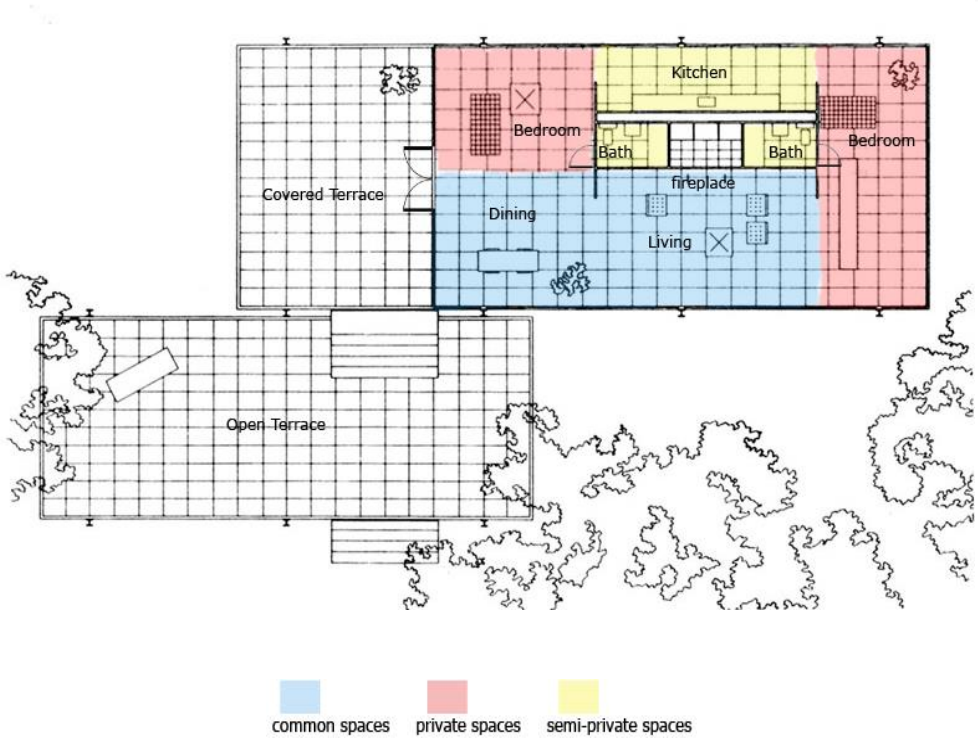


Figure 4.65. Floor plan of the Farnsworth House

Table 29. Layout analysis of the Farnsworth House

Drawings/Images	Description
Architectural features (Figure 4.64)	According to Mies van der Rohe, the Farnsworth House is a representation of both the International Style of architecture and the modern movement's desire to fuse efficient design of a structure with its surrounding nature. This 20th century modern house is considered a glass box residence with its minimalistic design. The structure of the house comprises of clear glass panel with the support of steel columns. The Farnsworth house with its continuous glass walls is an interpretation of purity.
Interior characteristics (Figure 4.65)	The floor plan of the Farnsworth House is based on an open-plan system that the architect incorporated as a means to tie the interior of the house with its exterior. The house truly reflects the living style of its owner Dr. Farnsworth who was single at that time. The entire open house plan has a living area, kitchen, dining, bedrooms and bathrooms, which all flow interchangeably. There are no internal walls in the house thus creating a life style with a mix of these spaces. The common areas (living and dining) are positioned along one of the longer sides of the house. A fireplace in the living room keeps this space cozy and warm. At the opposite side of the living room is a long kitchen, though not traditional, it serves perfectly in keeping the interior homely. The bathroom and fireplace are located in the center of the house and form a core. Both sleeping areas are at either shorter ends of the house, forming a compact space with just the necessities to relax and enjoy the view.

The design of this house interior (Figure 4.66) also reflects minimalism when it came to use of materials. Mies van der Rohe allowed the true nature of the materials to shine through and used steel, glass and wood which are highlighted in Figure 4.67. In describing the materials and their application, Table 30 provides clear descriptions of this.

Figure 4.66. Interior view of the Farnsworth House

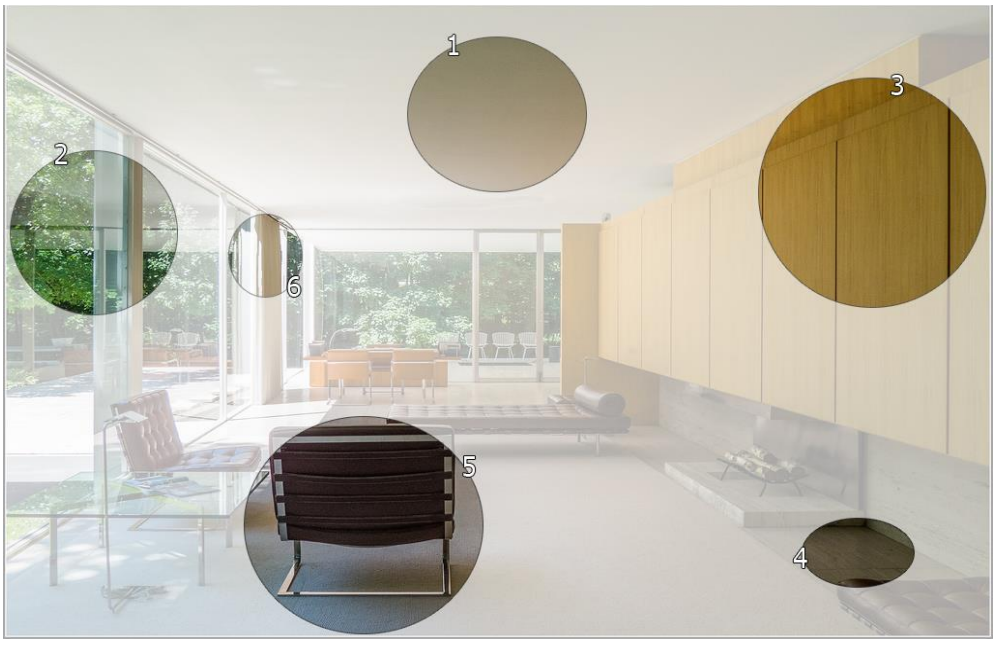


Figure 4.67. Analysis highlighting materials in living area of the Farnsworth House

Table 30. Material analysis of the Farnsworth House

No.	Element	Material	Description
1	Ceiling	Concrete	The roof/ceiling of the house is industrial concrete painted white to add stability and a touch of airiness within the house.
2	Wall	Glass Steel	Glass makes up the entire perimeter of this residence with steel columns. The atmosphere created within the house is open, airy and a seamless intertwining with its views of landscape.
3	Wall	Wood	The only internal wall within the house is a wooden enclosure that makes up the bathrooms and fireplace. This stands as a one large structural piece within the rather 'naked' interior. The openness created by the glass allows the richness from the wood permeate around the house.
4	Floor	Stone	The architect's conception of space was impressed by his feeling for material. The travertine floor of the house gives a smooth feel that creates a luxurious space.
5	Furniture	Leather Chrome	Furniture pieces designed by Mies van der Rohe himself comprise of a steel frame or base, covered with dark leather. His keen eye on materials made his selection a unique one.
6	Curtains	Fabric	One material that was not considered as dense as the others is Mies van der Rohe's use of fabric to make drapery around the house, cinched to the ceiling on tracks.

Mies van der Rohe had an impeccable taste for design of furniture. His pieces embodied the human form by using shapes and materials to provide maximum comfort to its users. The Farnsworth House is not exempt when it comes to this. The pieces designed by this architect are highlighted in Figures 4.68a & b, and described in Table 31.

Figure 4.68. Analysis highlighting furniture in living area of the Farnsworth House

Figure 4.68. Analysis highlighting furniture in living area of the Farnsworth House

Table 31. Furniture analysis of the Farnsworth House

No.	Furniture	Description
1 2 3	Barcelona Chair Daybed Ottoman	Numerous pieces of furniture were designed especially for the house, by both Mies van der Rohe and his partner Lilly Reich. The Barcelona chair sits in the living area of the house in front of the fireplace, creating a warm and inviting space for its user. This chair in design exploits the flexibility of flat steel bands. The Barcelona Chair exudes a simple elegance that epitomizes Mies van der Rohe's 'less is more' ideal. This piece recognized as an icon of the modern movement, is an attribute, to the union of modern design and exceptional craftsmanship. Barcelona Chair and Ottoman, and several other versions of furniture by Mies van der Rohe, became prototypes in the development of modern furniture.
4	Storage Cabinet	The storage cabinet serves the sleeping areas and the living area. This built in storage unit forms the only enclosed space in the house. Viewing the interior makes this piece stand out and look like a giant sculptural piece to the airy interior.
5	Curtains	A softer element to this house is in the form of curtains or drapery. These are attached to the ceiling on steel tracks and are pulled over the glass walls for privacy or to shield excess sun from penetrating into the house. Since the house was rather open, this element allowed for privacy or a more closed space to be created. When closed, the interior becomes obscured from its landscape and its interiors are dark rich spaces on its own.
6	Dining Set	The Brno chairs reflect the ground-breaking simplicity of its original environment. Its design is a symbol of 20^{th}-century innovation, and encompasses a slender form, clean lines and simple but careful attention to detail. A table made of wood and steel legs also show lines that are straight and clean, providing a smooth surface for maximum use.

Color for Mies van der Rohe was not used as a determinant factor in his designs, as the interior of this house does not show a variety of colors, but gets it ambience from the true nature of materials. The architect was aware of the surrounding of this building and did not allow it to be disrupted with the color of the house or its interior fittings. The overall color scheme of this housing interior stems off of nature. The image provided (Figure 4.69) is the living area of the Farnsworth House from which the interior colors can be seen. To analyze these colors, a color scheme bar is provided (Figure 4.70), and explanations of these made in Table 32.

Figure 4.69. Analysis highlighting interior colors in living area of the Farnsworth House

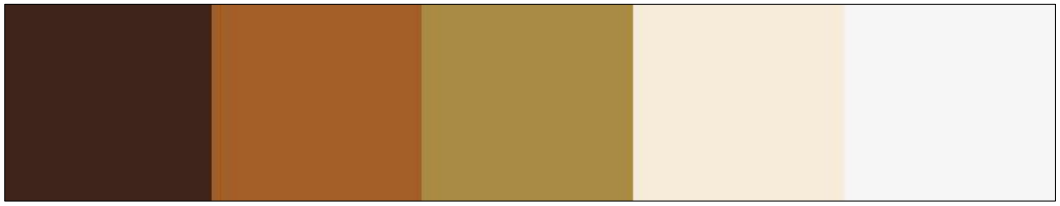


Figure 4.70. Interior color scheme of the Farnsworth House

Table 32. Color analysis of the Farnsworth House

No.	Element	Color	Description
1	Ceiling	White RGB (246,246,246)	The colors of interior elements in the Farnsworth House are pretty basic and minimalistic. White comes from the ceiling and the steel columns, which is a color that dominantly creates an interior that is clean and fresh.
2	Columns		
3	Floor	Off white / Cream RGB (247,236,217)	The off white color from the stone floor finish creates a marble effect to this element. It's off white/cream tone adds softness to the space, and the pattern and created give a luxurious finish to this house.
4	Wall	Brown RGB (169,139,68)	Interior colors in this Farnsworth House put the main emphasis in its surrounding landscape. Different tones of brown are seen around this interior in different elements. An example is the wall separating living and kitchen areas. The walls forming the enclosed space, is the most interesting element in this space. Its brown tone comes directly from the material it is made of; wood. Other rich tones of brown come from the leather upholstery used in Mies van der Rohe's furniture; the Barcelona chairs and the Brno chairs. The different hues of brown reduce monotony from having an interior dominated by browns.
5	Dining Set	Brown RGB (163,94,40)	
6	Barcelona Chairs	Brown RGB (62,36,27)	

4.4.2 Eero Saarinen

Eero Saarinen (August 20, 1910 – September 1, 1961) was a 20th-century Finnish American architect and designer, son of the architect Eliel Saarinen ("Eero Saarinen Biography", n.d.). Having immigrated to the US with his family in his early years, Saarinen had a background in arts and crafts atmosphere of the buildings designed by his father for the Cranbrook Academy of Art in Bloomfield Hills, Michigan, and except for a brief period as a sculptor, he practiced architecture with his father until his death in 1950 (Huxtable, 2010). From the 1930s onward Saarinen helped to introduce modern architecture to American practice through his buildings, and had a breakthrough in 1948, winning the St. Louis competition; which in turn became the pinnacle for the search of modern monumental expression (Pelkonen & Albrecht, 2007). The designer was considered a 20th century famous designer, who also engaged in furniture designer for Knoll International designing pieces like the 1946-47 "Grasshopper" armchair, 1947-48 "Womb" collection, 1955-56 Pedestal Group" ("Eero Saarinen Biography", n.d.). Saarinen was known for varying his style according to the demands of the project, creating simple and arching structural curves.

Saarinen pushed the boundaries and limits of modernism by taking its principles and extending them to extremes. Former New York Times architecture critic Ada Louise Huxtable wrote that Eero Saarinen 'pushed modernism's limits too fast, too far' (Huxtable, 2010). He departed from the conventions of modernist principles, which caused considerable unease among his peers; who acknowledged his talents but were uncomfortable with his buildings (Huxtable, 2010). He was noted for his neo futuristic style and his architectural legacy communicates this sentiment of giddy potential and unfettered optimism in post-war America, and became one of the most prolific architects of his time (Pelkonen & Albrecht, 2007). Some of his notable projects like the General Motors Technical Center, Warren Michigan (1956), the Miller House (1957) (explained in 4.4.2.1), TWA Terminal New York (1962), Gateway Arch, St. Louis, Missouri (1965), among others.

Eero Saarinen belonged to a group of modern architects who turned from modernisms abstract and formal constraints, in search of variety and visual effect (Pelkonen & Albrecht, 2007). His works show how he explored space in different ways and in the process, illuminate the core philosophy behind much of his work.

However, Eero Saarinen's place in the history of architecture has been a topic of debate among architectural historians. Architectural critic Vincent Scully criticized Saarinen's works for not having an identifiable style (Kornblatt, 2011). This is explained because Saarinen pushed traditional modernism, and approached each project in a way that was different from the other, and peculiar to its client, giving each structure an expressive dimension with vivid hues and exuberant details. With an approach to design, the designer represented an idealistic belief in a better future; he experimented with new materials and innovative technology to create sensuous forms. His solutions differed from project to project. Form was applied later in the design process of Saarinen's works, not just in immediate physical surroundings but in the meanings of a building's function in relation to the people interacting with it (Kornblatt, 2011).

For Saarinen, what led to his selection of form for any of his projects was his search for information related to the design a building and his careful studies of sites, their physical surroundings and cultural identities (Kornblatt, 2011). In the process of assigning form to a building after analyzing its function, Eero Saarinen was not limited to expressing what went on within a building, but establishing a relationship between a building and its surroundings. Saarinen took the three guiding principles of the time; functionality, honest structural expression, and awareness of time, and added his own; expression of purpose and meaning, relation to environment, and conceptualization (Kornblatt, 2011). These three he added were based on an extension to modernism, which connotes that 'function', could also be expanded to mean expression in a building. This means that modern buildings should not be limited to the use of simple structures or shells, but could also be functionally and structurally sound, yet express their purposes and meanings. Saarinen's projects are viewed as an essence to the aspirations and values of modern America, the Miller House and Gardens is selected with an analysis of its modern interior.

4.4.2.1. Miller House and Garden

The Miller House designed by Eero Saarinen is located in Columbus, Indiana, USA. This house was commissioned by business man J. Miller in 1953, and completed in 1957 (Kornblatt, 2011). The location of this house is shown on maps in Figures 4.71 and 4.72.

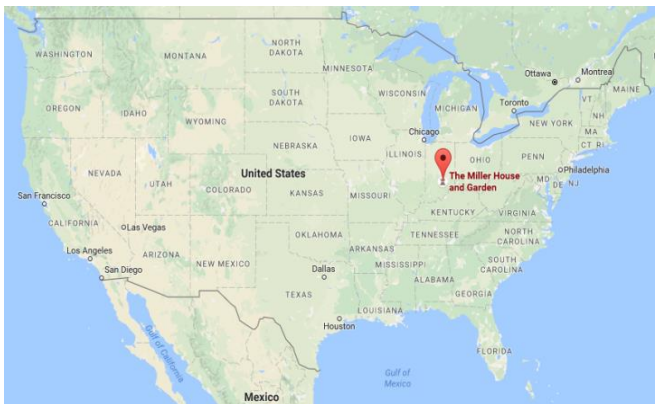


Figure 4.71. Map showing location of the Miller House

Figure 4.72. Location of the Miller House

The Miller House, a one story residence was designed for a single family. The design of the house is rectangular in plan, with a flat roof that overhangs the exterior walls (United States Department of the Interior, National Park Service, n.d.). Miller selected a 230 meter square site, with its landscape to serve as a buffer for the house. The design of the house sits on a 309 millimeter modular grid. The floor-to-ceiling windows Saarinen inserted on three sides fill the living room and dining room (Pelkonen & Albrecht, 2007). Like the Irwin Union Company in downtown Columbus, Miller wanted his house to literally be a reflection of the bank, and just like the bank, the house is subdivided into nine parts. At the bank, nine lit domes highlight the division of the plan, and the custom-designed Knoll furniture mirrors that module. At the house, the grid overhead and the grid below diverge. A 1.5 meter square grid is laid down across the house and all the walls, doors, windows, and cabinets follow its lines. However, these squares are stretched to create a grid of nine equal rectangles across the 24 by 30 meter space (Pelkonen & Albrecht, 2007). These nine rectangles have columns at each line, and a continuous skylight with a sandblasted glass diffuser that runs from fascia to fascia. (United States Department of the Interior, National Park Service, n.d.)

Just like the walls in the bank are glass, and the floor plan as open as possible, in the Miller House the glass is restricted to the center of each side (Pelkonen & Albrecht, 2007). In the nine-square plan, the corners are devoted to private spaces, each different in size, spiraling around the center of the house (Pelkonen & Albrecht, 2007). The parents and children's room, get one unit each, the guest and nanny get the third unit, and the kitchen and service areas the fourth. The carport utilizes the

center of the entrance (east) side. The remaining four sections of the plan are devoted to public functions; the dining room which is at the center of the north side, the living room at the center of the west side, and a recreation area in the center of the south side (United States Department of the Interior, National Park Service, n.d.). The bank featured one of the first drive-up teller windows in the USA, and in the Miller House, a drive-in garage with the same travertine floors as the living areas depicts this feature. In the 1959 February issue of House and Garden magazine, the public encountered the Miller House on the cover of this magazine, serving as the magazine's Hallmark House for the year (Pelkonen & Albrecht, 2007).

The visual richness provided by Saarinen's palette of materials and Alexander Girard's interior design radiates throughout this house. The house stands on a 3.5 meter wide plinth of terrazzo in cream color, which is raised only a few inches. The walls are of black slate and sandblasted with white marble, windows and doors that run from the floor to ceiling are of clear glass and brushed stainless steel frames (United States Department of the Interior, National Park Service, n.d.). The interior of the house is mostly made up of rich materials such as travertine floors, marble and plaster walls, and plaster ceiling. On the east wall of the living room is a long storage cabinet positioned to rest on a base of grey travertine floor. This storage unit is made with vertical panels of white plastic laminate, which has between them, in-filled walnut cabinet units and glass bookshelves. The sunken seating area in the living room is surrounded by grey travertine, and has off-white cushions. The steps into the conversation pit are layers of black walnut with thin layers of ebony alternating between them (United States Department of the Interior, National Park Service, n.d.). These materials give this house its vibrant feel.

Alexander Girard designed the rosewood storage wall, which runs the entire length of the entrance hall, serves to hold books, sculpture and paintings, and is set against gold silk and red tea paper. A television, bar, and stereo system are all hidden behind closed doors in this storage unit (Pelkonen & Albrecht, 2007) which were relatively common in modernist houses. The fireplace is an extremely minimalist cylinder placed off-center in the room near the storage wall. The plaster of the ceiling makes a smooth curve down into the plaster of the fireplace cylinder. The fireplace has a continuous folding glass screen (United States Department of the Interior, National Park Service, n.d.). This house encompasses some of the most fundamental aspects

of the international modernist aesthetic, which were architectural traditions Mies van der Rohe developed as a unified language.

The Miller House and Garden embody 1950s modernism in its fullest, a measure that comprises exhilarating space to move about in, visual richness to delight the eye, a total environment to nurture the spirits of the people who live in it. The tables below have been categorized under the four interior design characteristics to be discussed further; layout, materials, furniture and color. Each table has been analyzed based on the common area of the interior space selected from the Miller House.

The Miller House exterior features a flat roof and glass walls (Figure 4.73). From the outside, this house takes on the appearance of a white rectangular form that seems to be basic and clear. This housing interior includes an open and flowing layout (Figure 4.74), with descriptions of the floor plan made in Table 29.

Figure 4.73. Exterior view of the Miller House

Figure 4.74. Floor plan of the Miller House

Table 29. Layout analysis of the Miller House

Drawings/Images	Description
Architectural features (Figure 4.73)	The Millers wanted a home in which they could entertain different calibers of people. The house was to exude elegance, reflecting the rich taste of its client. In the design of the Miller house, Saarinen fully took into account modernist principles with an open floor plan, a flat roof and modern era materials such as stone and glass. From the exterior, the building showcases a very minimalistic shell. The white house which sits on the ground is in harmony with its landscape. This house eliminates a sense of separation between interior and nature through its use of huge panes of glass.
Interior characteristics (Figure 4.74)	The floor plan is essentially a grid in which each corner is used for a space that requires privacy, including the master, family and guest bedrooms. The arrangement of spaces acts as a systematic rectangle separated into nine sections or grids. The corners of these demarcations which are more zoned off include private spaces where the central grids serve as common areas of the house. The inside of the home incorporates a central-focal space, which is the sunken conversation pit, where four more private areas branch out from. These four sections include master bedroom suite, children's bedroom, kitchen/service area, rooms for guests/servants spaces, and a portion in the house functioning as a carport.

The Miller House is truly a modern interior that reflects a vast range of materials which makes this house an embodiment of American lifestyle, shown with the view of the living room interior in Figure 4.75. The materials used in this interior highlighted in Figure 4.76 expressed Saarinen's values. Table 30 lists and describes the interior materials used, that make this house stylistic.

Figure 4.75. Interior view of living area of the Miller House

Figure 4.76. Analysis highlighting materials in living area of the Miller House

Table 30. Material analysis of the Miller House

No	Element	Material	Description
1	Ceiling	Plaster	The concrete ceiling is finished with smooth plaster, a material common in the modern era.
2	Wall	Marble	The marble would look way too flashy if it was polished, but the matte finish makes it feel like velvet. And the veining pattern of the slabs becomes like wallpaper in the room.
3	Floor	Stone	The entire living area of the house is surrounded by travertine, which is a stone finish. This material is super-luxurious and gives the room its sense of richness.
4	Shelving unit	Wood	Saarinen alternated different material treatments, from rosewood and gold silk to red tea paper. This large wooden walnut and glass shelving unit for books and display of art and other objects extends the length of the wall.
5	Steps	Wood	The sunken conversation area in the living room and the steps leading into the sunken pit are layers of black walnut. This provides hints of a dark rich tone to the space.
6	Couch	Fabric	The sunken seating area is the most interesting element in the living room of the Miller house. The couch makes use of fabric which gives an additional soft and comfortable feel to its user and the vibrant space also. The addition of fabric covered throw pillows create a more personal and relaxing space.

Figures 4.77a & b are views of the living area which show highlighted furniture pieces. For the Miller House, Girard designed a wide range of interior objects, including a long main storage wall and the conversation pit. He also worked with J, Miller's wife Xenia Miller, to select ornaments and antique pieces to personalize the interiors. Descriptions of the furniture used in this interior space are made in Table 31.

Figure 4.77. Analysis highlighting furniture in living area of the Miller House

Figure 4.77. Analysis highlighting furniture in living area of the Miller House

Table 31. Furniture analysis of the Miller House

No	Furniture	Description
1	Sunken Couch	With a sunken seating area and free-standing fireplace, architect Eero Saarinen structured movement and views in the living room. The sunken "conversation pit" area allows for plenty of seating without visual clutter.
2	Shelf	Architect and designer Alexander Girard worked with Xenia Miller, on the house's interior decoration, and a 50-foot-long storage wall, which stands out in the space.
3	Couch	The success of the furniture in this room is about the assembly of pieces, more than any one standout. It's all of them in concert, how each piece reinforces the other. Saarinen was brilliant at furniture. Lines are kept simple, clean and fresh as can be seen in this simple couch facing the storage unit.
4	Pillows Rugs	Most of the fabrics in the Miller House were designed by Girard. The fabrics for the throw pillows and textile for the rug were chosen by Xenia. Miller. These pieces and personality to the room, reflecting the owners sense of style.
5	Piano	An intimate and colorful experience, particularly in the living room is created. The living area has a black piano statement piece which takes the focus of people while passing through the space or enjoying the company of others gathered in the seating area.
6	Tulip chair and table	The dining area's sculptural white pedestal chairs become the central focus point in the living room because of its unique design. In the dining area, there is a small buffet area made of a marble slab that cantilevers from the wall. The round travertine dining table sits on a terrazzo base and is surrounded by Saarinen Tulip chairs.

Alexander Girard's work imbued this housing interior with playful patterns, and colors that were strong, creating warmth and comfort to interior spaces that might have seemed dull and uninviting. The vibrant colors especially in the living room interior create a livened space with different experiences derived from color. Figure 4.78 highlights some of these colors with an interior color scheme provided in Figure 4.79. Colors making up this vibrant interior are explained in Table 32.

Figure 4.78. Analysis highlighting interior colors in living area of the Miller House

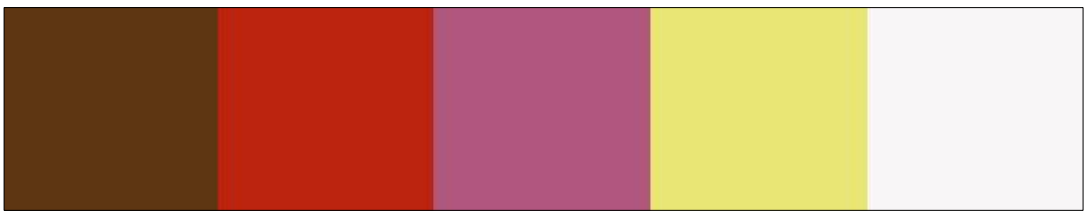


Figure 4.79. Interior color scheme for the Miller House

Table 32. Color analysis of the Miller House

No	Element	Color	Description
1 2 3 4	Wall Floor Ceiling Couch	White RGB (248,246,246)	The dominant color used in the Miller house is white, this is used for the main elements in the house; walls, ceiling and floor. It gives the space a unique feel of freshness with the use of this clean color.
5	Couch Pillows	Purple RGB (117,87,126) Red RGB (195,14,50)	The brightly colored fabrics are another great element about this house. Neutrals would have created a completely different look here, and wouldn't have worked so well. Textiles are a way of adding dimensionality to any space. Xenia Miller loved pattern. She switched out the pillows seasonally, which is such a great idea to heighten the indoor/outdoor connection and has off-white cushions.
6	Shelf	Red RGB (188,35,15) Yellow RGB (234,230,117) Brown RGB (248,246,246)	There is a long shelving unit which extends the entire wall of the living area; it also follows the theme of the other rooms. Color is added to break the monotony of brown from the wood by adding red and yellow colors. The brown wood shelf gives the room an earthy feel.

CHAPTER FIVE
CONCLUSIONS

The 20th century modern architecture movement is an important discuss that goes back to decades where pioneering architects and designers made attempts to successfully combine the principles of architecture with technological advancement and the modernization of the society. The significance in the modern movement would take on a variety of forms and schools of design. It is important to stress that modern architecture is the fusion of all architecture seen today, which cannot be overemphasized. It has also led to several innovations in the world of architecture over time that have been ground breaking, which is a reflection of how different societies value its heritage and history, as buildings serve as a character of a place.

The course of this study has its foundation or basis on modern architecture, and is a combination of modernist principles and the housing interior, with attempts made to establish a connection between both phenomena. Relating modernism with the housing interior is an issue which has not been commonly dealt with in the past whereas modern architecture has numerous characteristics that have been carefully and well-thought out in design. The analysis and the evaluation in the housing interiors of the case studies of this thesis follow the guidelines of modern architecture.

5.1. Findings from Modern Architecture

Over time following the post-war years, the modern house was seen to have evolved as a response and solution to the need for mass housing, and other social and economic factors. It is however worthy to remember that at that time, homes of such character were not a common phenomenon. Comparing the design of other building types with the house deign, the house is simple and inexpensive when it comes to its design and construction. Architects of this period were able to stretch the limits of the modern style in the area of house design, to produce homes worthy of their era.

Modernism brought a new depth to the understanding of the modern condition, and through this style, domestic architecture was able to find its most intimate representation.

At the beginning of the century, in domestic European architecture, an unstable economy due to the effects of the world wars, characterized the modern houses in this part of the world. An economic change in Europe due to the increase in population and housing shortages influenced house designs, as the goal was just to provide affordable mass housing in the quickest time possible. The social content of European domestic architecture was to improve conditions of social living, which in turn dictated their designs. As the century went on, the USA benefitted from industrial growth where development advanced socially, technologically and economically, which made the USA a more stable economy. As a result of this stability, architects in the USA were able to explore in a variety of ways in their design of houses, especially with choice of new materials and application. Thus the style was more about interpretation, exploration, development, invention, and transformation of the European modernist architecture traditions in the USA. For the European counterparts, modernism came about in order to resolve issues of daily life with housing; it was to bring about a resolution between the advancement in technology with social living.

5.2. Deductions from Interior Features of Case Study Houses

With connections made between modern architecture and the interior of modern houses, it establishes how modernist principles can be interpreted to interior spaces. The selected housing interiors exhibit the design principles that remain true to the designers modernist aesthetics. Tables 33 and 34 summarize the comparison between the housing interiors in the 1920s and 1930s era, respectively, using the four selection criteria for analysis.

What this table depicts is the change or growth in modern housing interior features. In the plan layouts, the dark grey colors represent the main idea or core, the architects used in laying out the design of the house. For the Schröder House (1924) by Gerrit Rietveld, his idea was to have a central vertical circulation and have other rooms, represented in light grey, around this central point. While for Le Corbusier's Villa Savoye (1929), his idea was to incorporate the landscape (dark grey) with the

interior (light grey). In choice of materials, both architects stuck to industrially produced materials. In the usage of these materials in the housing interiors, they are represented in their true nature, enhancing authenticity of the space.

Rietveld in the Schröder House, designed and used furniture simply made from wood, on the other hand, Le Corbusier's furniture were made of leather and chrome, designed to embody the human form. Color choice in the Schröder House was used in a strategic and functional manner. The color scheme stuck true to reds, blues and yellows. Places prone to get dirty easily, the architect used colors that would conceal the dirt. Le Corbusier on the other hand was not enthusiastic about color and this showed in the Villa Savoye with its interior mainly neutral and dark colors.

The 1930s in turn was an era that saw a couple of changes in the modern house. Alvar Aalto's House (1936) was planned out having the common areas (dark grey) serve as the central part of the house and have other supplementary spaces (light grey) around this. In terms of using materials, Aalto allowed each material speak for itself, furniture designed by Aalto also, was a reflection of simple design maximizing comfort. Color comes through from the real nature of materials used, mostly different tones of brown. Jacob's House I (1937) by Frank Lloyd Wright is a house that exemplifies an architecture that is one with nature. In the plan layout, the architect zones off private spaces (light grey) from common areas (dark grey), which allowed each space a view of its surrounding. Materials were also a representative feature of nature which was one philosophy Wright worked with. Again, materials were true to themselves. In terms of furniture, they generally were of wood, application of softer elements (chair covers) became commonly used to upholster chairs and sofas. The entire naturally feel of this interior is obtained from the choice of materials which gave the interior different tones of browns; a common color with nature

Table 33. Comparison between interior features of 1920s modern houses

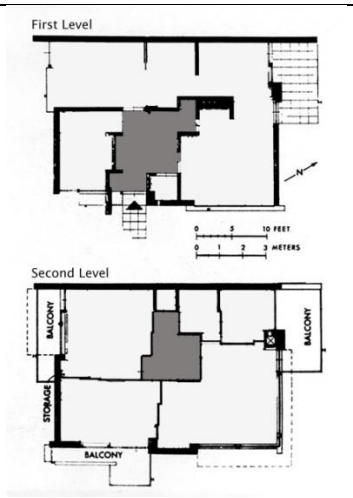
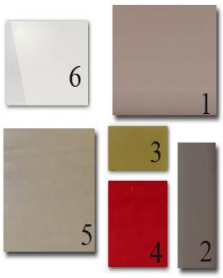
Criteria	1924 Schröder House	1929 Villa Savoye
Plan approach diagram	 Main: Central vertical circulation Auxiliary: Other rooms/functions	 Ground floor First floor Second floor Main: Outside terrace Auxiliary: Other rooms/ functions
Materials	 1. Concrete & paint: ceiling 2. Wood: foldable wall 3. Wood: cabinets 4. Rubber: floor 5. Rubber: floor 6. Glass: windows/door	 1. Concrete & paint: ceiling 2 & 3. Concrete & paint: wall 4. Wood: floor 5. Glass: windows/ door 6. Brick: fireplace 7 & 8. Leather: chairs
Furniture	 1918 Red and Blue Chair	 1928 LC4 Chair  1928 LC2 Chair
Colors	  Living dining & working-sleeping	  Living area

Table 34. Comparison between interior features of 1936s modern houses

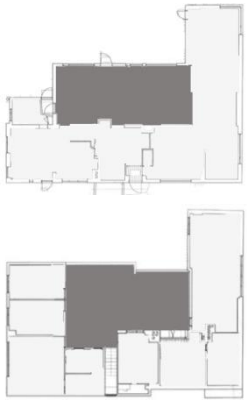
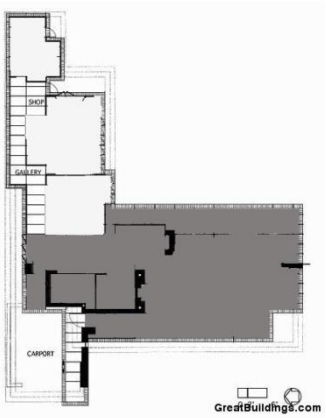
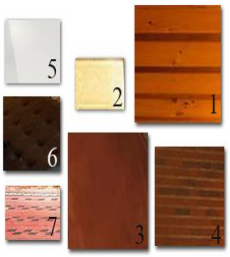
Criteria	1936 Aalto House	1937 Jacob's House I
Plan approach diagram	 Ground floor First floor Main: Central common areas Auxiliary: Other rooms/functions	 Main: Central common areas Auxiliary: Other rooms/functions
Materials	 1. Concrete & paint: ceiling 2. Concrete & paint: wall 3. Wood: wall 4. Wood: floor 5. Wood: table 6. Glass: windows/ door 7. Fabric: couch	 1. Wood: ceiling 2. Wood: chairs 3. Wood: floor 4. Brick: wall 5. Glass: Windows/ door 6. Fabric: couch 7. Rug: floor
Furniture	 1936 Tank Chair  1954 Fan Leg Table  1953 Pendant Light A331	 1933 Taliesin Floor Lamp  1955 Heritage Henredon sofa
Colors	  Living area	  Living area

Table 34 summaries the comparison between interior features of the selected houses from the 1940s. The Eames House (1949) by Charles & Ray Eames had the idea of a central courtyard (dark grey), separating living and working spaces (light grey) on the left and right parts of the building respectively. For Philip Johnson's Glass House (1949), the idea was to create one large open interior (dark grey), except for the enclosed bathroom (light grey). Both architects stuck to materials that saw their application in creating airy and light interiors. However, additional softer materials especially as rugs for floor coverings were used to break down the rather 'hard' interiors. The Eames's experimented with a new technique of bent plywood to make furniture, most of their pieces in this house used curved forms. On the other hand, the furniture used in the Glass House designed by Mies van der Rohe was made of leather and chrome to embody the human form. Color choice in the Eames House played off brown tones with other vibrant colors such as yellow, derived from accent pieces such as rugs and storage units. In the Glass House interior, very little color defines this house. As the house was to incorporate its surrounding into its interior space, the brown tones of its inside, is in harmony with its outside.

A comparison between the modern houses in the 1950s is shown in Table 36. The plan of the Farnsworth House (1951) by Mies van der Rohe was laid out having an entire open space (dark grey) with a wooden enclosed unit (light grey) that served as storage cabinets. Creating an entire open space allowed views of its landscape from anywhere within the house. In using materials, Mies van der Rohe was inspired to use those that would add to the openness of the space. Furniture designed by Mies van der Rohe was of simple chrome and leather, reflecting simple and comfortable forms. The interior of this house does not include a variety of color, but shows different tones of brown derived from wood and leather. The Miller House (1957) interior by Eero Saarinen reflects luxury, which was to reflect life style of its owner at the time. In the plan layout, the architect grids the layout into 9 squares, with common areas (dark grey) positioned in the center squares and other spaces (light grey) around. The materials of the house were selected to create smooth and rich surfaces to reflect the owner's high societal status. Furniture pieces exemplified simple forms, introducing circular patterns. The vibrant atmosphere created in this house comes from different color application used against the overall white interior. These colors come from accent pieces such as pillows, rugs, and shelving units.

Table 35. Comparison between interior features of 1940s modern houses

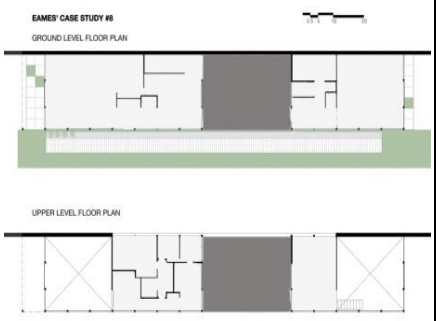
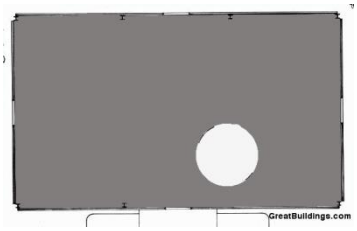
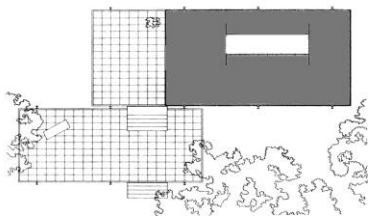
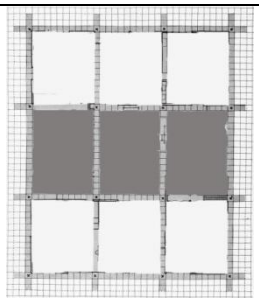
Criteria	1949 Eames House	1949 Glass House
Plan approach diagram	 Main: Central courtyard separating living and working areas Auxiliary: Other rooms/functions	 Main: Entire open space Auxiliary: Only enclosed space
Materials	 1. Wood: wall 2. Wood: chairs 3. Linoleum tiles: floor 4: Rug: floor 5. Leather: chair 6. Glass: windows/door	 1. Concrete: ceiling 2. Brick: wall 3. Brick: floor 4. Wool: floor 5. Glass: wall 6. Wood: cabinets 7. Leather: chairs
Furniture	 1950 Eames molded Chair  1956 Eames Lounge Chair & Ottoman	 1929 Barcelona Chair & Ottoman  1930 Brno Chair
Colors	  Living area	  Living area

Table 36. Comparison between interior features of 1950s modern houses

Criteria	1951 Farnsworth House	1957 Miller House
Plan approach diagram	 Main: Entire open space Auxiliary: Only internal wall	 Main: 9 grid squares with central common areas Auxiliary: Other rooms/functions
Materials	 1. Concrete & paint: ceiling 2. Glass: walls 3. Stone: floor 4. Wood: cabinets 5. Leather: chairs 6. Leather: chairs	 1. Concrete & paint; ceiling 2. Travertine: floor 3. Marble floor 4. Wood: shelves 5. Fabric: pillows
Furniture	 1929 Barcelona Chair, Ottoman, Daybed & Table.  1930 Brno Chair	 1956 Tulip Chair & Table
Colors	 Living area	 Living area

The study in discussing the 20th century modern housing interior is summarized in Tables 37a & b which show the features and trends peculiar to each of these houses. Through these tables it is possible to see how the modern housing interior evolved from its earlier stages in the 1920s through the 1950s. The modern house, which was a result of a century's change, brought along the idea that domestic architecture could bring about a social change within the society. In Europe, just after World War-I in the 1920s, provision of affordable housing was a dire need. Thus European architects designed efficient houses at low cost. This era was a time where architects and designers put ideas together that interior spaces of the modern house should form a complete design. Designers and clients saw the need for a design to depict the style of the middle class that showed off a new taste for modern things, which is seen in their designs. The 1920s interiors were characterized by an improvement in living standards.

Taking the Schröder House and Villa Savoye as examples in this decade, the trend at that time was evident. Zoning of spaces was a common feat when it came to laying out the plan of the house. Designers worked by having a main idea or central part of the house and positioned auxiliary spaces around this central part. In terms of choice of materials used in the house, they depict industrially produced materials that were readily available at that time; materials that were efficient and cost effective also. The use of these materials was evident through the 20s decade, which made sense because at that time, providing low-cost houses was the primary aim. Furniture at the beginning of this era was more rigid comprising straight lines and basic forms, which make them, stand out and compete in their space. Towards the end of the era furniture pieces began to take a softer approach involving curved lines and more comfortable materials. In terms of color, the 1920s saw a change from bold primary colors in its beginning years, to lighter tones towards the latter end of the decade.

With the notion of attempting to develop domestic architecture, houses of the 1930s had minimal changes from the features of the 1920s. Within a short time during the 1930s, a generation of architects and planners embraced modernism as the most progressive expression of modernization. Houses were made to suit its intended use, without unnecessary detail. During this decade, housing interiors were dominated by functionalist idiom especially that which was based on the five points of architecture by Le Corbusier. By the 1930s, the idea of 'form follows function' had become a

more common practice for other modernist architects with a belief of approaching design from a functionalist approach. Approaching design functionally enabled the interior plan layout of the house to be well zoned, creating a central common area. With this, it allowed views of the exterior from the central part of the house. The use of modern materials that were again industrially produced was also being practiced in this era. From this era, a trend of incorporating softer materials; woven rugs, especially on floors became evident. Furniture pieces in the 1930s were a reflection of 1920s design trends mainly made of wood. They were a reflection of the modern era when objects could be mass produced at low cost. By the second half of this era, a more streamlined style of furniture emerged in the USA. These pieces emphasized symmetry with round corners. The interior atmosphere created in these interiors was earthy as color tones ranged from browns to blues which were colors seen in nature.

At the beginning of the 1940s, design characteristics were still in the style of the 1930s, not until the end of World War II in 1945, that its own characteristics emerged. Modern era European designers who were immigrants had then begun to make their mark and influence in architecture especially in the USA. At the turn of a new decade and the growth of modernism in architecture, new features quickly modified the stark modern characteristics of the 1920s. Color in the interiors was mostly different shades of brown with subtle hints of other primary colors. In the USA, the modern houses of the 1940s era exemplified the search and exploration of new ideas for comfortability in design, and stable living conditions. Single-family homes in sub-urban areas became the ideal especially in the USA.

The architectural style introduced in the 1920s and 30s became more evident in the 1940s. With the European designers migrating to the USA, the modern interior was seen as a way to explore and translate European modernist principles to the American society. Advancement in industries, technology and a more stable economy meant that these modern houses could be a transformation of ideals of prior decades. These houses with certain characteristics embraced function and economy of scale, open floor plans and indoor/outdoor living. Newer technology also made it possible for creation and experimentation of new materials to emphasize layout and efficiency. The International Style in USA which was architecture of ideas was created by modern architects who had fled the war. This style was to be a vehicle to bring about social change to create a better society. By the 1950s, modern

architecture had become a popular phenomenon that had lost its emergence; designers critiqued domesticity by removing solid walls, extending views and opening up floor plans.

The modern architects of this era experimented with new materials like wood composite, steel, reinforced concrete and larger sheets of clearer glass. The extensive use of glass and the concept of open plan design was a feature designers used to tie interior spaces with its surrounding, thereby creating a connection with nature. Interior spaces were opened up to landscapes either through glass doors, clerestory windows, and porches, which merged indoor and outdoor living into a whole. Architecturally, the domestic interior enjoyed spaces considered at that time to be a luxury, having flat planes and changes in elevation or split levels. The architects and designers in the 1950s were able to create an industrial-inspired style of interiors that was considered easy, straightforward and more suitable to its time and place. As compared to the earlier years of this decade, the latter years saw the incorporation of a lot more color through accent pieces especially in the area of fabrics. These created more vibrant interior spaces.

Table 37a. Summary of interior features of 1920s and 1930s modern houses

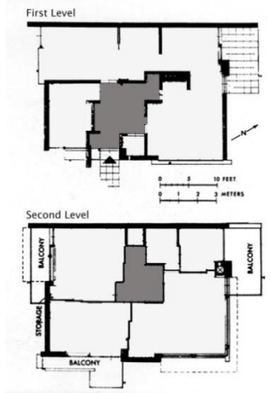
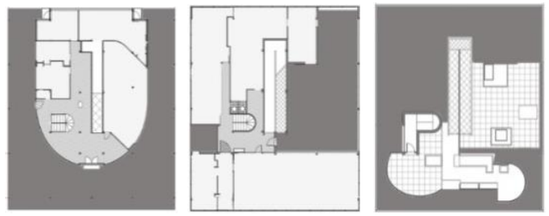
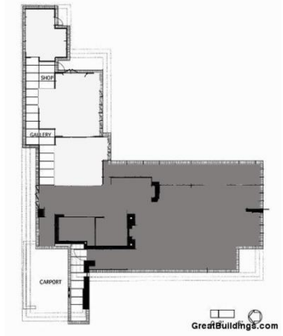
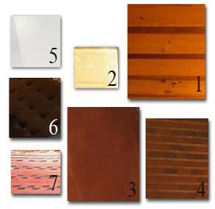
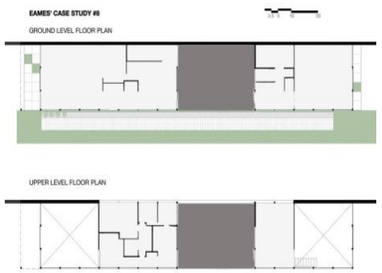
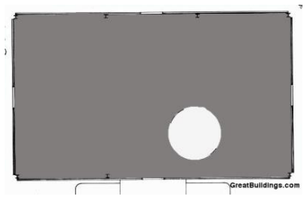
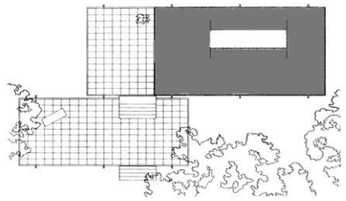
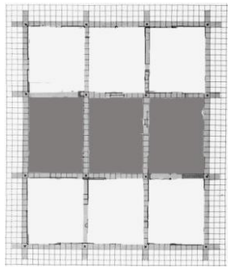
Criteria	1924 Schröder House	1929 Villa Savoye	1936 Aalto House	1937 Jacob's House I
Plan approach diagram	 Main: Central vertical circulation Auxiliary: Other rooms/functions	 Ground floor First floor Second floor Main: Outside terrace Auxiliary: Other rooms/ functions	 Ground floor First floor Main: Central common areas Auxiliary: Other rooms/functions	 Main: Central common areas Auxiliary: Other rooms/functions
Materials	 1. Concrete & paint: ceiling 2. Wood: foldable wall 3. Wood: cabinets 4. Rubber: floor 5. Rubber: floor 6. Glass: windows/door	 1. Concrete & paint: ceiling 2 & 3. Concrete & paint: wall 4. Wood: floor 5. Glass: windows/door 6. Brick: fireplace 7 & 8. Leather: chairs	 1. Concrete & paint: ceiling 2. Concrete & paint: wall 3. Wood: wall 4. Wood: floor 5. Wood: table 6. Glass: windows/door 7. Fabric: couch	 1. Wood: ceiling 2. Wood: chairs 3. Wood: floor 4. Brick: wall 5. Glass: Windows/ door 6. Fabric: couch 7. Rug: floor
Furniture	 1918 Red and Blue Chair	 1928 LC4 Chair  1928 LC2 Chair	 1936 Tank Chair  1954 Fan Leg Table  1953 Pendant Light A331	 1933 Taliesin Floor Lamp  1955 Heritage Henredon sofa
Colors	 Living dining & working-sleeping area	 Living area	 Living area	 Living area

Table 37b. Summary of interior features of 1940s and 1950s modern houses

Criteria	1949 Eames House	1949 Glass House	1951 Farnsworth House	1957 Miller House
Plan approach diagram	 Main: Central courtyard separating living and working areas Auxiliary: Other rooms/functions	 Main: Entire open space Auxiliary: Only enclosed space	 Main: Entire open space Auxiliary: Only internal wall	 Main: 9 grid squares with central common areas Auxiliary: Other rooms/functions
Materials	 1. Wood: wall 2. Wood: chairs 3. Linoleum tiles: floor 4: Rug: floor 5. Leather: chair 6. Glass: windows/door	 1. Concrete: ceiling 2. Brick: wall 3. Brick: floor 4. Wool: floor 5. Glass: wall 6. Wood: cabinets 7. Leather: chairs	 1. Concrete & paint: ceiling 2. Glass: walls 3. Stone: floor 4. Wood: cabinets 5. Leather: chairs 6. Leather: chairs	 1. Concrete & paint; ceiling 2. Travertine: floor 3. Marble floor 4. Wood: shelves 5. Fabric: pillows
Furniture	 1950 Eames molded Chair  1956 Eames Lounge Chair & Ottoman	 1929 Barcelona Chair & Ottoman  1930 Brno Chair	 1929 Barcelona Chair, Ottoman, Daybed & Table.  1930 Brno Chair	.  1956 Tulip Chair & Table
Colors	 Living area	 Living area	 Living area	 Living area

Lessons can be derived from modern architecture in the housing interior. The term 'modern' (in architecture) which was considered a European concept, was a style that other societies could adopt, and still maintain its key ideologies. The study was able to analyze the principles of modern architecture which were reflected in modern housing interiors regardless of their location, as:

1. The elimination of unnecessary detail that includes clarity of form and simple designs.
2. Materials should be at 90 degrees to each other.
3. The concept of truth to materials, where the natural appearance of a material ought to be seen rather than concealed to represent something different.
4. Use of industrially produced materials.

In addition to the above mentioned, similarities in interiors spaces of modern houses both in Europe and United States of America were cost effectiveness and minimalistic interiors; a lesson that can be applied to our interiors today. A design need not be cumbersome in its interior, but going by Le Corbusier's less is more principle, an interior can achieve its intended effect with the use of minimal elements. Furthermore, in comparing the modern housing interiors in Europe and those in the United States of America, certain differences can be observed. The interiors of modern houses in Europe were less dramatic and applied very little color to interior elements. Their home interiors can be considered to be more solid, with use of heavier materials, creating spaces that were more earthy and homely. Their American counterparts however had the interior of their homes to be considered more airy, vibrant and inviting. In the use of color, they were more dramatic and expressive, incorporating color through different elements. The architects who designed houses in America, made use of lighter materials such as expanses of glass and were more expressive in use of materials also such as bent wood.

Based on the selection criteria for analyzing the interiors of modern houses in this study, from the analysis made on these housing interiors in Europe and the United States of America, certain considerations can be employed in approaching the design of housing interiors in our era today. These are:

1. Generally, there should be a relationship not only between the exterior of a building and its landscape or surrounding, but also it's interior. There should

be a relationship between outdoor activities and indoor activities through proper planning incorporating site into interior space.

2. In terms of the house's layout, a seamless flow or interlink between spaces should be achieved. There should be a hierarchy of spaces which will also help in determining size and position of the space (zoning). The overall layout of an interior space will determine the limit of activities to be carried out in it. In meeting the demands of our ever changing societies, interior spaces should be created with flexibility of use in mind. The subdivision of the interior spaces should be minimized.
3. Materials should be used in their true nature and not disguised to represent another material. With modern day technology today, it has made it possible for a material to represent an entirely different one. This contradicts modernist principle. Truth to materials should be encouraged which enhances the true character of an interior and represents the defining spaces.
4. The furniture to be used in the interior of a house will define the activities that will take place therein. In the absence of internal wall partitions, furniture can be used to define a smaller space (function) within a bigger space.
5. In the use of color, careful consideration should be made in its choice and applications. A perfect example in this regard is the color selection in the Schröder House. Architect Gerrit Rietveld used color application in a functional approach. Places that would get dirty easily, he used darker colors to conceal the dirt, whereas places less prone to get dirty, he used lighter colors. Also, it is wise to note that color with a vast range to choose from, should be used in harmony with other elements that make up the entire interior.

21st century architects should design their architecture to not just care about the client, but also social issues which was the basis of modern architecture in the preceding century. According to architectural histories, this past has already stood the test of time, and as such, these housing interiors should be appreciated. The modern housing interior represents a significant moment in history, doing away with norms and traditions in favor of something new and undiscovered.

5.1. Recommendations for Future Research

In respect to this study based on interiors of 20th century modern architecture discussed in both geographical locations, and to understand the evolution of modernism better, there exists a wide range of other building types from the modern era. In future researches, other building interiors can be looked into such as like religious, commercial, educational etc. and not just residential which was used for this study. Further research that would be done in the future on the modern housing interior should also consider looking beyond the time zones this research was limited to; 1920s-1950s. Other time periods could extend this research further to provide additional information on the continuous growth of modernism through different times.

In studying modernism in housing interiors, possible extensions to this research in the future might include the selection of case studies from other geographical locations and not just Europe and the United States of America. This is in an attempt to understand how different cultures (other than where modernism originated), relate to modernist principles in their respective architectures. Comparisons can be made between these case studies to understand better how lifestyle from different parts of the world, influence modern architecture.

It is hoped that in the light of this research, similar studies will be carried out in the future, and also to help present day architects and designers with knowledge and better understanding surrounding the growth of architecture. This knowledge is to be put to use by adopting the intelligent solutions discovered and implemented by pioneering modernist architects and adapting them to the ever growing needs of the society.

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