YASAR UNIVERSITY
GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCE

(MASTER THESIS)

INFLUENCE OF NATURE ON SCANDINAVIAN DESIGN IN THE MODERN ERA: ALVAR AALTO

Cem Alp CANER

Thesis Advisor: Assist. Prof. Dr. Ecehan Özmehmet

Department of Interior Architecture

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2013

This study titled “Influence of Nature on Scandinavian Design in the Modern Era: Alvar Aalto” and presented as Master Thesis by Cem Alp Caner has been evaluated in compliance with the relevant provisions of Y.U Graduate Education and Training Regulation and Y.U Institute of Science Education and Training Direction and jury members written below have decided for the defence of this thesis and it has been declared by consensus of votes that the candidate has succeeded in thesis defence examination dated 21.01.2013.

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Rapporteur Member :	…….	……
Member	**:** …….	……

ÖZET

MODERNİZM SÜRECİNDE İSKANDİNAV TASARIMINDA DOĞA ETKİSİ: ALVAR AALTO

CANER, Cem Alp

YÜKSEK LİSANS TEZİ, İç Mimarlık Bölümü
Tez Danışmanı: Yrd. Doç.Dr. Ecehan Özmehmet
Ocak 2013, 163 sayfa

Mimaride, çağdaş anlamda tasarım kavramı ilk olarak 1920'lerde Modernizmin doğuşu ile gündeme gelmiştir. Bu süreçten önceki dönemlerde benimsenen anlayışlar tamamıyla geleneksel ve bireyci yaklaşımlardır. Modernizmin doğuşu ve gelişimiyle, ilk defa tasarımda kuramsal ve enternasyonal bir anlayış benimsenmiştir. Mimarlık tarihinde doğadan esinlenilmiş birçok örnek olduğu görülmektedir. Endüstri Devrimi ve onu takiben gelişen teknoloji sayesinde doğadaki gözlemlemeler çeşitlenerek farklı alanlara ayrışmıştır. Daha sonra gelişen çağdaş akımlar da kavramsal olarak Modernizm'in attığı temeller üzerine oluşmuştur.

Bunun sonucunda gelişen tasarım ve fikir gücü doğadan esinlenme kavramını farklı boyutlara taşımıştır. 20. yüzyıl başındaki sosyal ve ekonomik gelişmelerle birlikte, teknolojideki gelişimin getirdiği yeni malzeme, yeni yapım teknikleri ve Avrupa'daki rekabet, mimaride ve tasarımda önemli değişimlere sebep olmuştur. Bu süreçten günümüze kadar Avrupa'da birçok öncü ülkeyle birlikte özellikle İskandinav tasarımları akımlara önemli yön vermiştir. Bu tez çalışması, Modernizm sürecinde doğa olgusunun İskandinav tasarımına ve dönemin tasarım öncülerinden biri olan Finlandiyalı mimar Alvar Aalto'nun tasarımlarına olan etkisini incelemektedir.

Anahtar Sözcükler: Modernizm, tasarım kavramı, algısal ve kavramsal boyut, İskandinav tasarımı, tasarımda doğa etkisi, Alvar Aalto.

ABSTRACT

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CANER, Cem Alp

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In architecture, the concept of design in the contemporary sense first appeared in 1920s by the emergence of modernism. Previous approaches were completely traditional and individual. By the emergence and the development of modernism, a theoretical and international approach in design was adopted for the first time. In the history of architecture, many examples inspired by the nature can be observed. Through the industrial revolution and advancements in technology the observations in nature diversified and branched into several fields. The contemporary movements developed afterwards were conceptually established on the foundations of modernism.

Following this era in the beginning of the 20th century, the new materials, and construction techniques emerged by the advancements in technology besides the socio-economic developments and competition in Europe resulted in significant changes in architecture and design. From this era to present day in addition to many pioneering countries in Europe, Scandinavian designs influenced the movements significantly. This thesis study focuses on the effect of nature on Scandinavian design in the modernism era and on designs of Finish architect Alvar Aalto who is one of the pioneers of the era.

Keywords: Modernism, concept of design, perceptual and conceptual dimension, Scandinavian design, influence of nature on design, Alvar Aalto.

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TEXT OF OATH

I declare and honesly confirm that my study titled “Influence of Nature on Scandinavian Design in the Modern Era: Alvar Aalto”, and presented as Master Thesis has been written without applying to any assistance inconsistent with scientific ethics and traditions and all sources I have benefited from are listed in bibliography and I have benefited from these sources by means of making references.

21/ 01/ 2013

Name SURNAME:

Cem Alp CANER

Signature:

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CHAPTER 1

1. INTRODUCTION

The industrial revolution from the mid18th century to the beginning of the 20th century had resulted significant developments in science, technology and industrial production in the west, especially in Europe. Along with these developments, significant changes had occurred in many fields such as economy, social structure, culture, arts and architecture.

Following the industrial revolution, social and economic developments that took place in the era had significantly affected the field of architecture. The growth of the cities and population increase led to the search for new forms, new spaces and new types of structures. Furthermore, new materials and construction techniques resulting from the technological developments and competition in Europe gave rise to important changes and progress in architecture.

In modern sense, the emergence and acceptance of the 'design concept' in arts and architecture became prevalent internationally only in the beginning of the 20th century with the birth of modernism. The Bauhaus school, established in Germany in 1920's by artists, architects and craftsmen, came up with the concept of 'basic design' as the foundation of all art forms. With the rejection of previous approaches, modernism adopted simple, rational, aesthetical and functional design concepts by the use of basic geometrical forms. Although these approaches seemed to place the modernist design and designers in a standardized robotized system untying the artists from nature and humanitarian aspects, it is observed that the designers used 'the nature', which they were in contact with, for the solution of problems related with principle concepts that they were working on.

The modernism trend emerged in Europe in 1920's, had not only influenced the continental Europe but also a greater geography including North and South America, Russia and Japan. Initially Germany, France, England, Italy, Spain, America and Scandinavian countries had adopted and led the modernism trend.

In this study, the analyses of the works of modern era Scandinavian designers and the effect of nature on their designs were examined through the works of Finnish Architect Alvar Aalto (1898-1976), who was one of the pioneer Scandinavian designers.

In the universe, everything, from the atom molecule, to the largest star systems keep their existence in harmony and order. Like everything around us, **human being** is also an unquestionable part of this order. As every other living thing existing as a part of this order, **humans adapt to this order by way of evolution** and keep living. The main characteristic of human being separated from other living things is the capability to manipulate this process to their advantage, according to their needs and intentions by their mental ability. At this point, human beings discovered their power of **creation** and **design**.

Today, architects, interior architects, and industrial designers, many designers are influenced by life itself and basic properties of nature during the design process. Designers effected by the aesthetics, functioning and perfect order of the universe and reflected these affections to their designs from several aspects. From this point, it became possible to create functional and durable designs that fulfill the needs of humanity satisfying aesthetical concerns.

In this context, the designer can be defined as the person who turns this universal mechanism to his advantage by using his power of creation and design during his adaptation to the order of the universe.

In this study, the criteria, on which the designers based and formed their designs during the use of their creative power by the influence of nature were investigated. Furthermore, another aim of this study is to examine the reasons for which Scandinavian designers, who reflected the influence of nature as the initial point during the modernism era.

‘Inspiration’ is the basis of design. At the beginning of the creation process, the designer searches for a starting point besides his approach to the problem. Just at this point, ‘inspiration’ engages in. To capture this inspiration, the designer usually turns to nature of which he is in constant contact with. The inspiration and the design approach that the designer took from nature also serve as a guide in his

way of thought, point of view, and solutions to the problems during the design process.

This study covers the era of modernism in which the design awareness is formed conceptually and internationally and based on a certain basis for the first time. In this context, the modern period, of which the designs were influenced by the nature, were studied through the research on the works of Alvar Aalto who is chosen as an architect representing the Scandinavian designers of the era.

The aim of the study is to point out that the factors affecting the designer, the design and the solutions to the problems are not far away from the designer but rather very close to him, and can be found in the guidance of the universe and the nature leading us to the ideal and most suitable.

This study aims to examine the Influence of Nature on the Scandinavian Design in the Modern Era and Alvar Aalto who is one of the most influential pioneers of the Scandinavian and Finnish architecture.

The method of this study is consist collection of data information. During the thesis study, academic publications, theses, scientific papers, books, periodicals, journals, electronic journals, photographs on the modern period and its designers, Alvar Aalto and Scandinavian designers, Scandinavian designs and architecture were used. In addition some written and visual documents, projects, literature search on the subject from the internet have also been evaluated.

This thesis is made up of five chapters including the introduction. In the first chapter information is given on the study’s aim, scope and methods. The second chapter gives information about design concept and perception. In this chapter design concept is examined in two main titles: conceptual and theoretical. In the third chapter modern era, nature influence on design during the modern era, Scandinavian style approach in modern era are examined. Scandinavian design is analzed to better understand with respect to their perceptual and conceptual aspects during this period.In chapter four, the designs of Alvar Aalto who is one of the pioneers of the modern Scandinavian design at modernism period are

examined with respect to perceptual and conceptual dimensions. In the final chapter, conclusion of the study and further research section are given.

This thesis study is about understanding how the designer reflects the effect of nature to his/her designs during the design process in terms of cause-effect and observational relationship. The aim is to comprehend the conceptual attributes that the dimensions of this effect are based on and how it is realized by the examination of the general characteristics of the period. In addition to the common characteristics of the period, the reasons that propelled the designer to experimental approaches distinguishing him from his era were studied. Furthermore, **the conscious and unconscious** interactions of the designer with **the cultural and environmental values** in which he resides were also examined. In the light of the results from these examinations, designs that the designer created were investigated from **perceptual and conceptual dimensions** and are based on certain psychological and conceptual foundation to understand the effect of nature on the designer and how it is reflected on the design.

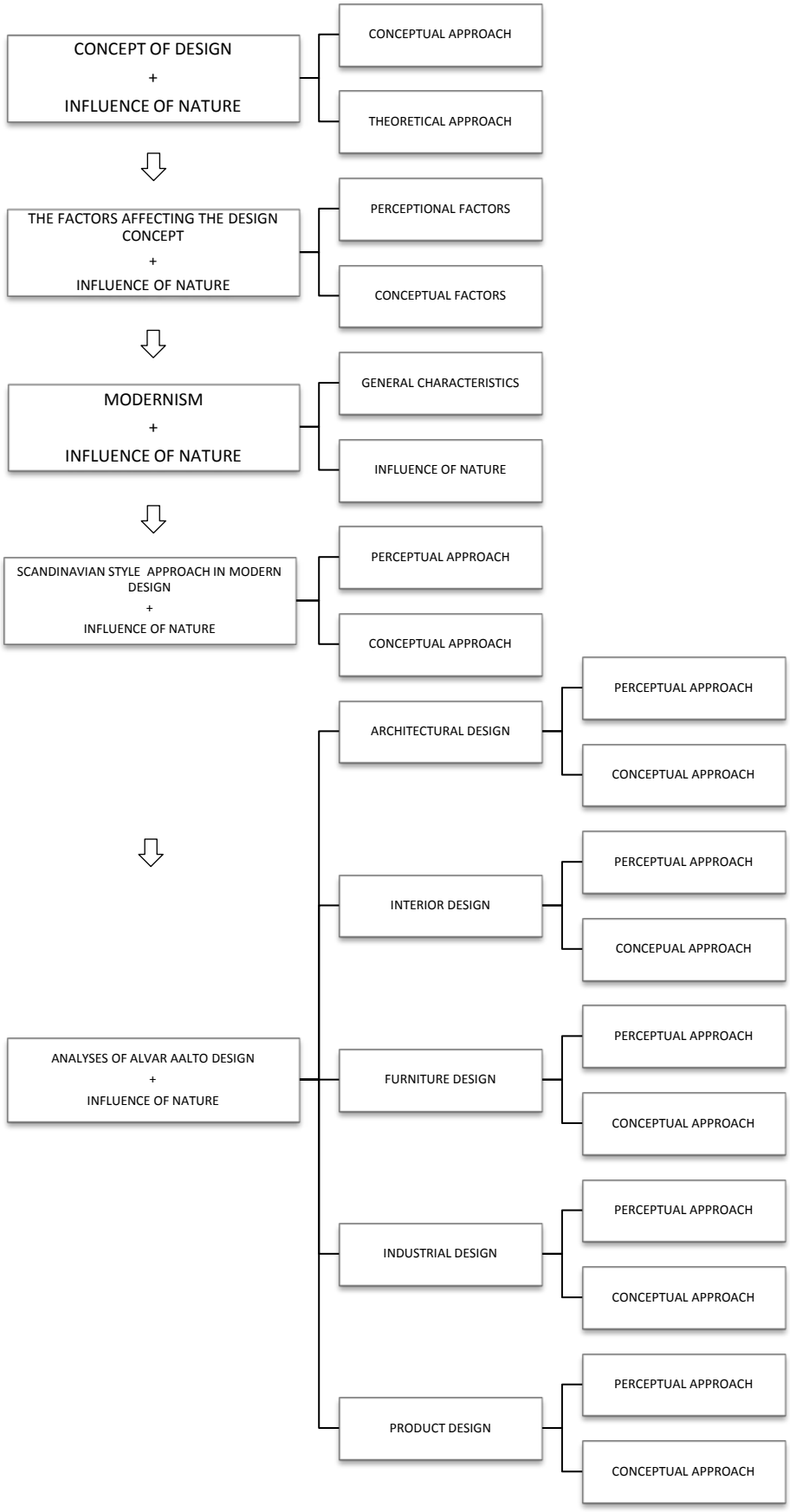
The reason that directs the designer to **design/create** is to bring a solution to a certain problem. Because of that, there is a story, a starting point in the background of every design. On account of the concerns to bring a solution to a problem, the designer has to see the situation from a different perspective. After examining the problem from a cause-effect relationship, the designer understands the nature of the problem and tries to find the best solution for the ideal design. At this point, no matter which culture or era the designer belongs, he/she is observed to find the solution -to a given problem- in nature, of which he is in constant interaction with. As a result the designer combines these factors with his power of design to come to a conclusion.

In architecture, the concept of design came up initially in 1920’s with the emergence of modernism. The adopted perception before the period of modernism was traditional and individualistic approaches. With the emergence and development of modernism, for the first time a conceptual and an international approach in design was embraced. The contemporary movements developed afterwards were established conceptually on the foundation of modernism. From

that period to present, Scandinavian designs have had important influences on movements besides many European countries.

This thesis study also addresses Scandinavian culture which is one of the pioneering design geography in the modern period. The designs of Alvar Aalto who is one of the pioneers of the modern Scandinavian design were examined. Besides being an important and pioneering person in the era, the characteristic that distinguishes him from his colleagues was the fact that he was one of the first designers who established the foundation of Scandinavian modern era on the organic architecture. Contemporary Scandinavian designers still continues the design concepts that he formed (Table 1.1).

Table 1.1. Chart Outlining of the Thesis



CHAPTER 2

2.1 INTRODUCTION

Throughout history mankind had been in an effort to keep up with the order and environment in which he lives. He continued and still continuing his existence in this order by his ability to solve the difficulties and problems with his intelligence. From making a fire and hunting for food and making a shelter in ancient times to the discovery of the atom, construction of skyscrapers and landing on the moon, many examples can be given.

Human is a creative being. This is the basis of his ability to solve problems and difficulties. So, what is creativity? Many definitions and explanations of creativity exist, however there is no precise and exact scientific definition. The word **creativity** is derived from “creare: to create” in Latin and “krainein: creation” in Greek (Young, 1985). Literally it is defined as “to make or bring into existence something new”. It has many meanings such as “inspiration, romantic intuition or foresight”. On the other hand scientists defined creativity as “the ability to create a new idea or a product from the combinations of known ideas”. Most of the tests conducted to define and understand the creativity of humans scientifically are based on these principles (Mithen, 1998).

In this context creativity is a subject of a large scale and can be divided into different subdivisions. Generally it can be covered in in two main subdivisions as individual and social creativity. Creativity on an individual level can be illustrated as the ability to bring suitable solutions to the problems one encounters in his daily life. Creativity on the social scale can be illustrated as a new scientific discovery, new art movements and new inventions (Sternberg, 1999).

Creativity is also the ability to produce the different and suitable. This production contains many factors such as unpredictability, originality, functionality, impressiveness, and appropriateness in itself (Lubart, 1994;

Sternberg and Lubart, 1991, 1995, 1996). However all these factors alone are not sufficient enough for creativity or to design a new product or to come up with a new idea. A creative product or an idea should have a “value” in addition to having the factors mentioned above. To better explain this we can give an example of a man picturing the sunset, on a beach he is having good time. This picture has a value for the man, because it reminds him the good memories he associated with it. To other people this picture might have no aesthetical value. But for the person who had frozen that moment by his painting, the picture has value. In this context, the person who conducts his art by painting a picture embeds a unique value into his production and the result of this action becomes a creative work (Young, 1985; Erdal, 2002).

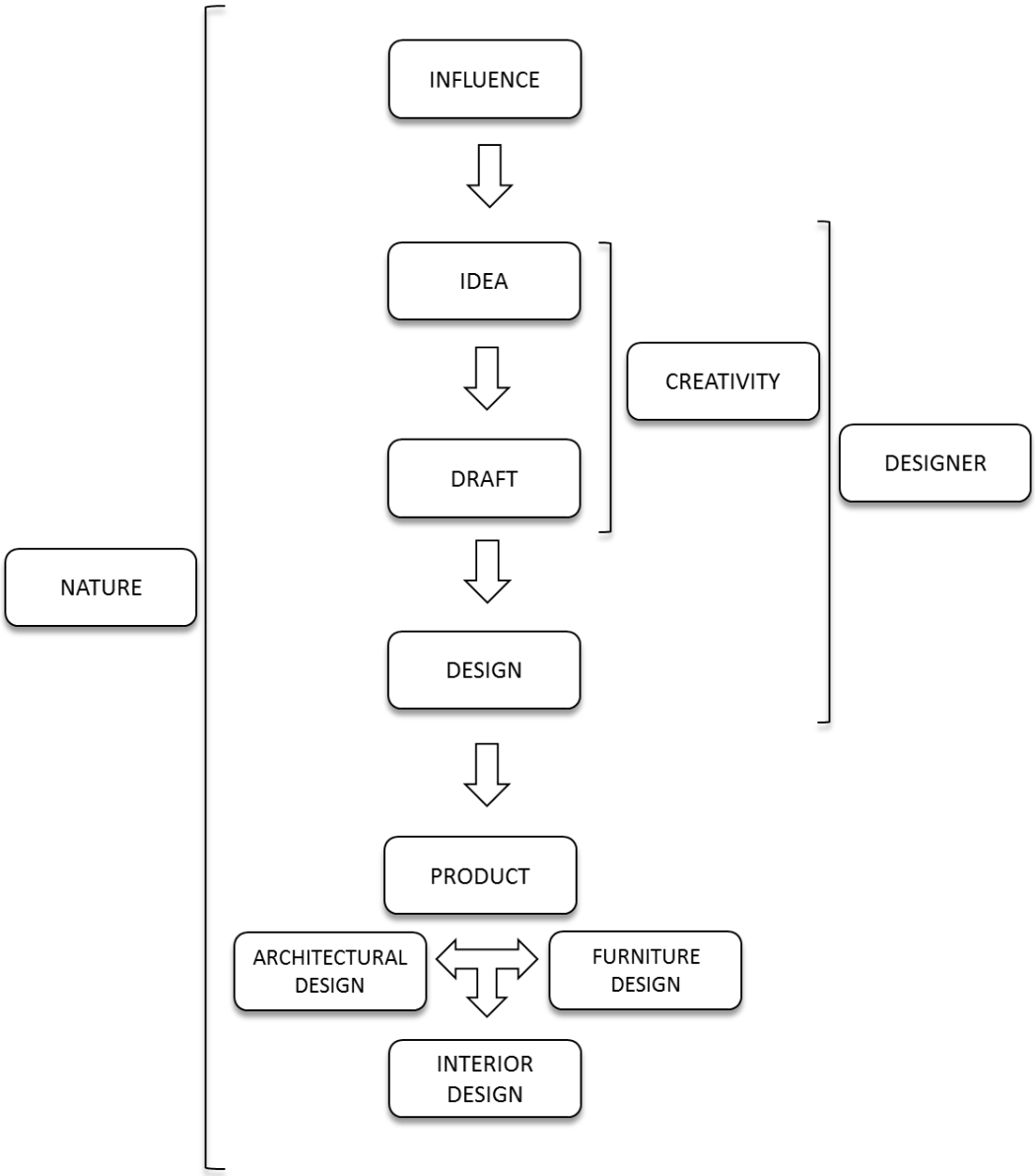
From this point of view creativity in a general sense is to imagine something new and the ability to realize it by designing. Creativity is not to create something from nothing. It is to bring up new products by using available resources with the combination of new ideas with existing trends. This action can be defined as the action of humans as putting on the creative identity by using intellect (Erdal, 2002).

Creative human is the center that all the factors come together and form an idea. So, creative human turns a common phenomenon into something new that has a value. Basically he turns the old to new by adding something unique. He aims to leave the traditional and outdated and to have a different and progressive perspective. The purpose of the creative human is beyond discarding the old and developing new solutions. He has to eliminate old rules to create new ones. Therefore he avoids the evident approaches but actually in terms of the solution he is on the same side with other approaches (Koray, 2004; Young, 1985).

In addition, creativity is not a talent of the person who is involved with arts or science. Every human possesses creativity to some extent. Whether this is a natural gift or something learned is not known exactly. However, both can be observed to be possible. The creative talent can be something that is born with or it can be gained by a formal or informal education. Creative talent can be developed through the fields of engineering, architecture, arts and sciences etc. (Koray, 2004).

Whether it is improved by formal or informal education, creative human possesses the power of design. Human without the ability to design is far from creativity. Likewise human without creativity is far from having an ability to design. So, the power of the ability to design is an integrated part of the creative identity of a designer. As a result it might not be true to think that a design without creativity or a designer without creativity identit can exist. From that point of view, to better understand the integrity of creativity, design - creative identity and designer, examination of the concept of design is crucial (Table 2.1).

Table 2.1. Design Process and Influence of Nature



2.2 CONCEPT OF DESIGN

To better clarify the subject, examination of the concept of design from different approaches is preferred. Because the concept of design have different aspects and factors in itself that can not be completely seen from a limited perspective. For this reason, two main approaches is proposed to understand the concept of design. These approaches are investigated in two main titles; **conceptual** and **theoretical.**

2.2.1 Conceptual Approach

Design is a phenomenon people encounters consciously or unconsciously in their daily life such as a commercial advertisement one run into while walking on a street, a building with an unconventional form, a plate of food served in an elegant restaurant, a stylish dress, an interesting lampshade or a common tin opener etc. In addition, preparing a dinner table, arranging the refrigerator, or decorating a living room can also be considered as a work of design. In other words, people are involved in the concept of design consciously or unconsciously, educated or uneducated (Aimone, 2004).

The concept of design has many definitions and meanings. Common definitions can be given as follows.

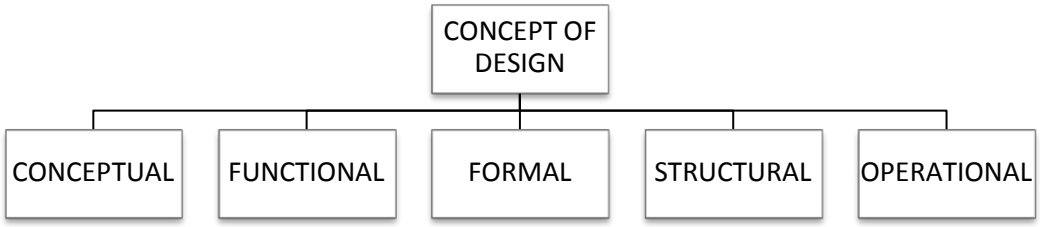
- *"A form imagined in mind, envisioning"(Türk Dil Kurumu [TDK], 2011).*
- *"An initial draft of a work of art, a structure or a technical product"(TDK, 2011).*
- *"A framework showing the path and procedures to be followed during the various stages of a research process" (TDK, 2011).*
- *"The act of designing or the form produced as a result of the designing process, envisioning"(Hasol, 2010, p. 498).*

- *"Designing is an action in the creative process, it requires definite and clear envision of the art work to be produced, helps the realization of the art work, it is founded on the base of available possibilities and concludes with a result that is clearly documented" (Myers, S. B., 1959, p. 335).*

When different definitions of the concept of design are examined, it is observed that they intersect at common points. In this context, **designing is simply the conversion of the talent of someone into something usable.** At this point, imagination, perception, awareness of the environment and perspective are factors affecting the talent (Aras, 2008).

Concept of design can be defined with more holistic approach as specifying and documenting all the specifications and qualifications of all the notions of an idea that will realize the functions that is defined to answer the needs. These components can be mainly stated as (Table 2.2) conceptual, functional, formal, structural and operational (İzgi, 1999).

Table 2.2. The Components of Design Concept



Creativity as a behavioral pattern is something that people exhibit both objectively and subjectively. This is one of the most important characteristics of the designer (Guilford, 1968). From this point of view, the designer carries on **the design process** with his emotions, feelings, desires and logic (Denel, 1981).

One of the characteristics of the creativity is the presence of the complicated factor in itself. The factors that the creativity has common with -the concept of design- can be stated as process, environment, product and person (Haensly and Torrence, 1990).

Design is a question of process. During this process, the act of decision making, taking responsibility and making choices are in concern. Design process is the only creative and artistic stage in the formation of the product to be design. In this stage the design that is in its conceptual form should be documented. Because, design process is the documentation of the concept to be realized according to the proposed aim. After the definition of the elements regarding the design, it can be realized mentally and visually (İzgi, 1999).

The creativity required for the process of design is related with conscious choices. Because creativity is the result of the development of a functional and original idea. Several factors affects the result. Aspects that the designer reflects such as original concepts, emotions and cultural effects can be said to be directly related with the design phenomena(Se Kim et al., 2008).

Starting from this point, the designer should get himself/herself accustomed to an unknown situation, understand the circumstances and come to a conclusion by evaluating the possibilities. He should bring out some suggestions from these results, improves these suggestions, document them and put them in a representative form. The proposed idea at the end of all of these processes, should present a new product, environmental changes and new opportunities (Potter, 2002).

As a result, it is observed that the concept of design covers the complete creativity and design - creative personality and designer relationships. However design phenomena cannot be explained solely with a conceptual approach. It can be understood that, the concept of design resides as a complete idea that can present the factors it embedded in itself only after passing through a certain process. This processstage is based on certain rules and ideas. So, the concept of design can be explained entirely only if these rules and ideas are combined theoretically with the design phenomena. Therefore, it is necessary to examine the second main approach, the theoretical approach.

2.2.2 Theoretical Approach

When studying the concept of design as a theoretical approach, initially the elements that form the design should be pointed out. Because, for the design there should be a need to serve, a situation to express itself according to the proposed aim, something to exhibit (Aimone, 2004). At this point, it is reasonable to mention the factors that define the purpose of design.

The aim of design should be; a) descriptive b) narrative, c) emotive, d) utilitarian, e) decorative. Today, many designs possess several of these features (Aimone, 2004). These factors can be explained in detail as follows;

a) Being descriptive; it can be defined as the realization of the concept of the design. It is the main theme of the methods used by photographers, sculptors, architects, industrial designers and interior architects to express their designs (Aimone 2004). Tomato Chair by Eero Aarnio and Switch Restaurant by Karim Rashid inspired by organic forms from nature and Munich BMW building by Coop Himmelblau inspired by natural shell forms can be given as examples (Figure 2.1).

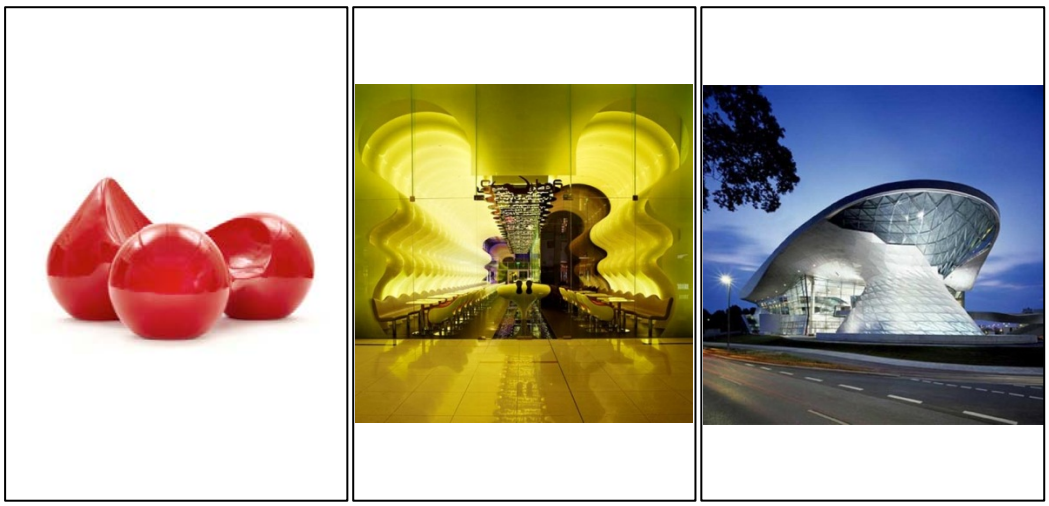


Figure 2.1.

a) Tomato Chair – Eero Aarnio
(http://www.ganj.fr/6763-thickbox/chaise-tomato-chair-rouge-adelta-eero-aarnio.jpg)
b) Switch Restaurant – Karim Rashid
(http://www.mimaristil.com/wp-content/uploads/switch-restaurant-by-karim-rashid-91.jpg)
c) Munich BMW Building – Coop Himmelblau
(http://www.jabuhu.com/wp-content/uploads/2011/07/Munich-BMW-Building-by-Coop-Himmelblau-in-Germany.jpg)

b) Being narrative; many designs have a relevant idea, a story or a history underneath. All these reasons can be suitable to serve for a certain aim such as to entertain, to educate, to inform people, to solve a problem and to interpret something or to express something (Aimone, 2004) for instance; Water bottle design by Ross Lovegrove inspired by the natural water flow, Mosquito Chair by Rud Thygesen inspired by a mosquito or the façade system of The Suits Avenue Hotel by Toyo Ito inspired also by natural water flow (Figure 2.2).

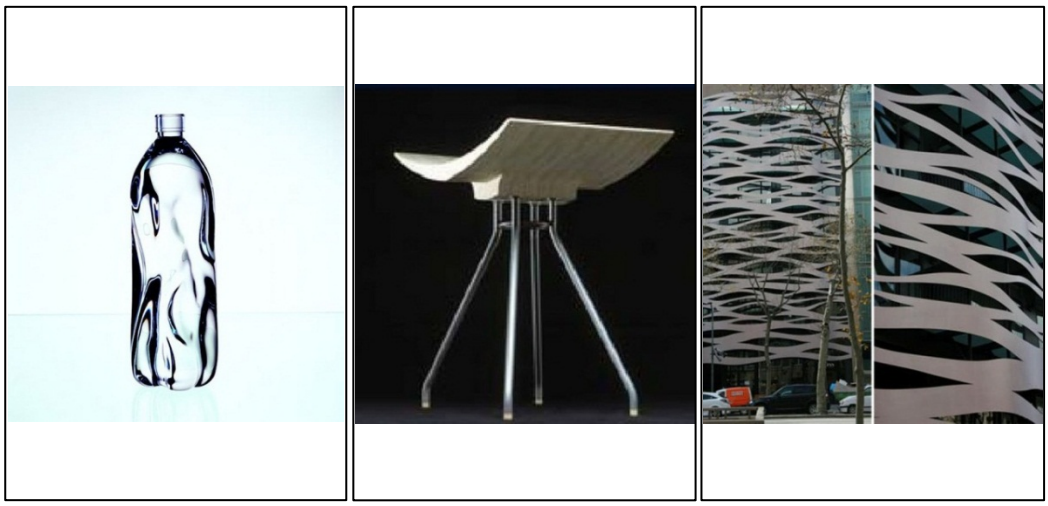


Figure 2.2.

a) Ty Nant Water Bottle Design - Ross Lovegrove
(http://www.ionoi.it/images/article/218%20shaped%20by%20water/Ross-Lovegrove,-ty-nant-waterbottle,-1999.jpg)
b) Mosquito Chair – Rud Thygesen
(http://www.netpublikationer.dk/um/8584/images/image_14-h5Rv_11.jpg)
c) The Suits Avenue Hotel – Toyo Ito
(http://4.bp.blogspot.com/_QX_TLRHcxk4/TLT1K-CWWPI/AAAAAAAAAE0/mpL7p73ztxk/s1600/toyo-ito-with-the-suites-avenue-hotel-exterior-barcelona-1.jpg)

c) Being emotive; a design should evoke emotional states such as peacefulness, warmness, happiness, excitement, astonishment etc. By this way, it is possible to make the perceiver to perceive the desired effect and meaning of the design (Aimone, 2004). The comfort of Eames Lounge Chair by Ray & Charles Eames designed with natural materials, giving user-comfort a priority, the feelings of movement and excitement inspired by the interior design of Sound Night Club by Orbit Design Studio designed with the use of fluid forms and

the astonishment of the London City Hall designed in organic form by Norman Foster can be given as examples (Figure2.3).

Figure 2.3.

a) Eames Lounge Chair - Ray & Charles Eames
(http://www.ivorinnes.co.uk/WebRoot/Store/Shops/innesestore/485A/1848/4B5A/BC58/7D68/5299/FE61/D816/lounge_chair_ottoman.jpg)
b) Sound Night Club – Orbit Design Studio
(http://yatzer.com/2010-Restaurant-and-Bar-Design-Awards-Winners-announcement)
c) London City Hall – Norman Foster
(http://3.bp.blogspot.com/_5bVN3kXOxFc/TEK8V9NHrcI/AAAAAAAABcA/xN8smyESoRQ/s1600/01+foster.jpg)

d) Being utilitarian; the design should not be created just for aesthetical purposes it should be created to fulfil a function, to serve for a purpose. By this way the design takes its form and becomes a product by combining the aesthetics and function with the intended purpose to serve the need of the user (Aimone, 2004).Vacuum Jug design by Erik Magnussen abstracted from the form of a swan, Waves Lounge design by Anne-Mette Jensen & Morten Ernst influenced by ocean waves or decoration of The Phantom Restaurant by Odile Deco Benoit Cornette with fluid forms can be given as examples (Figure 2.4).

Figure 2.4.

a) Vacuum Jug – Erik Magnussen
(http://vertigohome.files.wordpress.com/2010/10/vacuum-jug-by-erik-magnussen-for-stelton.jpg?w=480)
b) Waves Lounge - Anne-Mette Jensen & Morten Ernst
(http://urbanmyth.typepad.com/.a/6a0111683b66a2970c0133f1c6374f970b-800wi)
c) The Phantom Restaurant – Odile Deco Benoit Cornette
(http://yatzer.com/The-Phantom-of-the-Opera-Garnier)

e) Being decorative; if the previous factorsare ignored, design can be defined as the creative arrangement of the design elements (color, texture, form etc.). This creative arrangement of the design elements compose the aesthetical feature inspiring joy, emotion, desire etc. and becomes an integral part of the design (Aimone, 2004). Lemon Juicer by Phillippe Starck influenced by arachnoids,the interior design of The Tote Lounge by Serie Architects inspired by tree forms froms nature, Burj Al Arab by Tom Wright designed with the inspiration of fish fins and sails can be given as examples (Figure 2.5).

Figure 2.5.

a) Lemon Juicer – Philippe Starck
(http://worldradio.ch/wrs/bm~pix/alessi-starck-lemon-squeezer~s600x600.jpg)
b) The Tote Lounge – Serie Architects
(http://designcrave.frsucrave.netdna-cdn.com/wp-content/uploads/2010/07/DC072210-F.jpg)
c) Burj Al Arab – Tom Wright
(http://farm3.static.flickr.com/2762/4277506066_e941878e5e_o.png)

Besides the factors that form the purpose of the design, the factors that effect the design as a concept should also be investigated.

2.3 THE FACTORS AFFECTING THE DESIGN CONCEPT

After the conceptual and theoretical investigation of the concept of design, the questions of what design is, which processes it has, how it is expressed according to its purpose, to what criteria it should serve were examined generally. From this point the factors that affect the concept of design both theoretically and conceptually are going to be examined.

2.3.1 Perceptional Factors

The main perceptional factors that affect the concept of design was first proposed by the Roman architect and engineer Marcus Vitruvius Pollio who lived in the years between 90-20 B.C. Vitruvius mentioned the factors for successful design as “Utilitas, Firmitas, Venustas” (function, durability (material) and aesthetics) in his book De Architectura: The Ten Books On Architecture which is the only scientific work on architecture left from antiquity (Vitruvius,1960). From this point the perceptional factors that affect the concept of design are going to be examined under three titles.

2.3.1.1 Function

In a general and philosophical dimension, function can be defined as the action that makes it possible to the realization and differentiation of the design. In philosophy the movement of functionality derives from pragmatism. At this point the function of the reality is to be useful (Aksoy, 1987).

Functionalism became a factor focused by the designers to meet the needs and requirements of the growing cities during the industrial revolution in the 19th century. Before the 19th century designers proposed design solutions only for a single purpose, however due to the increasing demands in the 19th century, designers had started to create functional designs that served multiple purposes to maximize the fulfillment of the needs (Leupen, et al., 1997). The developments in the designs were a result of the need and interest for new functionalities. The changing world and the new way of life led to the emergence of new requirements, new functionalities and new building types (Soygeniş, 2006).

At this point, in modern design the intention of creating functional designs and functional way of thinking found a new meaning. This also clarified the meaning and usability, form and context relationships in design (Lauer and Pentak, 2008).

The general meaning of functionality in design is the aspect of the design that have the purpose to satisfy the needs of people in their daily life. In this context, architectural design, graphic design, environmental design, industrial design and product design are the designs to satisfy the need and fulfill the requirements of people, for instance; the design of an office chair for the office staff or a refrigerator designed to keep the food fresh for longer periods. By this way functional design comes up as an idea or a product that brings a solution to a certain problems (Brainard, 2006).

2.3.1.2 Durability (Material)

The durability and material selection that is related with the durability begins with visual experience. Many artists and designers imagine their designs with the intended material. They select the materials to be used by trial and error, by intuition or from previous experiences. At this point, the idea or draft design starts to be realized and the aim is introduced (Lauer and Pentak, 2008).

Every material has distinct properties. These can be the texture, color etc. related with the material used or the physical, chemical properties, durability, workability, availability etc. of the material (Soygeniş, 2006).

It will be incomplete to think material choices of a design only with the durability of the material and the fulfillment of the needs. The choice of materials and structure is also used by the designer as a way of expression. For instance, high stone columns of the Greek structures was a sign of development, however use of vaults and arches in the Roman period represented a higher technology. Later on, the new techniques developed during the Gothic Period made it possible to inspire the feeling of weightlessness of stone and build higher structures. In the 20^{th} century, replacing the stone and timber elements with the concrete and steel became the expression of advanced technology, development and contemporary. The use of concrete and steel also found its place in the designs having dramatic effects reflecting dynamism (Baker, 1996).

In this context, it is understood that the designer considers these points and choose the most suitable and ideal during realization of his idea or draft. Designers are observed to include their interpretation when using the material. It is also important for the designer that the material should fulfill the requirements and the way of the expression of the design and be suitable for the design (Leupen, et al., 1997).

2.3.1.3 Aesthetics

In the past, some philosophers proposed the idea that the reason behind arts, is solely for the beauty of it. Thus, they tried to reduce the aesthetical phenomena to a simple definition, beauty. However recent research indicate that there are many factors involved for defining beauty. The concept of beauty is a subjective concept which is directly related with the personal preferences, emotions and impressions. For example, natural attractiveness comprises an aesthetical value due to the fact that it is experienced by people since many people share the same emotions for such an object having aesthetical value. For that reason there is a distinction between the concept of beauty and aesthetics. The aesthetical values based on the knowledge and experience on the visual are not same as the superficial values of beauty (Aydınlı, 1993).

Aesthetical theories generally can be categorized as classical and contemporary. In a classical sense, it can be defined as inspiring joy, satisfaction or the art of interpretation of beauty. However according to the contemporary approach, it is not only the pleasure and joy inspired from beauty, it is also the visual entirety that has high practical and utility value, and inspires pleasant or painful emotions (Nasar, 1992).

During the creation process one of the duties of the designer is to create a visual integrity. In other words, the design should reflect aesthetical concerns during the creation process. The person who is looking at a design is actually looking at an arrangement of the different elements. Thus, he does not expect to see a chaos or disorder of elements. At this point, the designer makes the person

to perceive the unity and harmony that he likes to experience by giving clues in an aesthetical way. If the perceiver cannot perceive this, he/she easily gives up (Lauer and Pentak, 2008).

In this context, when talking about aesthetics and beauty, the concepts of integrity and proportion are also considered together in architectural design. Because in architectural design and applications, the concepts of arrangement and harmony are considered together as a whole (Soygeniş, 2006).Aesthetical concerns affect the harmony and proportion in several ways such as material, structure and production. Because there are physical and proportional differences based on the differences between the characteristics of materials. Due to these facts, the designer, based on aesthetical concerns,has to make the perceiver comprehend the composition and harmony without ignoring the principles of aesthetic (Ching, 2007).

2.3.2 Conceptual Factors

Design is the point that the abstract concepts turn into perceptual expressions. This point refers to the realization of the two dimensional drawings during the design process by the use of color, texture and mass. However, evaluating a design only from a perceptual dimension might not be complete (Aksoy, 1987). Because today, the design phenomena has to be examined not only with a perceptual approach but also considering the conceptual approach. In this context, conceptual factors should be evaluated under three titles considering culture, tradition and environment in which the design is created.

2.3.2.1 Culture

From the moment humans begin their life, they are in constant effort to adapt their environment and order in which they reside in. This common order is called culture. The development of culture mainly depends on the knowledge, education and the association of the existing systems. At the same time, culture is a phenomena that integrates the human to the ordered world by meaningful interactions (Norberg-Schulz, 1993).

The culture which emerges from the common values and activities of humans can be defined as the superimposition and intersection of the actions. It consist of functionally shared sustainable values and led by human behavior and cultural components. Culture which is the conceptual and abstract combination of the social foundations and conventions plays an integrative role for the society (Yürekli, 1980).

Mankind used the language as the primary form of communication from the ancient times. In other words, language is a grammatical system by the meaningful and ordered use of words. However, the insufficiency of words to express certain meanings have led to the emergence of different expression and communication systems. At this point arts, sciences, architecture and design can be observed to have emerged from the need to express the concepts and to better understand the word which cannot be accomplished by way of language. Like language, culture also differs from society to society. Thus, the art, science, architecture and design have their methodology differing from culture to culture in which they exist (Baker, 1996).

Culture is the total of the human actions based on reality. It is a system based on interconnecting and intersecting actions. It is abstract since it is conceptual, however its effects and results are perceived through its actions. Culture takes its form by the act of humans, social situations, ethnical effects and actions. It can be concluded that a designer also create his designs and -the shape that these functional, original and rhythmic conditions designate- with the environmental factors and the culture in which he lives in (Langer, 1953).

2.3.2.2 Tradition

Every society has its own history. Thus, every society has a distinct culture. Every culture develops form physically and socially by the effect of human and human communities. At this point human beings interact with their own culture consciously or unconsciously and becomes a part of that culture. Because of the values that the society imposes, they behave according to the culture (Aydınlı, 1993).

Every society has some values that are embraced through the culture accepted to be true and resist change. Through the internalization of these values they become traditions.Tradition is actually the transfer of the culture into a physical form consciously or unconsciously. In this context, the designer makes it possible for his designs to have an original identity by adding culture and tradition dimensions (Rapoport, 1969).

Tradition is a living phenomenon. It is a living part of humans and society. The effects that form up the tradition in this whole are the vital and environmental effects. Tradition is the total of images that reflects the emotions, fears, excitements, responses, way of thinking, histories and environments of the society. These are the factors that form and sustain the tradition. From this it is understood that the outcome of the abstract effects are realized and becomes tangible by the designs of the society. Thus, the tradition is the realization of the culture in the physical world (Langer, 1953).

2.3.2.3 Environment

Environment is defined as the mental scheme that is formed conceptually and perceptually in which historical, political, social and cultural interactions of humans take place. Humans combine the information about the environment in which they live with the former information and experiences in their memories. The information and experiences gained will then be constructed as a scheme in

the mind through the interactions with the environment. At this point, the scheme in humans mind is defined as an image reflecting the characteristics of the physical environment (Aydınlı, 1993).

In this context, the behavior and the responses of the humans in the environment they live, becomes the reflection of the image that is formed in their mind. Thus, humans perform their actions by interpreting the information they gain from the environment with this image. From this, it is possible to say that the designers reflect the conscious or unconscious impressions that they get from the environment to the design and design processes directly or indirectly (Krupat, 1985).

Environment is defined as a phenomenon that is the sum of artificial and natural environment that humans are physically exist in, live and be a part of interactively (Özkan, 2007). The physical environment consist of natural and artificial environments, on the other hand, the social environment composed of the factors such as custom, tradition, culture, ethics, law, politics which is interrelated with cause and effect relationships. At this point, with the inclusion of human to this environment, a total dynamic system covering the whole interactions of life is formed (Çubuk, et al., 1977). Starting from this point, it is appropriate to examine the environment, which is the last title of conceptual factors affecting the concept of design, under two subtitles as natural environment and artificial environment. Because humans are not only affected physically by the natural environment, but also affected by the artificial environmental factors.

2.3.2.3.1 Natural Environment

Natural environment is a part of ecological balance. Ecological process is the action of reproduction. It is necessary to examine the living thing in terms of their relationships with the natural environment they live in. The relationship between the living things and the environment is bilateral. A bird or a tree is a part of the natural environment, as well as they contribute to the existence of the environment. The concept of harmony is the source of natural harmony and

ecology. In other words, every living thing is in harmony with the natural environment through their relationships and interactions in the natural environment. The relationships between the community, environment and social organizations are actually actions sustaining ecological life (Micklin, 1974).

At this point, environment affects humans with several factors such as atmospherical, thermal, aquatic, objective and spatial in human-environment relationships. This interactions also specifies the anthropometric, emotional and perceptual characteristics and wills of humans in that environment. In this context, it is understood that the designer reflects the effects of his conscious and unconscious influences from the natural environment in which he resides in (Özkan, 2007).

2.3.2.3.2 Artificial Environment

Throughout history humans always have had the intention to control the environment, to be protected from it and to organize it. Thus first shelters and the related culture emerged. At the same time, the nomad and hunter human converted to farmer and established first permanent settlements. With the intention of protecting from the natural conditions and spending their time for their daily activities in close space, by the construction of structures first urban areas started to appear (Erdoğan, 2006).

According to Özkan (2007), artificial environment is defined as the activity areas dependent on the functions, of which functional and physical environment characteristics are considered as part of human activities. Humans were also in the intention of putting an aesthetical touch in the buildings they construct for the need of protection. In this context, the cities emerging with organization of the natural and cultural elements became areas having different qualities than the parts that form them. The artificial environment that is designed by the designers with the arrangement of the buildings or buildings and open spaces are not only for the fulfillment of the biological needs but also for the psychological and intellectual needs of human (Erdoğan, 2006).

At this point, it is necessary to examine the conceptual and theoretical factors affecting the concept of design based on their effects on human perception.

2.4 PERCEPTION

Perception is the comprehension of the environmental stimulus by way of sensory organs and intelligence or process of perceiving information consciously. At this point, recognition by the senses and gaining of information intellectually can be defined as perceptive actions or selection actionsinvolving both activities (Moles, 1969).

The conversion process of the sensory data that comes independently from different sensory organs to a meaningful result by processing in the brain is the main factor of the perception process. Emotional process comes first in this series of processes. Then comes perception. There is negligible delay between these processes and time delay cannot be recognized under normal circumstances. Sensory organs response differently according to the stimuli of external objects. These responses convert to neurophysiological energy and then perception process begins. During the perception moment mind forms a synthesis by combining the expectations, previous experiences, perceptions from other sensory organs, social and cultural factors. During these, some parts are neglected, some parts are reinforced, chosen and are given meanings (Lang, 1987).

As a result mind tries to put the gathered information into a meaningful template. If the information is nonsense mind disregards the input. Even if totally random visual and aural information is presented to the mind, it tries to evaluate these information based on previous experiences. Thus, what we perceive is dependent on what we experienced before (Roth, 2000).

Today many designers and architects create their designs by the utilization of the effects of the visual perceptions on human and mind during the design process. In this context, the way that the human mind evaluates the situations

related with the objects and events presented will be examined according to the Gestalt Principles of Perception.

2.4.1 Visual Perception and Gestalt Principles of Perception

Gestalt psychology was founded by three German psychologist Max Wertheimer (1880-1943), Kurt Koffka (1886-1941) and Wolfgang Kohler (1887-1967) in 1920s. The word Gestalt in German means essence or shape of an entity's complete form. Gestalt principles of perception influenced many disciplines from architecture and art to environmental design and became a point of interest and a source of inspiration. Gestalts' principles of perception is accepted as modern theory explaining the human perception and holistic inclination of humans scientifically (Graham, 2008).

According to the Gestalt principles the meaning extracted from entirety is not the parts that make it up, but is about how they make a whole together and the relationship between the pieces. One of the pioneers of the Gestalt school, Max Wertheimer explained the concept by giving the example of the impression of movement when a series of still pictures showed quickly in sequence which is not possible to perceive when only one of the pictures in the sequence is observed (Wertheimer, 1944).

In this context, the objects forming the environment exist together in an order and the perception is explained by mental schemes formed by the objects of this order (Kohler, 1947).

Form is a visual phenomenon that has an action by itself. Form is the action of shapes that combines with the context and makes itself prominent without disturbing the homogeneity of the background(Kohler 1947).

Isomorphism is defined as the parallelism formed by the shapes that emerges during the perception process due to the neurological processes. The emotions and feelings that appear during the observation of the objects visually

are the psychological correspondence of the physiological effects that has activated in the visual center in the brain (Arnheim, 1972).

Field strengths, as in mathematics has a gravitational force to an area or a direction. These force are explained by Pragnanz principle. According to this principle perception occurs as stable and constant forms. From this point of view every psychological event is proposed to have three main inclination of being meaningful, simple and complete (Arnheim, 1972).

However, the environmental perceptive effects should not be explained and organized only by the Pragnanz principle, but be evaluated considering the vital needs, religious beliefs, traditions and culture of the humans. For this reason, entities from the same physical environment react differently to a common stimuli. To better understand the reasons behind the behaviors of humans, behavioral environment of the humans should be examined instead of the physical environment (Koffka, 1935).

In parallel, in 1920s painter Amedee Ozenfant (1886-1966) and architectLe Corbusier (1887-1965) divided the perception process in two stages as primary and secondary sensations. As it can be seen from Table (2.3), primary sensations are in the physiological process and composed entirely of shape and color. This process is constant and universal for the human being. Secondary sensations on the other hand are dependent on the cultural background and personal involvement. Secondary sensations are personal and variable (Bonta, 1979).

Table. 2.3. Perception Process

PERCEPTION PROCESS	**PRIMARY SENSATIONS**	**SECONDARY SENSATIONS**
Component	Shape, Color	Cultural Background, Personal Involvement
Properties	Physiological	Pertaining to Human Beings
	Constant	Variable
	Universal	Personal

In this context, the duty of the designer is to put forward a new perspective by using carefully selected new elements where the conventional and old is proved to be insufficient. In other words, the designer arranges the pieces to make meaningful coherences inside the entire work. By using the conventional in an unconventional way and arranging common objects in an original way, the designer changes the connections of the objects. Furthermore the designer can even use the clichés. In this case, by using familiar objects in a new context they are perceived as new as well as old. Also the complications and contradictions in the designs are achieved through the use of illusions and invariance of perception (Venturi, 1991).

2.4.2 Factors That Affect Perception

Gestalt principles of perception, in summary, explains all perceptions as a organizedcoherent body. At this point there are main factors affecting the perception. These factors are the factors of which the designers and architect consider during the design process. These can be listed as figure-ground relationship, proximity, closure, similarity, continuity, proportion and simplicity (Lang, 1987).

2.4.2.1 Figure-Ground Relationship

The simplest but the main principle of perceptional organization is the figure-ground relationship. The forms perceived as figures on a background have visual effect. In other words the forms appear to be figures in relation with the background. Thus, a meaning is given to the random organization of objects with reversible concepts to be perceived in an order (Kohler 1947).

The form within the context of the ground is perceived as a figure on the background by the brain deducing which is which. Visually the figure is closer to

us and perceived as an object having a form. Background on the other hand have a difficult to perceive impression. There are situations where figure and ground are perceived reversed. The form that can be perceived as a figure initially can be perceived as the background after some time. However the figure cannot be perceived as the figure and the background at the same time. For instance, as in Figure 2.6, the figure can be chosen to be perceived as a dark colored vase on a white background, or a two face silhouettes on a dark background or the same effect can be observed in the interior design of Harajuku Church of which the walls and ceilings are formed by the use of natural and organic forms (Roth, 2000).

Figure 2.6.

a) Figure-ground relationship
(http://www.proprofs.com/flashcards/upload/q7712682.gif)
b) Harajuku Church (interior) – Ciel Rouge Creation Design
(http://briointeriordesign.files.wordpress.com/2010/02/20080426harajuku.jpg)
c) Harajuku Church (outside) – Ciel Rouge Creation Design
(http://www.archdaily.com/134128/harajuku-church-ciel-rouge/__h19/)

2.4.2.2 Proximity

In visual organization the principle of proximity actualizes in the simples conditions. Because relative proximity results indiminished resistance to the connection between the perceived units, objects close to each other are tended to be perceived as groups (Lang, 1987).

Even if the objects are far from each other, they may be perceived as organized and interpreted as aligned on line. For instance, in Figure2.7 the texture and proximity relationship of the points created by the proximity of the points with varying sizes. Campell's chair designed by the use of circles with different sizes influenced by seashells or the structures designed Toyo Ito by using organic forms can be given as examples to the same principle (Roth, 2000).

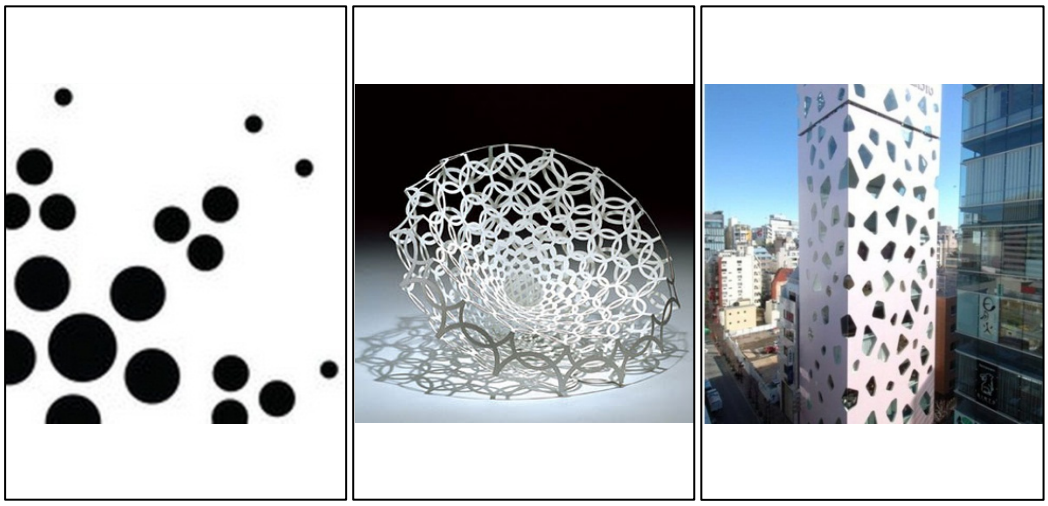


Figure 2.7.

a) Princple of proximity
(http://th05.deviantart.net/fs70/150/i/2011/066/8/c/gestalt_theory___proximity_by_amacina-d3b5rqu.jpg)
b) Very Round Chair Design – Louise Campbell
(http://2.bp.blogspot.com/_XPcT1H8srDU/SiJvUqaX3yI/AAAAAAAAAC8/Tf5XX97fPbE/s320/Louise_Campbell_Veryround_Armchair_amo.jpg)
c) Mikimoto Ginza2 – Toyo Ito
(http://www.toyo-ito.co.jp/WWW/Project_Descript/2005-/2005-p_06/3-800.jpg)

2.4.2.3 Similarity

If the elements have similar size, form, texture and color, they are perceived as a grouped single unit. This is called the principle of similarity. In Figure2.8 the eye perceive the similar shapes as a distinct group of squares in black and white. The same principle can be observed on a lightshade designed by the use of circular forms or a structure design influenced by an armadillo (Lang, 1987).

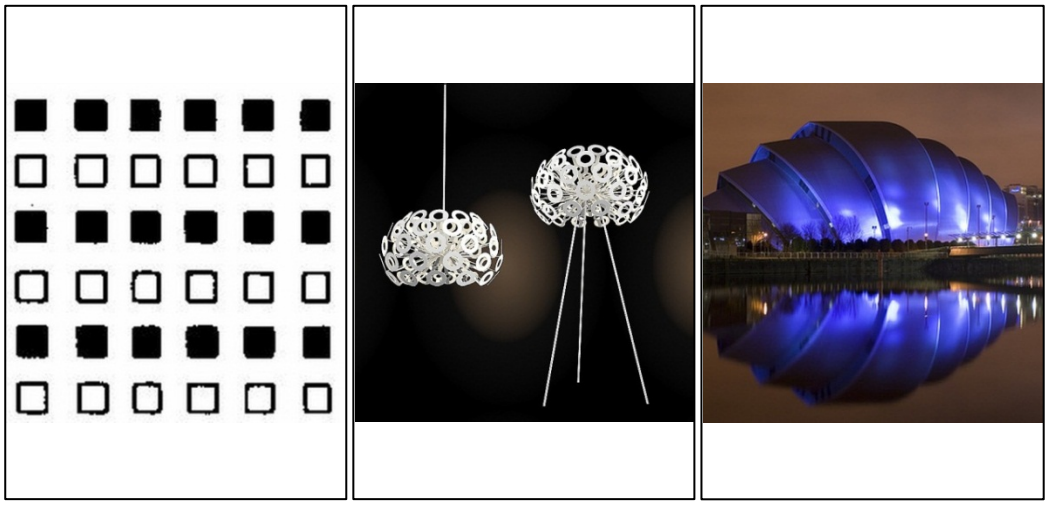


Figure 2.8.

a) Principle of similarity (http://www.users.totalise.co.uk/~kbroom/images/gestaltpics/similarity.png)
b) Dandelion Lamp Design – Richard Hutten (http://dekorasyon.kadin.ca/wp-content/uploads/2011/02/Modern-Salon-Ayd%C4%B1nlatma-Tasarimlari-2.jpg)
c) The Clyde Auditorium – Norman Foster (http://www.redblugraphics.co.uk/blog/wp-content/uploads/secc_glasgow.jpg)

2.4.2.4 Closure

Principle of closure explains that humans tend to perceive continuous objects as a whole. In other words humans fill the gaps of the perceived object instead of perceiving the pieces and the gaps separately. In Figure2.9.a the geometrical shapes are perceived as triangle, rectangle, sphere and line. As it is

seen the shapes perceived to be complete even if they are not. In Figure 2.9.b the semicircular LED Rings Design that appears as a whole because of the perception and Figure 2.9.c the buildings designed by Renzo Piano with the inspiration from nature and primitive life are given as examples (Lang, 1987).

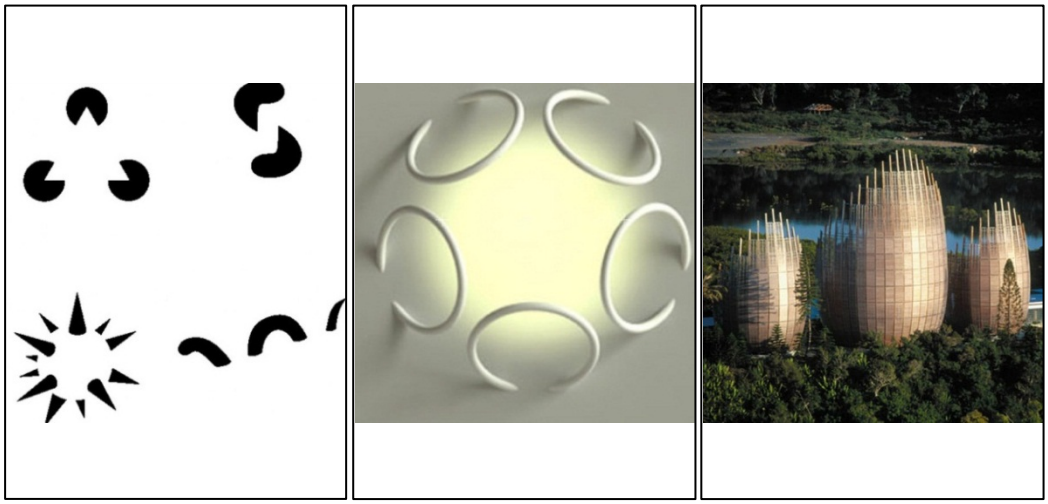


Figure 2.9.

a) Principle of closure
(http://sharp.bu.edu/~slehar/webstuff/bubw/illus.gif)
b) Wall-Mounted LED Rings Design – Angelic Architectural
(http://dornob.com/angelic-architectural-lighting-via-wall-mounted-led-rings/)
c) Jean-Marie Tjibaou Cultural Centre – Renzo Piano
(http://www.rpbw.com/)

2.4.2.5 Continuity

The units, distances and spaces that go in the same direction are perceived to be equal, interconnected and a whole. Thus a line or a group of points are tended to be perceived as being at equal distances. The points in Figure 2.10.a are perceived as intersecting lines instead of being perceived as separate points. In the other example in Figure 2.10.b the continuity in the interior design elements influenced by liquid fluidity is observed. The use of same principle can be seen in Figure 2.10.c the Spanish Pavillion designed by the influence of bamboo trees to create the effect of continuity and natural texture (Roth, 2000).

Figure 2.10.

a) Principle of Continuity
(http://johnbonadies.blogspot.com/2010_01_01_archive.html)
b) Frame Bar Design – Tsigos Design
(http://www.hobbyfashion.com/furniture-design-cafe-in-kolonaki.html/frame-bar-modern-white-chair-and-table)
c) Expo 2008 Spanish Pavillion Design – Patxi Mandago Architects
(http://www.contemporist.com/photos/zaragoza_pavillon_1108_02.jpg)

2.4.2.6 Proportion (Visual Hierarchy)

Human mind at the same time also tries to find mathematical, geometrical relationships and proportions in patterns (Roth, 2000). The principle of proportion consist of the principle and rules applied for the arrangement of the pieces to create an ordered and coherent whole. In this context, several systems were proposed to explain the concept and the theory of proportion for creating a coherent order. Proportion, explains the constant relationship that support the concepts of coherence, continuity, fluidity coherently by connecting the pieces of the whole in a coherent order allowing the transition between a piece to the other or from the whole to the pieces (Laseau, 1989).

Another approach for the systems related with the proportion is the use of the mathematical relationships in nature and universe. W. Hoffer proposed that nature is a measurement device with the indispensable logarithmic spiral, dependable, diverse, and having a perfect balance. Today and in the past many designers used the principle of proportion and reflected it to their designs. In

Figure 2.11 lampshade and stair design inspired by the logarithmic spiral and nature can be seen (Bergil, 1988).

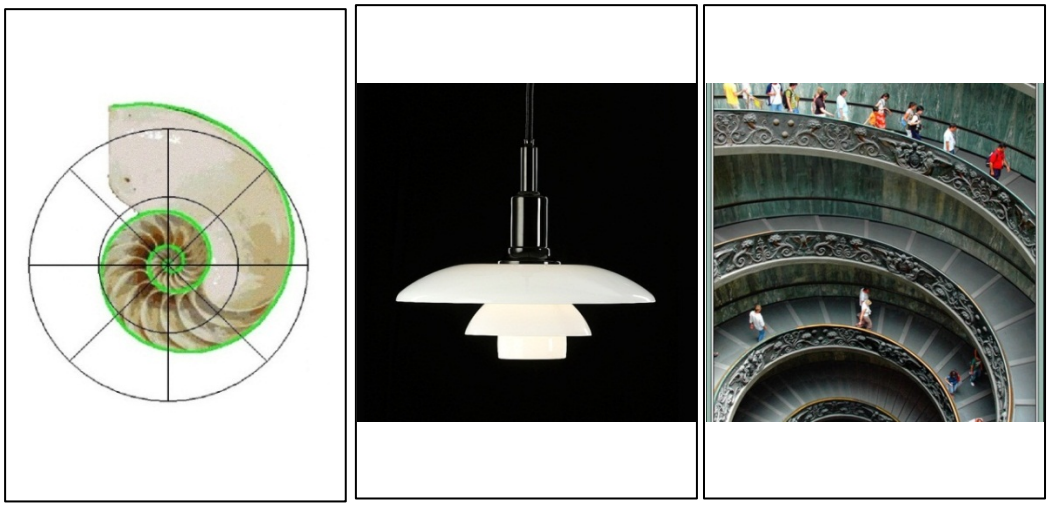


Figure 2.11.

a) Logarithmic spiral and sea shell
(http://mathdl.maa.org/images/cms_upload/spiral04457.gif)
b) Pendant Light Design – Poul Henningsen
(http://www.ivorinnes.co.uk/WebRoot/Store/Shops/innesestore/4D6C/FCCD/362A/5F8F/0451/4D44/2999/4394/PH_32_pendant_01.jpg)
c) Vatican Staircase – Guiseppe Momo
(http://www.trekearth.com/gallery/Europe/Italy/Lazio/Vatican_City/Vatican/photo831156.htm)

Proportion can be found also in human body. The proportion systems which are based on experimental and theoretical principles were developed by the examination of human body from Vitruvius to Le Corbusier and present time as shown in Figure 2.12 (Aydınlı, 1993). Also this proportion is encountered in leaf order of plants, shells of mollusks, the patterns of insects, birds and feathers of birds (Lawlor, 2002).

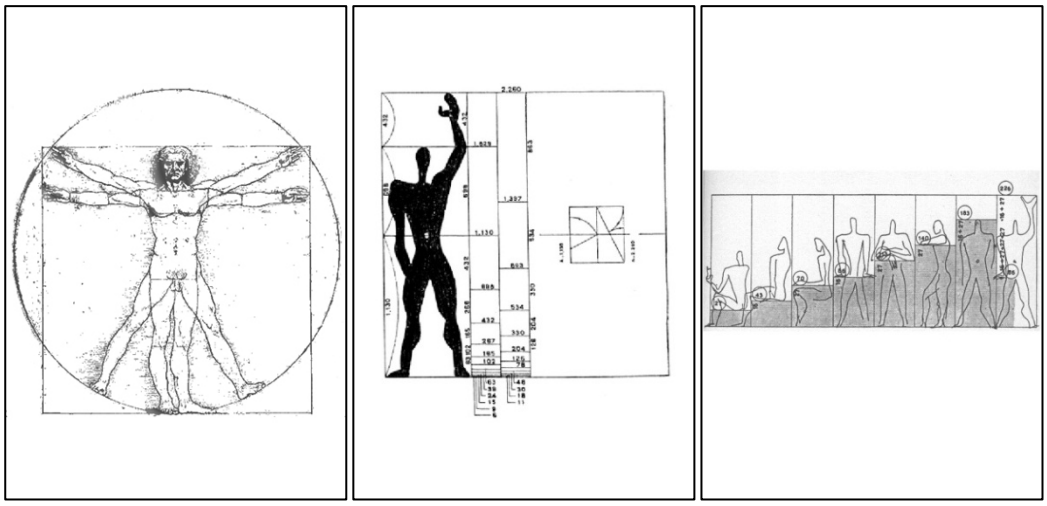


Figure 2.12.

a) Vitruvian Man
(http://leonardodavinci.stanford.edu/submissions/clabaugh/images/vm/leonardo.jpg)
b) Le Corbusier Modular 1
(http://www.emis.de/journals/NNJ/images_number1/RHF-28.gif)
c) Le Corbusier Modular 2
(http://www.centraliens.net/groupes-regionaux/province/lorraine/img/corbusier_modulor.jpg)

In addition, the proportion systems such as golden proportion in nature, the logarithmic spiral and modular were used also in the structural designs in the past and present. The façade design of Marseille Residents by Le Corbusier or plan schema's of Villa Savoye or the façade proportions of the Greek temple Partheon or plan schema's of Emo Villa by Palladio can be given as examples (Figure 2.13) (Fletcher, 2001; Olsen, 2006).

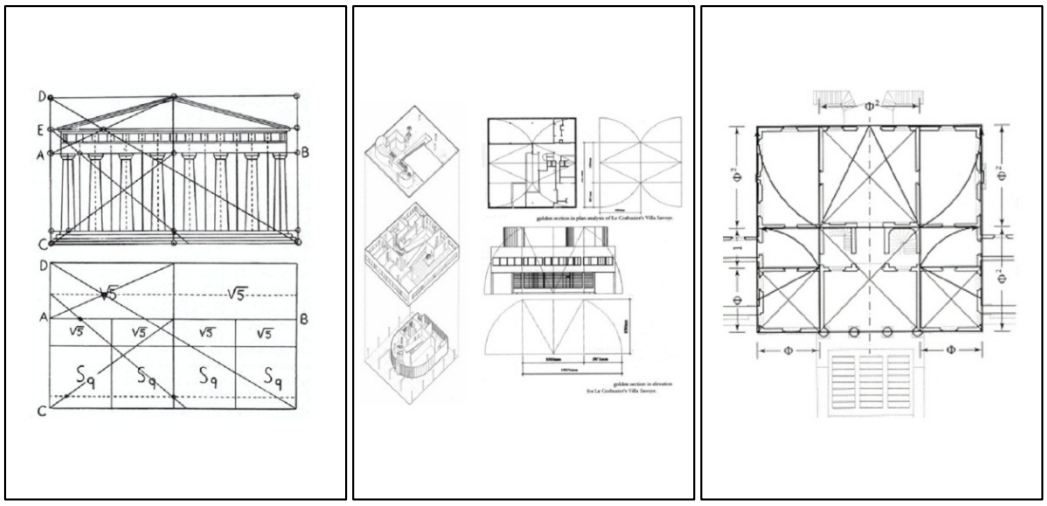


Figure 2.13.

a) The Parthenon Temple View
(http://www.stangrist.com/Parthenon.jpg)
b) Villa Savoye Drawings - Le Corbusier
(http://postfiles15.naver.net/20110427_254/jluke313_1303892826716ruzK4_JPEG/Le_corbusier_golden_section.jpg?type=w3)
c) Villa Emo Plan – Palladio
(http://www.emis.de/journals/NNJ/conferences/images/N2000-Fletcher.gif)

2.4.2.7 Simplicity

According to Gestalt principles of perception, simplicity is defined as the organization of the pieces in a harmony as a coherent whole with a simple and plain way. In this context humans are observed to be in the inclination of perceiving figures organized in a simple and plain way. Figures are defined to be catchy and beautiful based on their ease of perception. The difficulty in proposing a design theory in this subject is because of the insufficiency in the conversion of the terminology of the topic into practical concrete definitions. In this context, the chair designed with inspirations from the plain forms of pebbles or human anatomy or Kaeko Coffee Table inspired by human anatomy or a structure of Ando influenced by the nature of light can be given as examples reflecting the concept of simplicity (Figure 2.14) (Lang, 1987).

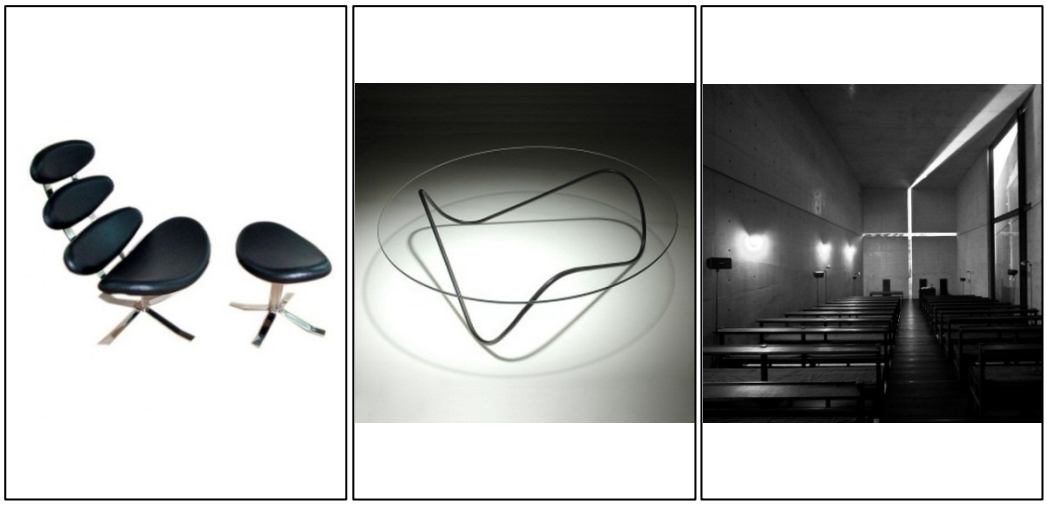


Figure 2.14.

a) Corona Chair – Poul M. Volther
(http://efarfurniture.com/uploadfile/Classic%20chair/39/%E5%A4%A7.jpg)
b) Kaeko Coffee Table – Rafic Farah
(http://store.objekto.fr/coffee-tables/17-kaeko-table.html)
c) Church of the Light – Tadao Ando
(http://fc09.deviantart.net/fs41/f/2009/051/2/e/church_of_the_light_by_leesaf.jpg)

2.4.3 Invariance of Perception

Human mind tends to comprehend an object or a shape normally under different conditions. Although the light rays reflected from an object falls to the retina inversed after passing through pupil, humans perceive the object straight as it is. Likewise, an object far away is perceived in its original dimensions even though the image of the object falls to the retina smaller than its original size. Similarly, the two dimensional image of an object in a photograph is perceived as three dimensional. As a result, the brain appears to rearrange and interpret the perceived visual information about an object. This characteristics of brain helps us to adapt to our environment (Clifford, 2009).

Invariance of perception defined as the perception of the objects unchanged as they are. Despite the differences in the stimuli, the images of the objects perceived unchanged. This uniformity in perception is called invariance of perception (Clifford, 2009).

2.4.3.1 Shape Invariance

A previously known object perceived as it is independent of the viewing angle. The important point is familiarity with the object and the previous information about how the object should look like (Clifford, 2009). As it is seen in Figure2.15, the shape of the door remained same at every angle. Likewise, because of the familiarity with the structure and the form, the buildings with hyperbolic forms designed with the influence of crystal structures in the nature perceived same independent of the point of view.

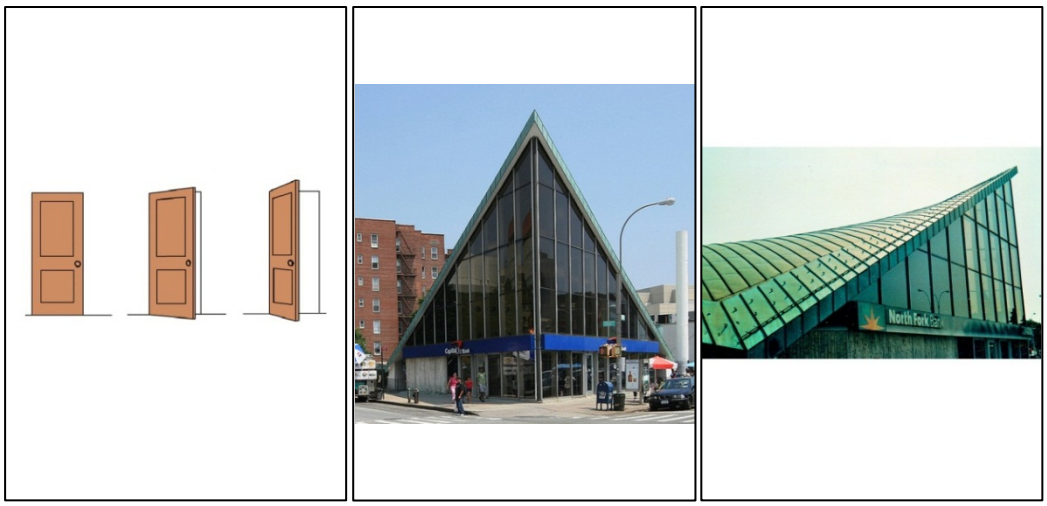


Figure 2.15.

a) Shape invariance
(http://home.comcast.net/~pamelawhite0794/AP%20Psych/ch6/perception%202_files/slide0009_image004.gif)
b) North Fork Bank Design - William Franklin Cann 1
(http://1.bp.blogspot.com/_5er_o4gE6Jo/TUfkiccJouI/AAAAAAAAAro/z1tWy3R0Hvg/s1600/3770723015_be7206a0d5%255B1%255D.jpg)
c) North Fork Bank Design – William Franklin Cann 2
(http://4.bp.blogspot.com/_5er_o4gE6Jo/TUfknr3cHVI/AAAAAAAAARs/FJLL6-TFtRE/s1600/Off-the-beaten+path+modernism+in+NYC_0005_NEW.jpg)

2.4.3.2 Size Invariance

The image of an object on the retina becomes smaller as the distance of the object to the perceiver increases. But the brain interprets this as the object is becoming distant instead of getting smaller and keep perceiving the size of the object unchanged. In this context, size invariance is kept by the knowledge about the distance of the object to the perceiver and the nature of the object (Clifford, 2009). As it is seen in Figure 2.16, since the size of the tree does not change the brain interprets this as tree is moving away. A similar effect can be observed in the interpretation of the loadbearing elements of the structures designed with the influences from the shells of the mollusks.

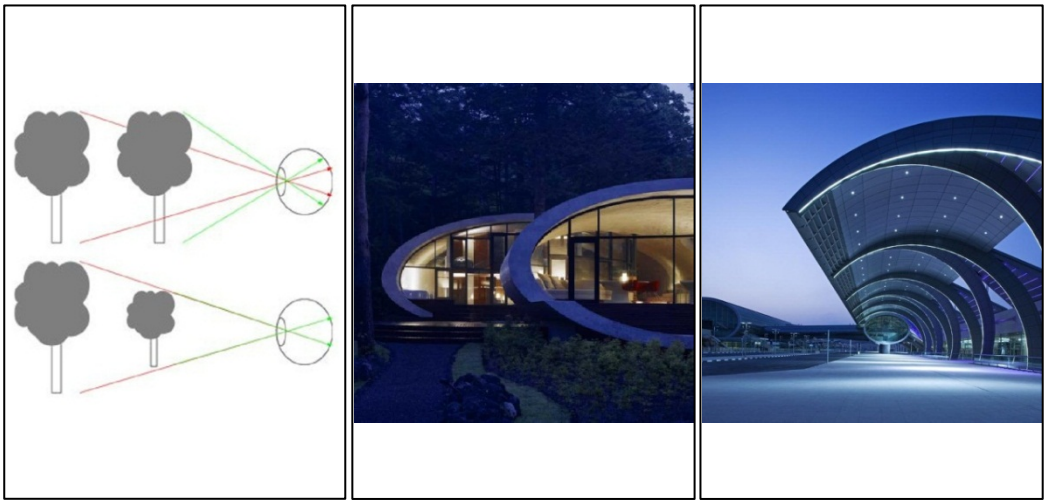


Figure 2.16.

a) Size invariance
(http://www.ottobwiersma.nl/philosophy/perspect.htm)
b) Shell Villa – ARTechnic Architects
(http://www.contemporist.com/2009/02/14/shell-villa-by-artechnic-architects/)
c) Dubai International Airport – Paul Andreu
(http://www.arabianaerospace.aero/media/images/stories/DXB_Terminal3.jpg)

2.4.3.3 Invariance of Color and Illumination

The invariance of color and illumination is the invariance in the perception of the color and illumination of the familiar objects independent of the changes in the color and the brightness depending on the environmental conditions (Özkalp, 2004). In Figure 2.17, the illuminated red ball is perceived as red throughout even it has more and less illuminated parts. The brown scale of the structure influenced by the natural rocks in Figure 2.17 is perceived as shades of brown independent of the daylight.

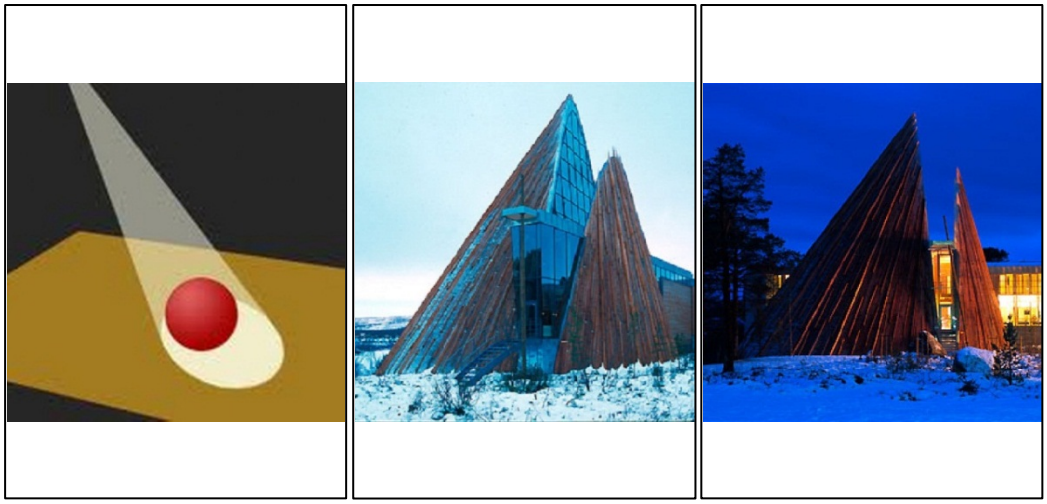


Figure 2.17.

a) Invariance of color and illumination
(http://parker.psych.psu.edu/images/light.gif)
b) The Sami Parliament 1 – Stein Halvorsen & Christian A. Sundby
(http://thomasmayerarchive.de/images/2192/115AA20011130A0017/jpg/115AA20011130A0017,Architecture,architects,Halvorsen,-Stein,Sami-Parliament,Sami-Parliament-Karasjok.jpg)
c) The Sami Parliament 2 – Stein Halvorsen & Christian A. Sundby
(http://thomasmayerarchive.de/images/666/115AA20011130A0032/jpg/115AA20011130A0032,Travel,Norway,Sami-Parliament,Sami-Parliament-Karasjok.jpg)

2.4.4 Depth and Distance Perception

Although, the image of the object on the retina is two dimensional, humans perceive the objects in three dimensions because the brain interprets the objects by

using some optic cues. These are shades, other objects between the eye and the object, the effect of light on the object, height differences and interpretation of the object by the information coming from two eyes (Binbaşıoğlu, 1992).

Thus, to perceive the dimensions humans need some cues. Only one eye is sufficient to perceive some of these cues. These cues are called monocular. For some of use both eyes are necessary. These cues are called binocular (Binbaşıoğlu, 1992).

2.4.4.1 Monocular Cues

The shades appearing by the direction of light creates a sense of depth. Objects appear to be close or distant depending of the clearness or mistiness of the atmosphere. In misty atmosphere objects appear to be distant and in clear atmosphere objects appear to be closer. In addition artists, use several monocular cues to represent the closeness of the objects. There are four kinds of cues for the perception of depth. If the one of two objects block the view of the other partially, the object blocking the view perceived to be closer (Binbaşıoğlu, 1992). In Figure 2.18, one of the triangles appear to be closure and in front of the other. The same effect can be observed in the geodesic domes of the Eden project influenced by honeycombs or the designs of Meier influenced by the organic and curvy forms of the shells of mollusks.

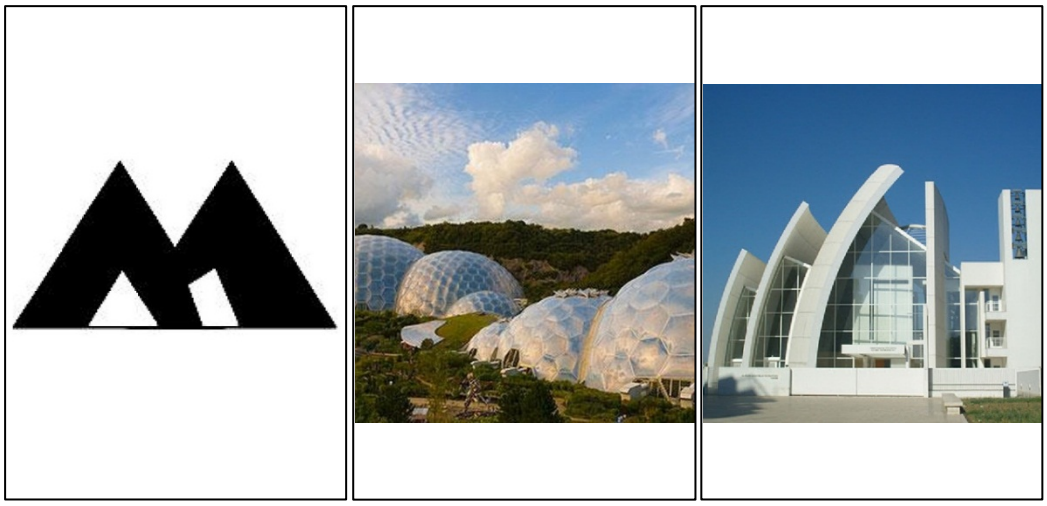


Figure 2.18.

a) Blocking the view
(www.aof.edu.tr)
b) The Eden Project – Nicholas Grimshaw
(http://i.telegraph.co.uk/multimedia/archive/01601/eden-project_1601897c.jpg)
c) Chiesa Dives – Richard Meier
(http://lh3.ggpht.com/KObW6Z3l18E/SugJx8sDYFI/AAAAAAAAALs/4drs8tPBMuw/SNV15312.JPG)

If the same object with different sizes are aligned together, the one with the smaller size appear to be further away (Binbaşıoğlu, 1992). The circles in Figure 2.19 with different sizes appear to be spheres of the same size in varying distances from the viewer. Same effect can be observed in the bookshelf by Bredahl influenced by the coherency of the circular and amorphous forms or the structures of Villa Ronde with the use of cellular forms.

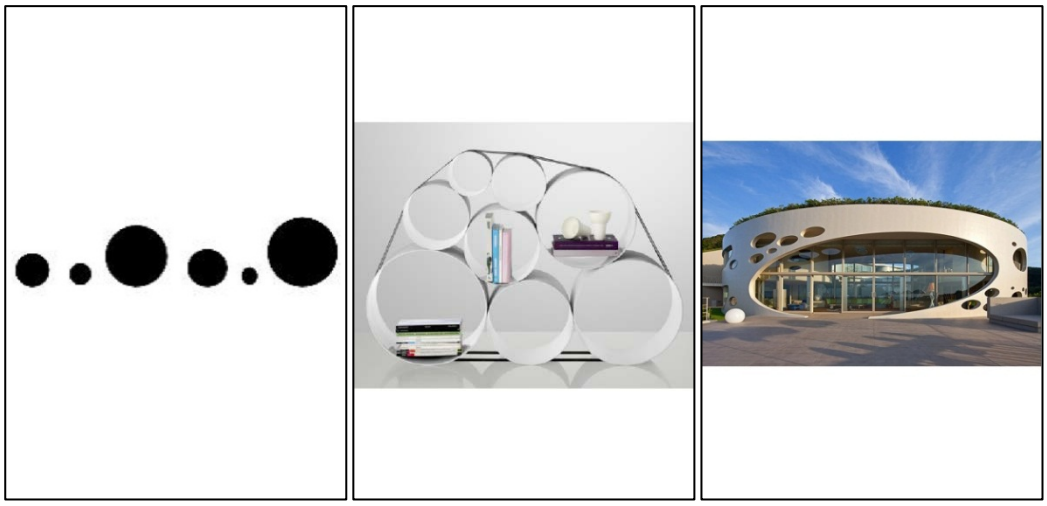


Figure 2.19.

a) Relative size
(www.aof.edu.tr)
b) The OTO 100 Eterage - Phil Bredahl
(http://www.designrulz.com/product-design/storage-items/2010/10/furniture-by-pil-bredahl/)
c) Villa Ronde – Ciel Rouge
(http://www.designsigh.com/wp-content/uploads/2011/04/villa-ronde5.jpg)

Another cue is the height of visual field. If observed on the same plane the objects that are far away appears to be at a higher level than the visual field. When objects of the same size are placed at different heights, they appear to be far from each other (Binbaşıoğlu, 1992). The trees in Figure 2.20 appears to be far from each other when they are placed at different heights. The same effect can be observed in the lampshade by Elica influenced by ocean waves and in the structure by O'Gehry influenced by the figure of a dancing woman.

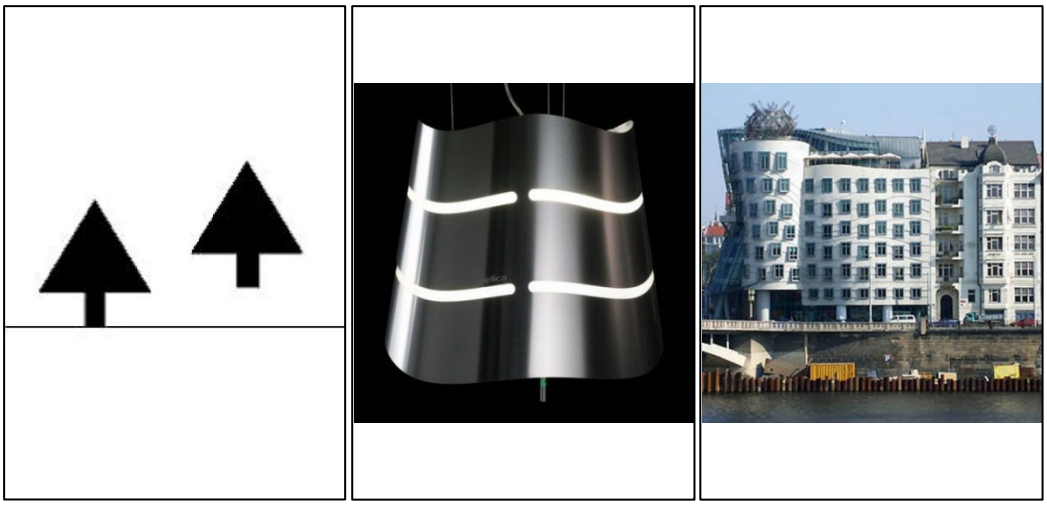


Figure 2.20.

a) Relative height
(www.aof.edu.tr)
b) Wave Lighting Desing – Elica (Cooker Hood)
(http://www.appliancist.com/elica-cooker-hood-wave.jpg)
c) Dancing House – Frank O'Gehry
(http://www.galinsky.com/buildings/dancinghouse/Dancing%20House%201.jpg)

In linear perspective, the objects with known sizes appear to be closer to each other when they are far away from the viewer (Binbaşıoğlu, 1992). The railroad tracks appear to be closer to each other and intersect when they are far away (Figure 2.21). The same effect can be observed in the interior design arrangement of Saco Architects with organic and fluid forms and the structure by Calatrava influenced by a bird waving its wings (Figure 2.21).

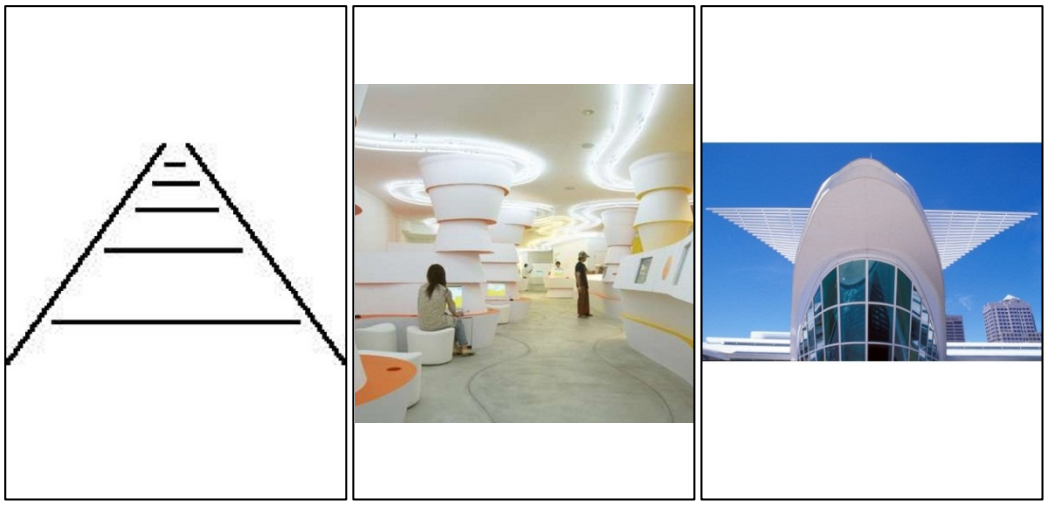


Figure 2.21.

a) Linear perspective
(http://www.cg.tuwien.ac.at/courses/Seminar/WS2005/index.php/Bild:Perspective.jpg)
b) Flat Flat Store Design – Sako Architects
(http://www.trendhunter.com/trends/flatflat-store-sakos-design-is-anything-but#!/photos/33587/1)
c) Milwaukee Art Museum – Santiago Calatrava
(http://larryspeck.com/2009/11/05/milwaukee-art-museum-quadracci-pavilion/)

2.4.4.2 Binocular Cues

Two eyes perceive an object from different angles because of the distances between them. Due to the differences in the viewing angle a variance situation occurs in the retina. This results in the formation of depth perception. In this context, there is a difference between the images on the left and right eyes. However, the brain combines these two images to form a single image. This is called the stereoscopic effect (Binbaşıoğlu, 1992).

2.4.5 Perceptual Illusions

Perception has significant importance for the daily life of the human. For instance, if there were no invariance in perception one is not able to recognize an

object that was seen before. In addition, perception can sometimes leads to the misrecognition or perceptual illusions. There are several perceptual illusions. Muller-Lyer Illusion, Ponzo Illusion, Zöllner Illusion (DirectionalIllusions, The Ames Room (Field Illusion) and Hering Illusion are the most well-known (Özkalp, 2004).

2.4.5.1 Muller-Lyer Illusion

Muller-Lyer Illusion is one of the most common perceptual illusions. The upper line in Figure 2.22 appears to be shorter than the lower one even though they are identical. The reason for this is because the arrows at the ends of the lines perceived to be a part of the lines. The closure of perception results in the perception of the stimulants together when they are close to each other (Özkalp, 2004). By the use of different materials and colors in the façade of the buildings in Figure 2.22, the balconies appear to be longer or larger than they actually are.

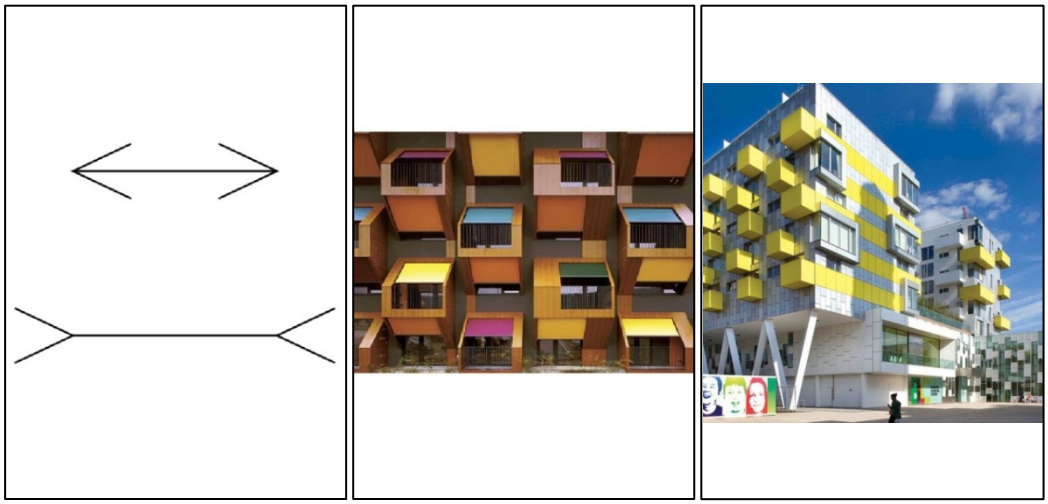


Figure 2.22.

a) Muller-Lyer Yanılması
(http://peace.saumag.edu/faculty/kardas/courses/GPWeiten/C4SandP/muller.GIF)
b) Block Balconies – Ofis Architects
(http://www.100percentdesign.net/files/coast.jpg?0)
c) Barking Learning Centre
(http://bldgblog.blogspot.com/2008/09/future-slum.html)

2.4.5.2 Ponzo Illusion

Ponzo Illusion shows that human mind interprets the sizes of objects based on the background (Robinson, 1998). As it is seen in Figure 2.23 the upper line appears to be longer than the one at the bottom. The same illusion can be observed in the interior design of KLAB Architecture designed with the use of organic forms and in another interior design with the use of wavy forms in Figure 2.23

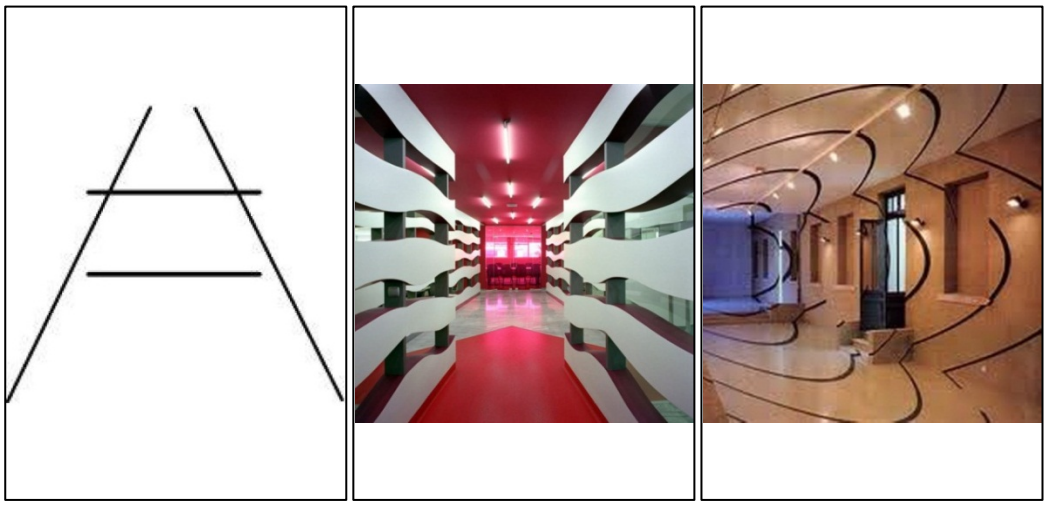


Figure 2.23.

a) Ponzo Illusion
(http://img.tfd.com/ElMill/thumb/F0I-11-S2958.jpg)
b) Wunderman Offices – KLAB Architecture
(http://www.woovaa.com/stylish-office-interior-design-ideas-from-klab-architecture/)
c) An Interior Design
(http://3.bp.blogspot.com/_NpINLHeo8rM/RoVB8U8euCI/AAAAAAAACRU/pG6wfuJV6Ko/s400/interior+%287%29.jpg)

2.4.5.3 Zöllner Illusion (Directional Illusion)

Zöllner Illusion is observed when parallel lines are drawn at an angle on a longer line. When a series of these long lines observed together the angled shorter lines create impression that the longer lines are closer to each other at one end and far from each other at the other end (Figure 2.24) (Luckiesh, 1965). The same effect can be observed in a curvy stair design of HSH Architects and a structure of

King Roselli Architects where the distance between floors appears to be different even though they are the same (Figure 2.24).

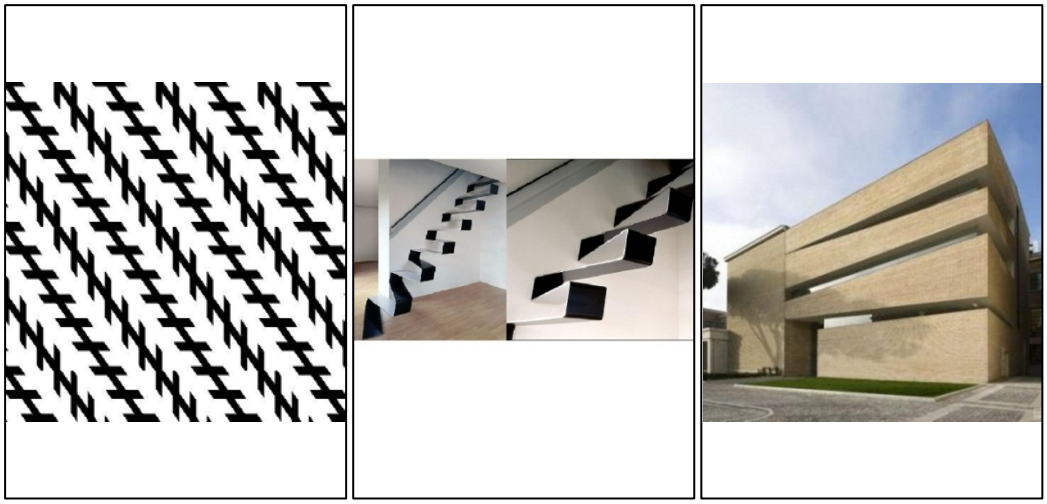


Figure 2.24.

a) Zöllner Illusion
(http://0.tqn.com/d/psychology/1/0/a/5/zolner-illusion.jpg)
b) Ribbon Staircase Design – HSH Architects
(http://illusion.scene360.com/product-design/3968/ribbon-staircase/)
c) Pontifical Lateran University Building – King Roselli Architects
(http://www.roomu.net/files/user10/pul_02.jpg)

2.4.5.4 The Ames Room (Field Illusion)

As it is seen in Figure 2.25the room designed by Albert Ames (1880-1955) observed as a normal cube by using depth perception and single point of view it creates a field illusion (Luckiesh, 1965). A similar example can be observed in the interior design of Starck by the use of proportional differences. The same effect can be observed by the use of proportional differences of chairs in the interior design of Mackintosh (Figure 2.25).

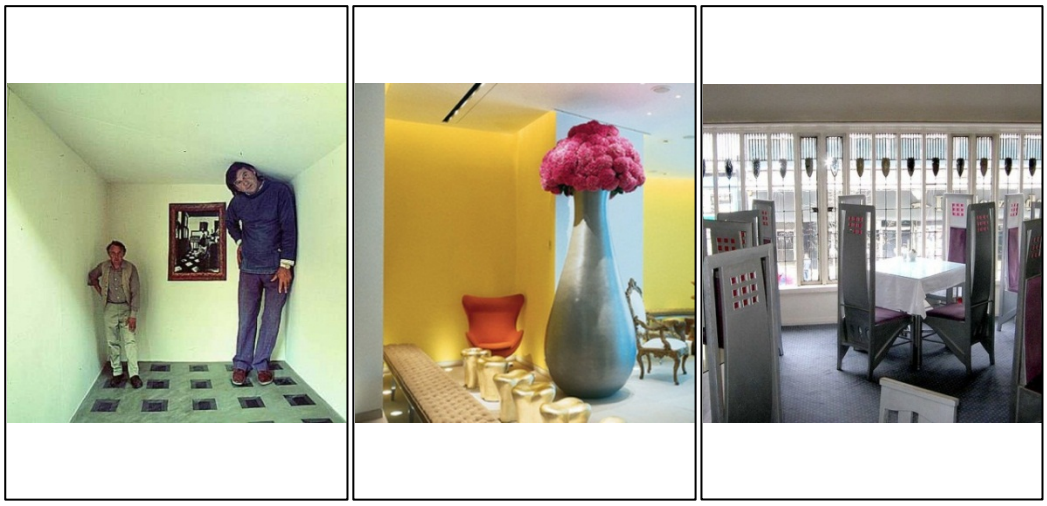


Figure 2.25.

a) The Ames Room
(http://www.illusionism.org/media/ames-room-2.jpg)
b) St. Martins Lane Hotel – Philippe Starck
(http://3.bp.blogspot.com/33gsM5k7we4/TbDZ0pdQYI/AAAAAAAABU8/VzCsuNmpsEk/s400/Saint%2BMartins%2BLane%2BHotel.png)
c) The Willow Tea Room - Charles Rennie Mackintosh
(http://www.scotiana.com/wp-content/uploads/2010/03/The-Willow-Tea-Room-Room-de-Luxe-Wikipedia.jpg)

2.4.5.5 Hering Illusion (Bending)

In Hering Illusion shown in Figure 2.26.a, the red lines are parallel and straight. However, the angular lines in the background form a false depth and perspective perception and make the red lines appear bended (Robinson, 1998). The building in Figure 2.26.b designed by the use of straight forms appears to be concave by the use of color and linear textures on the façade. In Figure 2.26.c the stairs in a building designed with organic forms influenced by a cocoon appears to be bended and expanded.

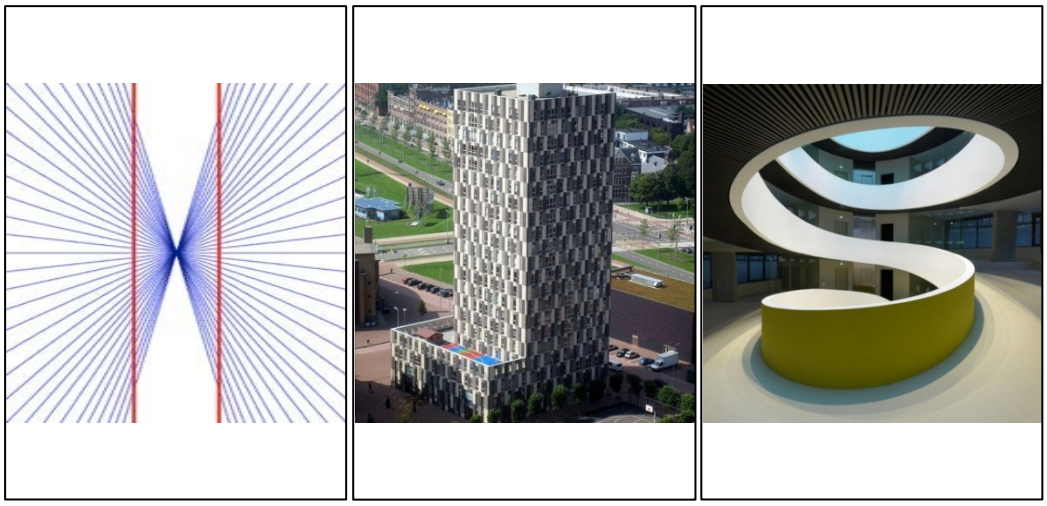


Figure 2.26.

a) Hering Illusion
(http://upload.wikimedia.org/wikipedia/commons/a/a0/Hering_illusion.svg)
b) A Tower In Rotterdam
(http://www.flickr.com/photos/jaspervisser/226056554/)
c) Cocoon Building – Camenzind Evolution
(http://www.bestofremodeling.com/blog/latest-trends/free-flowing-architecture)

2.5 CONCLUSION

Creativity is to bring out new products by combining the conventional with the new ideas by using available resources (Erdal, 2002). However to create new products by the use of the new ideas, several factors are to be considered. These are unpredictability, functionality, impressiveness, innovativeness, originality, suitability. The combination of these factors in an idea is the basis for designing a creative product (Lubart, 1994; Sternberg and Lubart, 1991, 1995, 1996). However new ideas and principle factors are not sufficient for designing creative products. Because the most important factor for a creative product is the new value incorporated in the design. Thus, the design is the result of the combination of all of the factors (Young, 1985).

The action of creation of new products or ideas is a matter of process. At this point “the concept of design” appears. The concept of design can be explained as defining the elements for the formation of a series of coherent ideas to realize the functions to meet the determined needs. The person who realizes this process,

decides, takes responsibility, proposes new ideas and makes decisions is the person who undertake the creative identity (İzgi, 1999).

Every design has a purpose to serve, something to express or explain. At this point the factors that define the purpose of the design emerges (Aimone, 2004). In addition there are several factors affecting the concept of design. These can be categorized as perceptual and conceptual factors (Vitruvius, 1960).

The concept of design is the point at which the abstract concepts becomes perceptual expressions. For this reason it is not sufficient to examine the concept of design at a perceptual level only. Thus conceptual factors should be considered (Aksoy, 1987). In this context, under the concepts such as creativity-creation, design-designer lies the human's way of perception of the world. Perception can be defined as the interpretation of the environmental stimuli -via sensory organs- by the brain or information retrieval (Moles, 1969). Perception, at the same time, is the synthesis in the brain of human's expectations, experiences and the information gathered by the sensory organs considering the social and cultural effects (Lang, 1987). In this context the main element lying under the factors that affect the designer and the concept of design is perception.

The designer, thus, is able to create meaningful contexts for the pieces by arranging the pieces in a coherent way. At the same time, the sophistication and the contradiction in the design is created by the designer with the use of principles such as perceptual invariance, perceptual illusions and perceptual organizations (Venturi, 1991).

At this point, the concept of design and the factors affecting the concept of design will be investigated in relation with the modernism era.

CHAPTER 3

3.1 INTRODUCTION

As a result of the technological developments starting from the 18th century through the 19th century, western countries had reached the social organization that was dictated by industrialization and the capital accumulation. As a result of these developments, architecture has gain the discipliner structure to become a professional occupation rather than an artisanal work as it was once. During this period, educational system was being reformed with the use new approaches, but also the current rules and techniques of the day were also being utilized in the educational system. At the end of 19th and in the beginning of the 20th centuries these trends became to a point to initiate the concept of Modern Architecture (Adam, 1985).

Modern Architecture continued as an evolutionary process lasting for 100 years during which the conceptual base developed. Even though the beginning of the process can not be pinpointed, it could be said that it is a result of the developments in social and cultural areas due to the Industrial Revolution. Its effects were initially observed on railroads and bridges by the use of the developments in materials technology and application techniques, followed by buildings, interiors and product designs (Benevolo, 1981).

In this chapter the modernism era and the influence of nature on design is investigated.

3.2 MODERNISM AND INFLUENCE OF NATURE

During the emergence of the modern architecture and modernism era, many designers and artists were observed to be influenced by the human nature and the nature itself in finding solutions for the current needs according to the

changing social structure and culture. This interactions can be encountered in building designs, furniture designs or industrial designs. To better understand the relationship between modernism and effect of nature, first the emergence of the concept of modern design and modern architecture should be investigated first.

3.2.1 General Characteristics of the Modern Era

The products of the 19th century as a result of the Industrial Revolution, mechanization, industrial and serial production techniques were ill designed mechanized adaptations of the classical medieval forms (Roth, 2000). William Morris (1834-1896) and John Ruskin disturbed by this practice started to form the new design standards. Thus, with a group of supporting artists they initiate a search for new forms in line with the requirements of the new order of life and became pioneers of the trend, Arts and Crafts (1850-1914) (Mutlu, 1996). According to the Arts and Crafts trend, industrial production was harming the spirit of the craftsman and society. For them the source of corruption in arts and society was the industry because of the fact that machines were lacking the soul and thus affecting the human to become emotionless. So, they tried to revive the traditional medieval techniques like weaving, glass painting and furniture craftsmanship (Whitford, 1988).

While eclectic trends were in favor and stucco techniques were usedin England, William Morris believed in forming a new language for art and designed a house with the architect Philip Webb (1831-1915). The house in Figure3.1 which is influenced by local mediaeval structures was named as ‘Red House’ because of its façade pavement with exposed red bricks without the use of plaster (Roth, 2000). In addition, this structure was built using timber and tiles in a traditional way by hand-workmanship. Thus, a new type of English house was created with its functional and naturalistic design and interior, quality materials and workmanship (Pevsner, 1985). Because he could not find the aesthetical and functional furniture for the house, he established the Morris Marshall, Faulkner

&Company in 1861 with his friends for the design of the furniture (Tuğcuoğlu, 1999).

Later on, summer houses were started to build in a naturalistic way. The first reaction to the eclectic architecture came from William Morris. The artist were actually reacting against mechanization and its end products. But his antipathy for imitations is the reason for him to become the modern pioneer of the concept of functionalism in architecture and design. Red House with its functional form and simple material selection became an important work of the era and residential architecture had once again become organic (Mutlu, 1996). The Arts and Crafts movement started by William Morris lasted from 1850s to1920s and only attracted only a few wealthy entrepreneur. However, his influence in the field of design became prevalent by his followers in England and United States such as Charles Francis Annesley Voysey (1857-1941) and Frank Lloyd Wright (1867-1959)(Roth, 2000).

Figure 3.1.

a) Red House – Philip Webb (http://www.mariabuszek.com/kcai/Design%20History/Design%20Images/Midterm%20images/RedHouse1.jpg)
b) Furniture Of Red House – Philip Webb (http://www.countrylifeimages.co.uk/Image.aspx?id=17839ffd-6ce8-47a9-a357-feaa14e7beb7&rd=2|red||1|20|187|150)
c) Interior Of Red House – Philip Webb (http://1.bp.blogspot.com/_eUSY5pm2tIY/SuX6E2MSGrI/AAAAAAAAAfs/c1kJ0WcI9hM/s400/red+house+interior.jpg)

While the industrialization and simplification were becoming popular, the Art Nouveau (1890-1910) movement emerged against the eclecticism and neoclassicism of the 19th century. The aim of this movement was to purify the architecture, discard the stylistic surpluses and return to a simplistic and straight approach for expressing the spiritual, social and economical life of the era. The pioneers of this movement are Victor Horta (1861-1947), Hendrik Petrus Berlage (1856-1934) and Josef Hoffmann'ın (1870-1956) (Figure 3.2) (Kortan, 1996).

Art Nouveau had left a short lived but strong impression. The movement was started in Belgium and expand initially to France than whole Europe (Colquhoun, 2002). Art Nouveau can be considered as a modern movement of the 1900s since it has rejected traditional approaches. Contrary to the eclectic style a new and original art form that rejects the traditional tried to be established. The effects of Art Nouveau had been observed from architecture to book illustration. Its application was especially successful in Architecture for decorative use, for which it had been used extensively. Glass and iron which were used exclusively by engineers started to be used for decorational purposes. For this reason the movement was more successful in object design and art. The most prominent impression of the movement in architecture can be observed in the curved lines influenced by the forms of animals and plants, rounded windows and exedras. In general, Art Nouveau was against the eclectic approach and tried to bring in an original style (Mutlu, 1996).

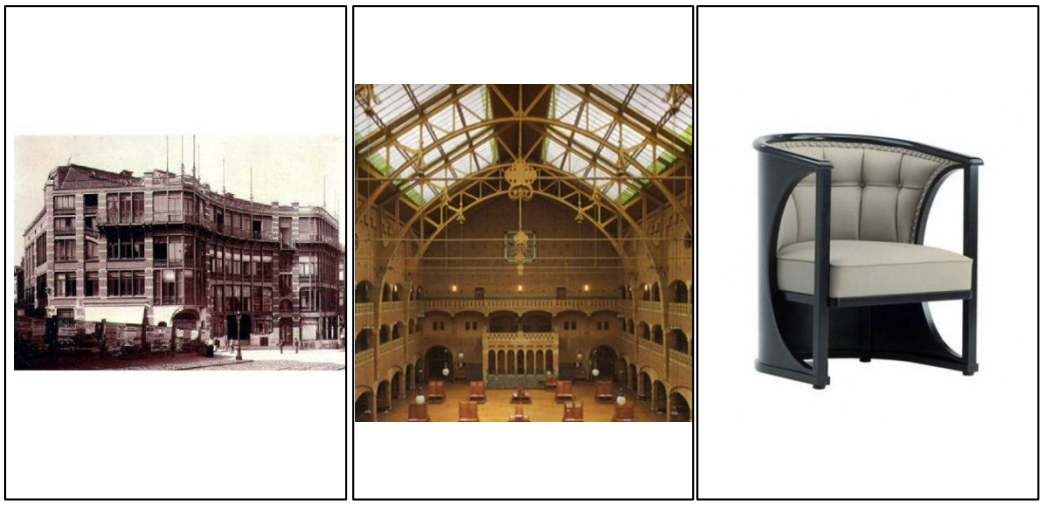


Figure 3.2.

a) La Maison Du Peuple - Victor Horta
(http://www.ebru.be/Architectuur/ArchPics/archvolkshuis.jpg)
b) Amsterdam Commodities Exchange - Hendrik Petrus Berlage
(http://d.hatena.ne.jp/images/diary/k/ken106/2005-05-19.jpg)
c) Hoffmann Sessel Armchair – Josef Hoffmann
(http://www.edition20.com/images/products/364/HOFFMANN-SESSEL-armchair-by-Gebr-der-Thonet-Vienna-by-Josef-Hoffmann-image-1.jpg)

The aim of Art Nouveau was to create forms based on structural principles observed in nature instead of designs contradicting the natural. The forms in nature were utilized as decorations by abstraction. But the idea was to use the decoration as a natural extension of the structure, not an attachment. In this context, Antoni Gaudi (1852-1926) became the great pioneer of the modern architecture with his buildings in Barcelona (Figure 3.3). By combining the influences of nature and structural knowledge with baroque traditions, he created original arts of works (Mutlu, 1996).

Figure 3.3.

a) Casa Mila - Antoni Gaudi
(http://www.gaudidesigner.com/data/article/60.jpg)
b) La Sagrada Familia – Antoni Gaudi
(http://2.bp.blogspot.com/_w0yLBX8BQnY/TUxEUpLdBGI/AAAAAAAAAClQ/vjF6KOf4-uM/s1600/La-Sagrada-Familia-Interior.jpg)
c) Casa Batllo - Antoni Gaudi
(http://cache2.artprintimages.com/lrg/55/5544/WC6LG00Z.jpg)

At the same period, in Austria, Adolf Loos (1870-1933), Tony Garnier (1869-1948) and Auguste Perret (1874-1954) tried to form a new architecture by using simple, pure and abstract geometrical forms (Kortan, 1996). In the same era Otto Wagner (1841-1918) tried to renew the concepts of design and architecture and in his book titled “Modern Architecture” he supported the modern and contemporary archtiecture because of the fact that new construction techniques, new materials and new society demands a renewal of the outdated forms. Adolf Loose showed a tendency to Art Nouveau, but at the same time he was against it since it was originating from ornamentation. Otto Wagner supported him with his functionalist approach (Dostoğlu, 1995; Mutlu, 1996).

So, in 1898, while supporting the plain and ornamentless architecture, Adolf Loos suggested that the new architecture should be based on the new life style. According to Loos, an architect should design spaces considering the needs and requirements of users. He demonstrated his ideas by the plain, ornamentless, simple design of the Steiner House (Figure 3.4). Thus, the foundations of Modern Architecture were started to be established (Mutlu, 1996).

Figure 3.4.

a) Steiner House - Adolf Loos
(http://www.checkonsite.com/wp-content/gallery/steiner-house/steinerhouse-nina-no.jpg)
b) Post Office Savings Bank - Otto Wagner
(http://www.galinsky.com/buildings/wiensparkasse/sparkasse1.jpg)
c) Desk & Chair Design Model No. 1010 – Otto Wagner
(http://image.architonic.com/imgObj/phillips1203_sat/3101_0014_1_lg_sq.jpg)

The spread of the concept of aesthetics in the beginning of the 1890s, encouraged the use of ornamental arts and architectural design in the Eastern European and Scandinavian countries. Design forms were resembling mostly the forms used in England, United States and Western European countries. But at the same time the designs contained pronounced natural, local, traditional and national influences. During the period, Denmark, Finland and Norway were among the pioneers of the Scandinavian design (Raizman, 2010).

Finnish architect Eliel Saarinen (1873-1950) is one of the important modern pioneers of the Scandinavian architecture. By using local materials, he created a national identity and a romantic effect (Romantic Nationalism) in modern Scandinavian design (Figure 3.5). Effects of romanticism encouraged them to use local and natural materials and showed its influence on their designs as pronounced local elements and nature based inspirations. In addition, they utilized local techniques, asymmetric, oval and curvy forms in timber works. These influences are also seen in handcrafts, wallpapers designs and in textile. While the same aesthetical efforts were observed in Belgium, France and England in the same era, Scandinavian design proved to be the modern economical solution for the requirements of the new society instead of repeating the tradional.

The effect of Scandinavian design in ornamental arts with its modern national identity at the end of 19th century, showed its influence also in Europe (Raizman, 2010).

Figure 3.5.

a) Helsinki Central Railway Station - Eliel Saarinen (http://rpmedia.ask.com/ts?u=/wikipedia/commons/thumb/0/0b/Helsinki_Railway_Station_20050604.jpg/50px-Helsinki_Railway_Station_20050604.jpg)
b) Saarinen House – Eliel Saarinen (http://www.cranbrookart.edu/museum/Images/vu4_Saarinen.jpg)
c) Saarinen House Side Chair – Eliel Saarinen (http://www.arkitekturanyc.com/cat203.htm)

While the neo-gothic medieval style were still popular in Germany, in 19th century, princes and dukas curious about the changes in architecture took steps of which resulted Germany to be the center of modern architecture later on. The artists invited from Brussels, London and Vienna to Germany such as Henry Van De Velde (1863-1957) and Joseph Maria Olbrich (1867-1908), had established the Jugendstil similar to Art Modern (Colquhoun, 2002; Mutlu, 1996).

Henry Van De Velde was an advocate of simplifying forms and rational ornamentalism.He directed several industrial art studios and initiated Deutscher Werkbund. Peter Behrens (1868-1940), one of the founders of Werkbund, was also one of the leading architects of the era. He initially used the principles of Art Nouveau in his designs, then he diverted from the style and used a geometrical, simplistic style. He also designed factories, public housing and office buildings

with extensive use of concrete, iron and glass. His fame comes not only because of his designs but also the fact that several world-famous architects such as Walter Gropius (1883-1969), Mies Van Der Rohe (1886-1969) and Le Corbusier (1887-1965) were educated in his studios (Figure 3.6) (Mutlu, 1996; Frampton, 2007).

Figure 3.6.

a) Villa Esche - Henry Van De Velde
(http://cdn0.wn.com/pd/0b/75/ce3d6dc29baf8f1efa8c8fcd2bcc_grande.jpg)
b) A.E.G Turbine Factory Interior - Peter Behrens
(http://cueflash.com/cardimages/questions/thumbnails/5/6/4965426.jpg)
c) Desk and Chair Design – Henry Van De Velde
(http://russegold.tripod.com/pages/page_018.htm)

During the same period in 1917, De Stijl movement emerged in Holland. It was pioneered by Piet Modrian (1872-1944), Theo Van Doesburg (1883-1931) and Gerrit Rietveld (1888-1964), but lasted for 14 years. The movement advocated the universality of the new approach against the subjectivism and thus suggested that buildings should be designed in such a way to expose its structure. In the design of the buildings designed with the influence of Piet Mondrian primary colors, right angled walls, cubic forms were used without the use of bricks. Thus, stable and balanced structures as shown in Figure 3.7 were built (Frampton, 2007; Mutlu, 1996).

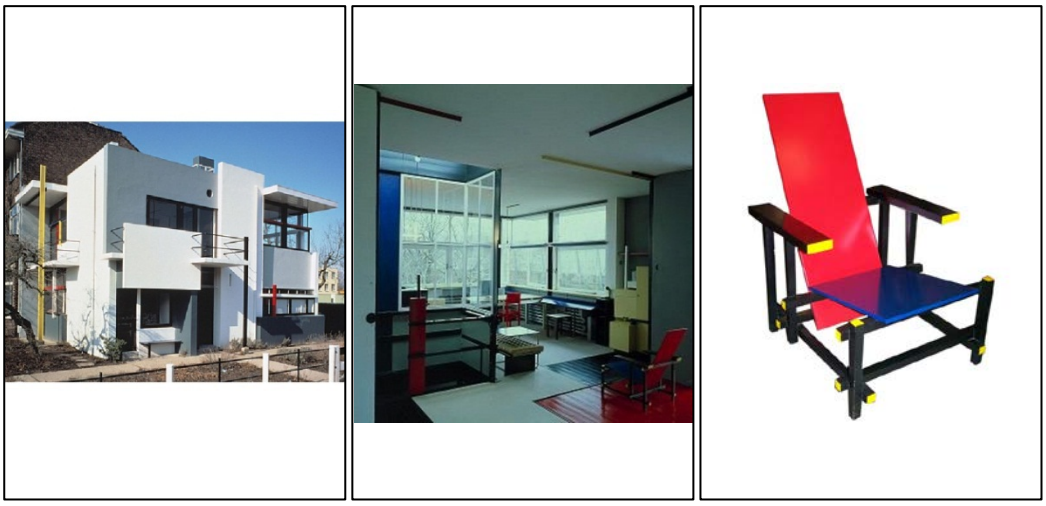


Figure 3.7.

a) Shröder-Huis – Gerrit Rietveld
(http://www.historiasztuki.com.pl/72_ARCHWSP_1-eng.html)
b) Shröder-Huis Interior – Gerrit Rietveld
(http://www.daysout.nl/img/dagjeweg/rietveldhuisinterieur-1035.jpg)
c) Red And Blue Chair – Gerrit Rietveld
(http://pinkappledesigns.co.uk/uploads/cms/GerritTRietveld_Image1.jpg)

Meanwhile, the expressionist movements started to appear at the end of World War I in 1919. The movement which is in close relationship with Art Nouveau influenced rationalist architects such as Walter Gropius and Mies Van Der Rohe and resulted in the creation of expressionist works. Mies Van Der Rohe imagined high buildings with glass walled, but this could only been realized after advancements in construction technology. During this movement extensive use of concrete is observed. Most noticeable architects of the movement were Erich Mendelsohn (1887-1953), Hans Poelzig (1869-1936) and Bruno Taut (1880-1938) (Figure 3.8) (Mutlu, 1996).

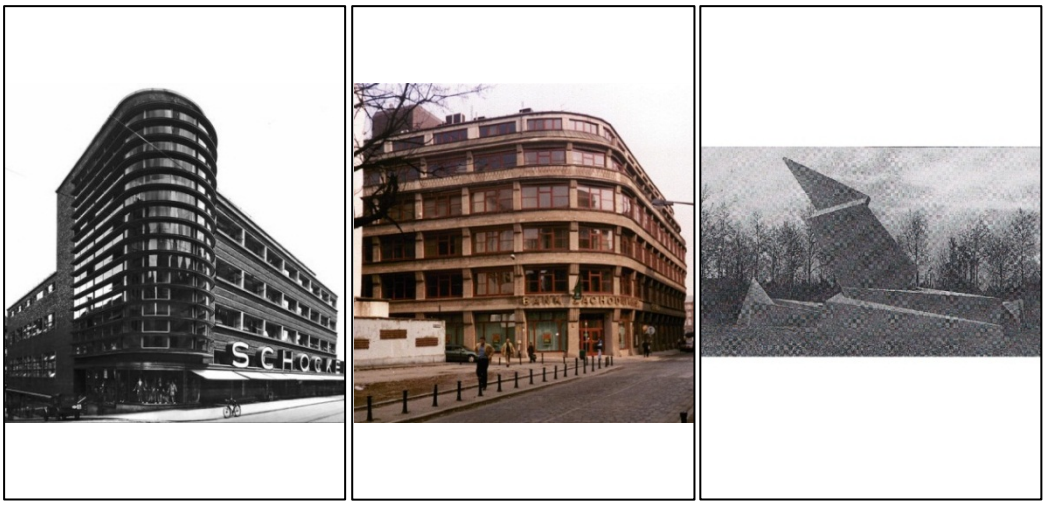


Figure 3.8.

a) The Schocken Department Store - Erich Mendelsohn
(http://www.studio-international.co.uk/studio-images/mendelsohn/Schocken_b.jpg)
b) Department Store In Junkernstrasse - Hans Poelzig
(http://upload.wikimedia.org/wikipedia/commons/d/d7/Wroclaw-Junkernstrasse-Poelzig.jpg)
c) Kapp Monumanet – Walter Gropius
(http://upload.wikimedia.org/wikipedia/commons/7/7e/Monument_to_the_March_dead.jpg)

At the beginning of the 20th century, Chicago School pioneered by, William Le Baron Jenney (1832-1907), Daniel Hudson Burnham (1846-1912) and Louis Sullivan (1853-1924) who were designing commercial buildings in city centers became prominent. Louis Sullivian -who proposed the principle; “form follows function”, which will later on became one of the main principles of Modern Architecture- were opposing the contemporary ideas and practices of the era and insisted on the idea that buildings should be designed giving practicality, productivity, functionality a priority(Figure 3.9) (Dostoğlu, 1995). According to Louis Sullivian designs of the buildings should satisfy the spiritual and emotional needs as well as physical ones. The form should be to be simple enough to satisfy the requirements of the day. For this reason steel, which was a new material at the time were extensively used, special foundation and grid systems that are still being used today were developed, horizontal windows were used in office buildings thus rejecting the eclectic approaches and plain building were designed. Consequently the foundations of rationalist approach and Modern Architecture were established (Mutlu, 1996).

Figure 3.9.

a) The Guaranty Building - Louis Sullivan
(http://en.wikipedia.org/wiki/File:Prudential_buffalo_louis_sullivan.jpg)
b) The Home Insurance Building - William Le Baron Jenney
(http://en.wikipedia.org/wiki/File:Home_Insurance_Building.JPG)
c) Chicago Masonic Temple Building – Hudson Burnham
(http://upload.wikimedia.org/wikipedia/commons/6/67/Chicago_Masonic_Temple_Building.jpg)

Modern Architecture has started by the use concrete and steel in 19th century. These two new material allowed to pass openings and construct buildings with heights that were not possible before and thus allowed substantial freedom in design and establishment of the foundations of the Modern Architecture (Pevsner, 1985).

In summary, the technological developments by the Industrial Revolution, use of iron, steel and glass as constructional materials, advancements in communications, production techniques, availability of national trade fairs and exhibitions, rationalism and developments in engineering, new art movements, Arts and Crafts, Art Nouveau and developments in the use of concrete have resulted in the emergence of the Modern Architecture (Gür, 2004).

Construction with concrete which is an invention of the French shaped the contemporary architecture. In the beginning, since architects could not aesthetically use concrete, it was mainly used by engineers for the construction of hangars, docks, bridge and arches for its inexpensiveness and practical use. Anatole De Baudot (1834-1915), a student of Viollet-le-Duc (1814-1879), was one of the first architects who used concrete in the construction of St. Jean De

Montmartre Church (1894-1904). The use of concrete in a construction had completely changed the structural principles of architecture. It was extensively used in 1900s because of its use to cover the large spaces without the need of bearing elements. In addition, the use of concrete resulted in the emergence of new aesthetical approaches in architecture. Due to the impossibility of ornamentation and decoration on concrete buildings, the façades of the buildings became plain and this situation favored the use of brick and ceramic as decorative purposes (Curtis, 1996; Mutlu, 1996).

The use of iron and concrete have led to the construction of visible skeleton in the structure and removal of load bearing walls. Therefore, in the buildings of the era plainness and simplicity that were unseen before were observed. Ability to construct large open spaces by the use of new synthetic materials have led to new and original plan solutions. Architecture and nature relationship started to be fully utilized. Buildings without altering the character of concrete and only using glass were first constructed in France pioneered by Tony Garnier (1869-1948) and Auguste Perret (1874-1954) (Figure 3.10) (Curtis, 1996; Mutlu, 1996).

Figure 3.10.

a) St. Jean Montmartre Church Interior - Anatole De Baudot
(http://www.ad.ntust.edu.tw/grad/think/homework91/8913004/baudot%20Anatole%20de/index.2.jpg)
b) Notre Dame Du Raincy Church – Auguste Perret
(http://www.flickr.com/photos/darkcorners/3356751619/in/photostream/)
c) Atelier Esders Interior – Auguste Perret
(http://api.ning.com/files/YT8Zyjz4MRBbPwMoE62Z3fIctRd5xGeqfmr*4t8rpIZG5*Q8USydMRsG3WbDEIkWc07XjV7BmKkVFaRfeEryNjdyD7o5hOZB/47711_0.jpg)

During 1914 many famous architect abandoned their bonds with the past and adopted the techniques, forms and problems of theage of machines. During 1920s the concept of aesthetics were less of a concern, since the space layout were considered to be related with better use of the land, orientation, functionality, solutions were scientific. At this point the concept of functionality emerging. Materials, structure and environment were utilized from this point of view. Meanwhile architects favoring the cubist aesthetics were trying to reach a plain and unconventional style by using geometrical spaces in their designs. The results of these efforts can be observed in the clear, plain and straight forms in architectural designs which also influenced architecture in general. Frank Lloyd Wright (1867-1959) from United States, Le Corbusier (1887-1965) from France, Walter Gropius (1883-1969) and Mies Van Der Rohe (1886-1969) from Germany were cubist architects of the era (Mutlu, 1996).

Transition to Modern Architecture yet took place after World War I. Former initiations in favor of modernism were mostly individual. Modernism emerged because of the need to meet the requirements of the new society by the use of contemporary possibilities. Rational architecture was born to meet these requirements (Mutlu, 1996). Walter Gropius one of the most important pioneers of the rational architecture, founded the Bauhaus school by combining Arts and Crafts movement with Weimer Art School in 1919. He reconstructed the education program to prioritize the principles of design (Conrads, 1991).

Walter Gropius intended to educate and work with artists, architects, sculptors, engineers and industrial designers. They created designs with the use of the developments of modern times to meet the requirements of the society. These designs were reproduced easily because they were designed considering the industrial standardization. Bauhaus did not have an influence on architecture alone, it also affected all art forms and the idea of functionalism came into prominence. Usefulness and suitability to fulfill a function were considered to be priority for all buildings and every furniture, and thus designs were created based on this idea (Figure 3.11) (Frampton, 2007).

Figure 3.11.

a) Bauhaus - Walter Gropius
(http://upload.wikimedia.org/wikipedia/tr/6/6d/Bauhaus.1993.jpg)
b) Bauhaus Interior 1 – Walter Gropius
(http://www.flickr.com/photos/doctorcasino/1001826303/)
c) Bauhaus Interior 2 – Walter Gropius
(http://farm2.static.flickr.com/1137/1001826303_f0445c991a.jpg)

Bauhaus was not an architecture school, but influenced the modern architecture because of the relationship of architecture with every art form. A new concept of form was discovered starting from and connecting to technique. The plans and spaces were designed purposely for bring out practical solutions and beauty was intended to be the result of this approach. Simple, plain and functional designs were created without the use of ornaments (Mutlu, 1996).

Another pioneering architect of Bauhus, Mies Van Der Rohe developed the rational architectural concept. By paying attention to functionalism and detailing in his solutions, he aimed to reach perfection using plain geometry and flawless details in his designs.Discipline, plainness, perfection, order and the effort for creating an international architectural language can be observed in his designs.In addition, for the continuous changes in the required functions of the buildings, he came up with an idea to construct practical and economical buildings that can be easily adapted to the changing functions. Thus, he advocated the design of buildings that would last because of their flexibility which make it possible to adapt them for new usage scenarios (Birol, 2006). Mies Van Der Rohe used simple geometric forms in their structures and search for universal solutions.

At the façades, he separated the structural elements from the dividing elements and expressed this separation clearly. He supported plainness in his structures and stated his approach by the words “less is more” (Figure3.12) (Tanyeli, 1993).

Figure 3.12.

a) German Pavilion - Mies Van Der Rohe (http://www.examiner.com/images/blog/EXID12322/images/barcelona-pavilion-mies-van-der-rohe-1929.jpg)
b) German Pavilion Interior – Mies Van Der Rohe (http://images.travelpod.com/users/zento/eandl2006.1162384920.09_interior_of__pavillion.jpg)
c) Barcelona Chair – Mies Van der Rohe (http://www.ivor-innes.co.uk/WebRoot/Store/Shops/innesestore/4A83/0F46/434E/399E/A9BA/4D44/2999/A741/chair1.jpg)

Le Corbusier, praised the mechanical perfection and the forms of air-planes, steamships, and automobiles which are the results of pure functionality as the most intelligent expression of their beauty. By comparing the photographs of modern machinery with the images of Parthenon, he suggested that 20th century machinery have the same elegancy in their forms as the temple. Thus, Le Corbusier pointed out architectural individualism and featured machine aesthetics (Roth, 2000).

Le Corbusier was one of the first architects that had the opportunity to utilize the possibilities provided by concrete in his designs. The Citrohan House with its simple cubic form was an important milestone because the five principles of the new architectural approach was utilized in its design by erecting the

building with the use of columns, the use of roof gardens, the freedom in designs provided by the concrete skeleton system, the use of horizontal windows and the use of free façade. With the same approach, he designed L'Espirit Nouveau Pavillon at the Exposition des Arts Décoratifs in Paris in 1925 and Villa Savoye in 1929. Le Corbusier focused on the urban aspects of architecture in contrast to contemporary architects in Europe such as Gropius and Mies Van Der Rohe. He followed a consistent approach in his works of urban design parallel to his architectural approach (Figure 3.13) (Aydın, 1997).

Figure 3.13.

a) Villa Savoye - Le Corbusier
(http://en.wikipedia.org/wiki/File:VillaSavoye.jpg)
b) Villa Savoye Interior – Le Corbusier
(http://www.viahouse.com/wp-content/uploads/2010/11/Villa-Savoye-French-Villa-Architectural-by-Le-Corbusier-Interior-588x390.jpg)
c) Le Corbusier Armchair – Le Corbusier
(http://t-j-design.com/wp-content/uploads/2011/07/LC2-Armchair-1.jpg)

In 1930s, Frank Lloyd Wright started the **organic design** approach. He proposed that form does not need the traditional aesthetical criteria but it is used as a tool to construct the design. This leaded to functionalism. In addition, its main principles overlaps with the principles of modernism. Following the phrase "form follows function" by Louis Sullivan, Frank Lloyd Wright proposed that form and function are the same. This architectural approach proposed that every part of a building has its own identity and express its interconnections with the building. The necessity of the structure to be connected with its environment is

emphasized. This was stated as the harmony with the nature and based on factors such as material used, the relationship of the forms with the environment and colors. The principle was to **combine nature with the space**, to integrate nature inside the house or building in an unobtrusive way (Figure 3.14). During this period a trend for designing human centric furniture by combining the organic design principles with human needs emerged. In the following years Scandinavian designers such as Eero Saarinen (1910-1961), Alvar Aalto (1898-1976), Arne Jacobsen (1902-1971) and Jorn Utzon (1918-2008) became the pioneers of this movement (Julier, 1993; Tokyay, 2004).

Figure 3.14.

a) Falling Water House - Frank Lloyd Wright (http://www.wright-house.com/frank-lloyd-wright/fallingwater-pictures/fallingwater-2.jpg)
b) Falling Water House Interior – Frank Lloyd Wright (http://dummidumbwit.files.wordpress.com/2010/09/fallingwater_interior.jpg)
c) Barrel Chair – Frank Lloyd Wright (http://www.smow.com/out/pictures/z4/cassina-barrel-4395-213_z4.jpg)

During 1930s, after the entrance of the functional architecture into the Scandinavian countries, the architects used its principle in accordance with their traditional methods. Finnish architect Alvar Aalto was one of the most important pioneers that made the Scandinavian architecture recognized in the world. Alvar Aalto is one of the most prominent architects of modern architecture. He brought up a very individual and organic architectural style. White smooth surfaces,

rectangular and well-articulated groupings, transparency, lightness were readily recognized beginning form his first structures. He constructed a new style by the use of form as an outcome of function. **By using organic materials, he designed buildings connected to the environment and nature according to the principles of organic architecture.** Since he is faithful to Scandinavian traditions, he used timber as a traditional material and succeeded in creating plastic effects with timber. Independent of the use of the building, he consistently searched for solutions considering the landscape and the traditions of the local people (Figure 3.15) (Mutlu, 1996; Tokyay, 2004; Goldhagen, 2007).

Figure 3.15.

a) Viipuri Library - Alvar Aalto
(http://3.bp.blogspot.com/-YI8R4X7c0-Q/T1rdvEV743I/AAAAAAAAAGAg/kYChsPU-GfQ/s400/1.png)
b) Viipuri Library Interior – Alvar Aalto
(http://aasid.parsons.edu/decorationascomposition/sites/default/files/Alvar-Aalto-Library-IMG_1287-b_0.jpg)
c) Stool Design – Alvar Aalto
(http://www.spacedinteriors.co.uk/media/catalog/product/cache/1/image/9df78eab33525d08d6e5fb8d27136e95/a/l/alvar.jpeg)

Arne Jacobsen was another important Scandinavian pioneering architect of the modern era. Because of his interest in botanic and organic elements he was influenced by nature and universe and created designs integrated with nature by using the principles of organic architecture of which played a central role in his projects. In addition, he proposed the universality of the design and so used these principles on building designs to interiors and furniture. Although he was

considered as a modernist designer, he utilized natural materials. In this context, the nature influences in his design showed that he was in connection with the traditional (Figure 3.16) (Kristensen, 2007; Aerbo, 1997).

Figure 3.16.

a) Villa On Gotfred Rodes Vej - Arne Jacobsen
(http://www.bolius.dk/uploads/RTEmagicC__billeder_2007_april_Ny_Gotfred_Rodes_vej_2.jpg)
b) Villa On Gotfred Rodes Interior – Arne Jacobsen
(http://4.bp.blogspot.com/_zqFoq3qej2c/SwWblUqHxTI/AAAAAAABJvE/RYzXDf80-rw/s1600/Picture+43.png)
c) Ant Chair –Arne Jacobsen
(http://www.danish-furniture.com/images/arne-jacobsen-ant-chair.jpg)

It can be concluded that the developments following the Industrial Revolution constitute a milestone in the world of architecture and resulted in a rational approach in the architecture approach in line with the contemporary requirements free from historical, local and cultural references. International Style had become one of the most important approaches -even the pinnacle- of modern architecture. The concept of rational design have significantly influenced the subsequent developments for about a century. The loss of validity of modern architecture's principles, the socio-cultural changes in society and critics against modern architecture and the emerging new trends in 1970s resulted in the formation of a postmodern architectural approach which aims at returning to the architectural styles and formal repertoire of the past (Birol, 2006; Jencks, 1981).

3.2.2 Nature Influence on Design During The Modernism Era

Vitruvius proposed that architecture was as important as the discovery of fire or the language. He considered that the discovery of fire was the initial step for the appearance of the social life. People started to live together for their mutual benefits and found solutions for their sheltering needs by the examination of natural formations and using the materials from the nature. In addition, they started to improve their skills by conscious or unconscious observations and/or mimiking of the natural formations (Vitruvius, 1960; Arslan and Gönenç, 2004).

Throughout the history of architecture, many examples influenced from the nature can be observed. But, in the examples till the middle of the 20th century, the inspirations and applications are mostly limited to form. Through the Industrial Revolution and with the advances in technology, the forms of observing nature became varied and divided into different fields. The improved design techniques as a result of this variation and dividition moved the inspiration concept to different dimensions not only limited to form but also as the interpretation of color, pattern, mass, façade and decoration (Portoghesi, 2000; Hersey, 1999; Tsui, 1999).

In the beginning of the 20th century, Peter Behrens, Hans Poelzing, Erich Mendelsohn and Bruno Taut created a completely new and dynamic symbolic design concept -by the use of original, strong sculptural forms- during the expressionism movement starting in Germany. They defined this approach of expression as the symbolic interpretation of the architecture in a physical form reflecting human emotions and nature. In this context, crystalline and organic forms were influenced by their designs (Birol, 2006; Lampugnani, 1989).

Einstein Tower, built in Berlin-Postdam by Erich Mendelsohn as an astronomical observatory, is one of the examples of this approach. In this structure, rounded edges, apparent horizontal lines and new spiral, curvy organic forms were used (Figure 3.17). Because of the construction techniques used and the ongoing war Einstein Tower, there had been many difficulties in the construction of the building. Therefore, the structure was finished by using concrete plaster on brick tower on concrete foundations (Jones, 2002; Roth, 2000).

Figure 3.17.

a) Einstein Tower - Erich Mendelsohn
(http://en.wikipedia.org/wiki/File:Einsteinturm_7443.jpg)
b) Flower Leafs
(http://blogs.bgsu.edu/artc3110richakk/files/2009/09/organic-forms-2-in-color-charlie-osborn.jpg)
c) Einstein Tower Interior – Erich Mendelson
(http://www.hughpearman.com/illustrations5/Bexhillstairoriginal.jpg)

Hans Poelzig worked using the same expressionist ideas and created crystalline and organic forms in his designs by the influence of nature (Figure 3.18). In the decoration of the Berlin Theather in 1919, he showed the independence and richness of concrete with an ornamented ceiling decorated with stalactites influenced by the natural forms in caves (Mutlu, 1996; Curtis 1996).

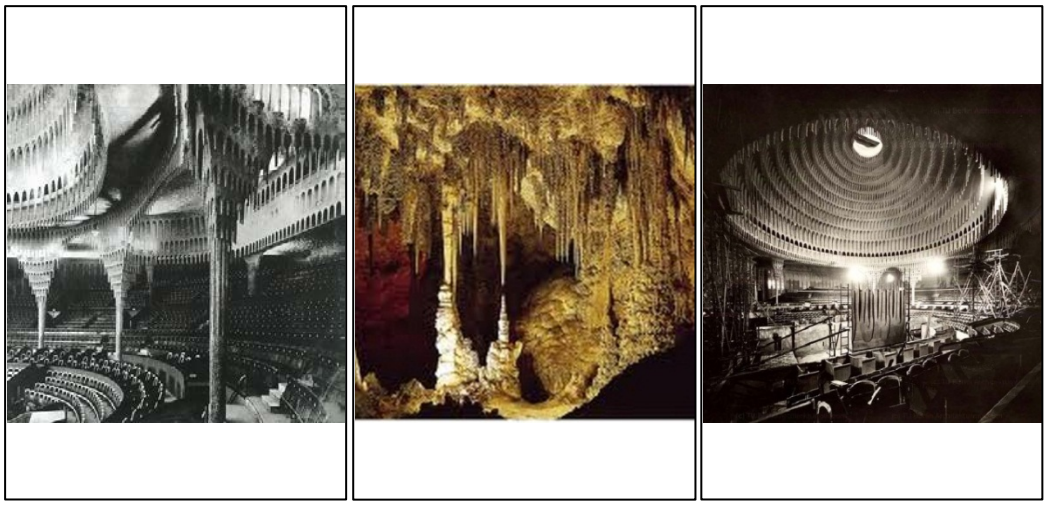


Figure 3.18.

a) Berlin Theatre - Hans Poelzig
(http://www.cabinetmagazine.org/issues/13/Poelzig_300dpi.jpg)
b) Cave Stalactites
(http://media.photobucket.com/image/stalactite/Raine_n_the_south/Stalactite.jpg)
c) Berlin Theatre – Hans Poelzig
(http://thefunambulistdotnet.files.wordpress.com/2010/12/hanspoelzig-grossesschauspielhaus28berlin297.jpg)

Bruno Taut who is another expressionist designer from the same period integrated crystalline structures in his designs with the influence of Alpine Mountains climaxes which he named as “Alpine Architecture”. At the same time he improved the ideas of his “Glass Chain” movement with important architects of the era such as Walter Gropius, Hans (1890-1954) and Wassili (1889-1972) Luckhardt brothers, Hans Scharoun (1893-1972), Hermann Finsterlin (1887-1973) and Max Taut (1884-1967). Bruno Taut tried to solve the theoretical problems of the traditional architectural approach by observing the living and non-living forms and formations of nature. They tried to create a model for the architecture of the future by searching new design and construction techniques with the use of forms of shells, crystalline structures, plants and microscopic organisms (Frampton, 2007; Gössel and Leuthauser, 1991; Schirren, 2004). Bruno Taut designed the Glass Pavillion in 1914 with these approaches and used glass both on the roof and in the walls, even in the stair rails using its color, clearness and transparency (Figure 3.19) (Jones, 2002; Schirren, 2004).

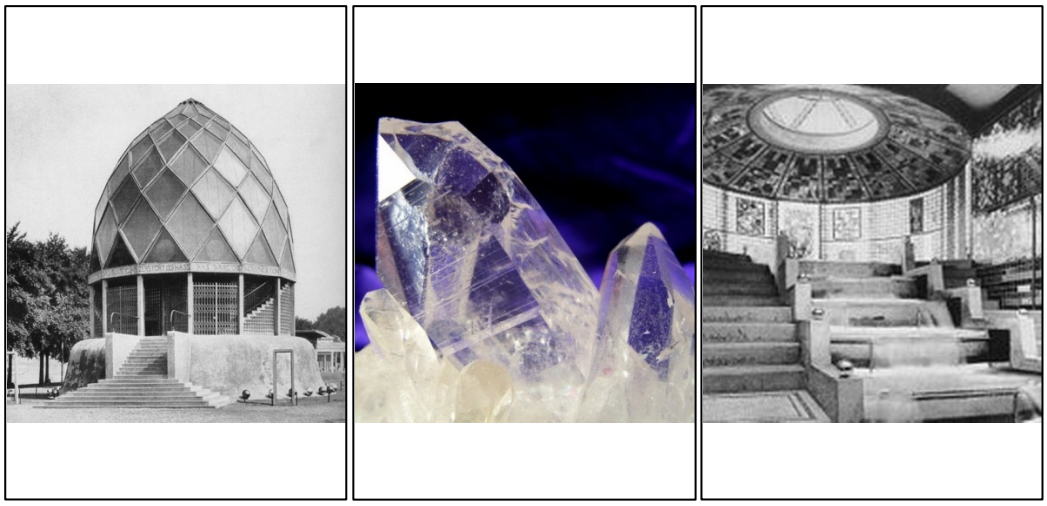


Figure 3.19.

a) Glass Pavillion - Bruno Taut
(http://upload.wikimedia.org/wikipedia/commons/e/ed/Taut_Glass_Pavilion_exterior_1914.jpg)
b) Quartz Type Of Cyrstal
(http://www.typesofcrystals.net/wp-content/uploads/2011/09/quartz-type-of-crystal.jpg)
c) Glass Pavillion Interior – Bruno Taut
(http://upload.wikimedia.org/wikipedia/commons/thumb/e/e3/Taut_Glass_Pavilion_interior_1914.jpg/250px-Taut_Glass_Pavilion_interior_1914.jpg)

During the same period, German designers, Hugo Haring (1882-1958), Otto Bartning (1883-1959) and Max Berg (1870-1947) used organic and crystalline forms in their designs with influences from living and nonliving organisms (Frampton, 2007). Hugo Haring was one of the important originators of the organic architecture. He designed organic forms considering the function with the influence of the nature. He integrated this hierarchy between forms to the structure with the combination of the forms with the function. His most important design, which reflected his ideas, was Garkau Farm that was built in 1923, in Germany (Figure 3.20) (Jones, 1999).

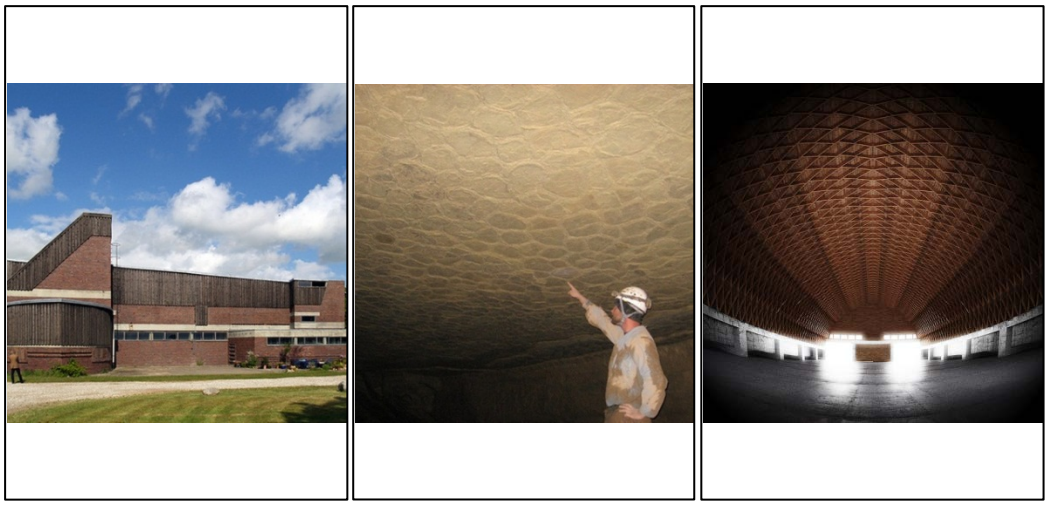


Figure 3.20.

a) Garkau Farm – Hugo Haring
(http://farm4.static.flickr.com/3010/2523013113_9fdc776f14.jpg)
b) Calcereaos Siltstone In Buckeye Creek Cave
(http://www.flickr.com/photos/ilikegooglebetter/987106411/)
c) Garkau Farm Interior - Hugo Haring
(http://upload.wikimedia.org/wikipedia/commons/a/a1/Scharbeutz_Gut-Garkau_NW.JPG)

In 1913 Max Berg designed the Centennial Hall in Breslau (Wroclaw) influenced by the shelled bugs and arthropods, exposing the majestic loadbearing elements (Figure 3.21) (Pevsner 1985; Curtis, 1996).

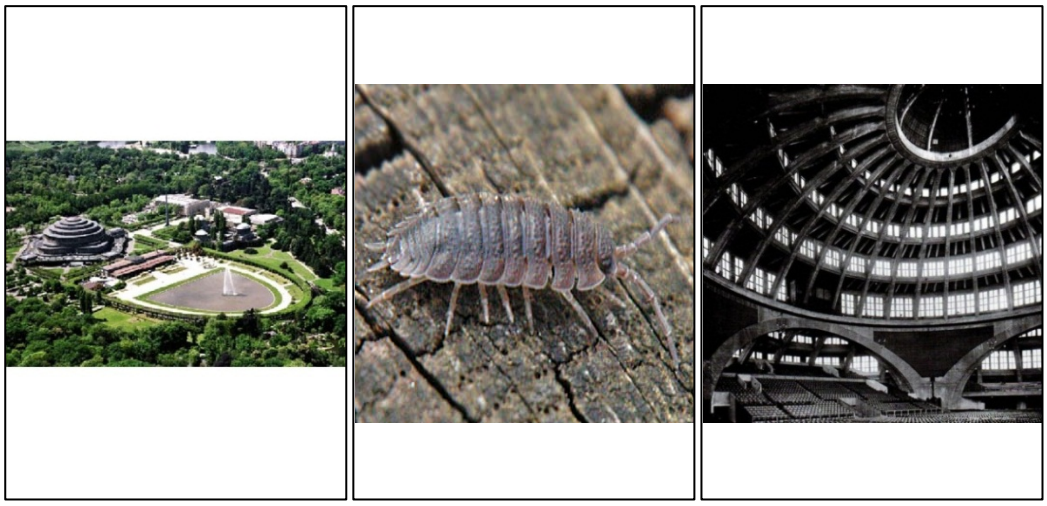


Figure 3.21.

a) Centennial Hall – Max Berg
(http://www.thevisitor.pl/Editor/assets/WROCLAW/szczytnicki%20park/hala_ludowa1_d.jpg)
b) Woodlouse Insects
(http://www.copyright-free-pictures.org.uk/insects/44-woodlouse.htm)
c) Centennial Hall Interior - Max Berg
(http://www.all-art.org/Architecture/images18/1177.jpg)

Similarly, Otto Bartning were also influenced by natural forms and reflected these on his designs. The Sternkirche Project (Star Church) became a work reflecting this design approach with its seven cornered star plan, crystalline and shell forms emphasizing purity, clearity and illumination (Figure 3.22) (Colquhoun, 2002).

Figure 3.22.

a) Sea Shell
(http://www.msxlabs.org/forum/ext.php?ref=http%3A%2F%2Fimageshack.us)
b) The Stern Kirche Project (Star Church) – Otto Bartning
(http://www.berlinischegalerie.de/typo3temp/pics/35bfda59e6.jpg)
c) Some Roaches
(http://www.pestcontrolrx.com/photos/uncategorized/2008/09/07/cockroachincar.jpg)

Rudolf Steiner (1861-1925), a versatile designer, suggested the conversion of the geometrical-dynamic forms into organic-living forms as in the “Plant Metamorphosis” principle of Goethe. Thus, he adopted organic forms based on the principle of growth of plants in nature instead of gridal geometrical forms. The Goetheanum structure designed by Rudolf Steiner in 1924 has a continual form governed by organic and plant originated influences with a structure and a scale based on concrete (Figure 3.23) (Colquhoun, 2002; Frampton, 2007).

Figure 3.23.

a) The First Goetheanum – Rudolf Steiner
(http://www.historiasztuki.com.pl/72_ARCHWSP_1-eng.html)
b) Epacris Gunni
(http://lh3.ggpht.com/_xgVWs4Uo5Y0/SyTOJz-bb0I/AAAAAAAAFIU/BuGJ2X1wApc/Epacris%20gunnii%20metamorphosis.jpg)
c) The Second Goetheanum - Rudolf Steiner
(http://farm1.static.flickr.com/36/117294963_8f3192885a.jpg)

The Traum Aus Glas (Glass House) designed by Herman Finsterlin -who became well known by the Exhibitions for Unknown Architects in 1919 pioneered by Walter Gropius- was a structure with organic and amorphous forms influenced by nature (Figure 3.24) (Colquhoun, 2002).

Figure 3.24.

a) Balsam Pear
(http://farm2.static.flickr.com/1406/1260585992_53a7887ccc.jpg)
b) Traum Aus Glas (Glass House) – Hermann Finsterlin
(http://28.media.tumblr.com/tumblr_lhrou2Wt9y1qzlcoro1_500.jpg)
c) Blue Puya
(http://strangewonderfulthings.com/BluePuya4910.jpg)

The Exhibition Building project of Wenzel Hablik (1881-1934) who is another designer from the same contest is observed to be designed with crystal forms as a result of Alpine Architecture and Glass Chain movement (Figure 3.25) (Colquhoun, 2002; Frampton, 2007).

Figure 3.25

a) Alpine Mountains
(http://www.bestourism.com/img/items/big/989/Mount-Matterhorn-Alpine-Mountains_Matterhorn-view_3699.jpg)
b) Exhibition Building - Wenzel Hablik
(http://synopticdesigns.com/Images/Thumbs/Visual_Gallery_Page/Wenzel%20Hablik%20-%20Exhibition%20Hall_Thumb.jpg)
c) A Cyrstal Panel
(http://www.seslisahili.com/wp-content/uploads/2011/06/cyrstal-panel.jpg)

The crystalline and plant originated forms influenced by nature can be clearly observed also in the design of Concert Hall Project for the city of Berlin in 1948 by Hans and Wassili Luckhard Brothers (Figure 3.26) (Colquhoun, 2002; Frampton, 2007).

Figure 3.26

a) A Flower
(http://www.ace-clipart.com/photos/flowers/flower-07.jpg)
b) Concert Hall - Hans And Wassili Luckhardt
(http://cdn.archdaily.net/wp-content/uploads/2010/08/1280981960-image-112038-galleryv9-ugyq-528x265.jpg)
c) Lotus Flower
(http://www.teachenglishinasia.net/files/u2/lily_pad_lotus_flower.jpg)

It can be understood that during the first half of 20th century, designers reflected the results of their examination of the relationship between -their structural design approaches emerged by the search for new materials- and the nature-architecture. These reflections can especially be observed on scale designs in which the material and structure take form together. Franz Dischinger (1887-1953) and Walther Bauersfeld (1879-1959) who created designs by using concrete scale developed the idea to design dome forms influenced by egg shells. This development showed its first appearance with the use simple vaults, then in 1930s as more complex forms (Figure 3.27) (Melaragno, 1991).

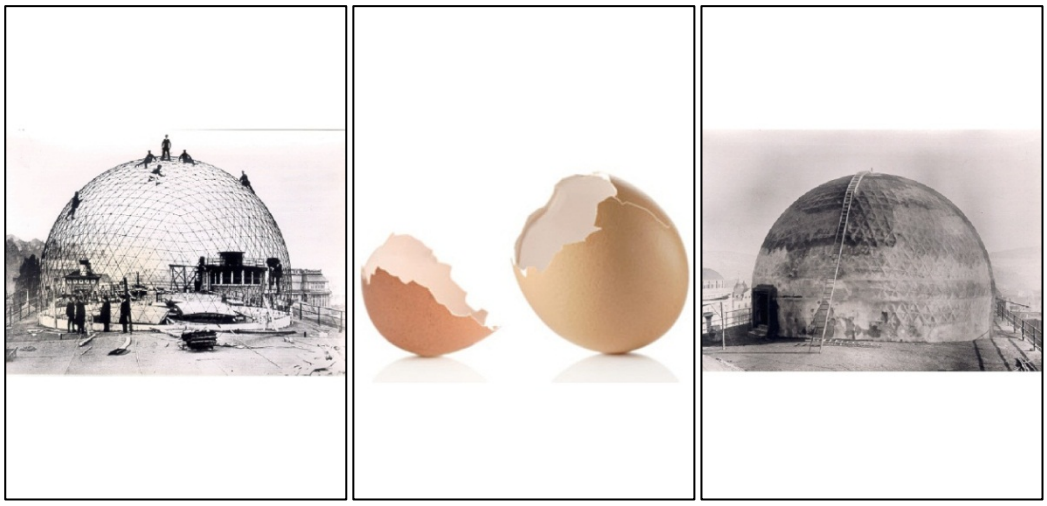


Figure 3.27.

a) Zeiss Planetarium Structure - Franz Dischinger (http://www.physics.princeton.edu/~trothman/dome3.gif)
b) Eggshell (http://www.thedailygreen.com/cm/thedailygreen/images/Gy/egg-shell-md.jpg
c) Zeiss Planetarium Complete – Franz Dischinger (http://www.physics.princeton.edu/~trothman/dome1.gif)

Several designers such as Robert Maillart (1872-1940), Eduardo Torroja (1899-1961), Eugéne Freyssinet (1879-1962), Pier Luigi Nervi (1891-1979) and Felix Candela (1910-1997) used geodesic forms by developing appropriate materials and construction techniques (Arslan and Gönenç, 2007). In the concrete reinforced bridge designs of Swiss designer Robert Maillart, a construction technique using geodesic and organic forms in the structure influenced by abstract forms from nature were observed (Figure 3.28) (Billington 1990; Curtis, 1996).

Figure 3.28.

a) Salginatobel Bridge - Robert Maillart
(http://www.rogersandall.com/wp-content/uploads/2009/09/Salginatobel_Bridge.jpg)
b) Domestic PLant Of Long Sharp
(http://us.123rf.com/400wm/400/400/pressmaster/pressmaster0904/pressmaster090400122/4624594-image-of-green-leaves-of-some-domestic-plant-of-long-sharp-form.jpg)
c) Salginatobel Bridge – Robert Maillart
(http://images.gadmin.st.s3.amazonaws.com/85625/images/IVS_03_02_Schwandbachbr.jpg)

In the same way, Spanish engineer Eduardo Torroja utilized steel and concrete to design shell roofs with organic forms influenced by crustaceans. By this way he improved the construction techniques of his era and designed lighter, hyperboloid, thin shells and covered large spaces. (Figure 3.29) (Vera and Ordonez, 1999; Curtis 1996).

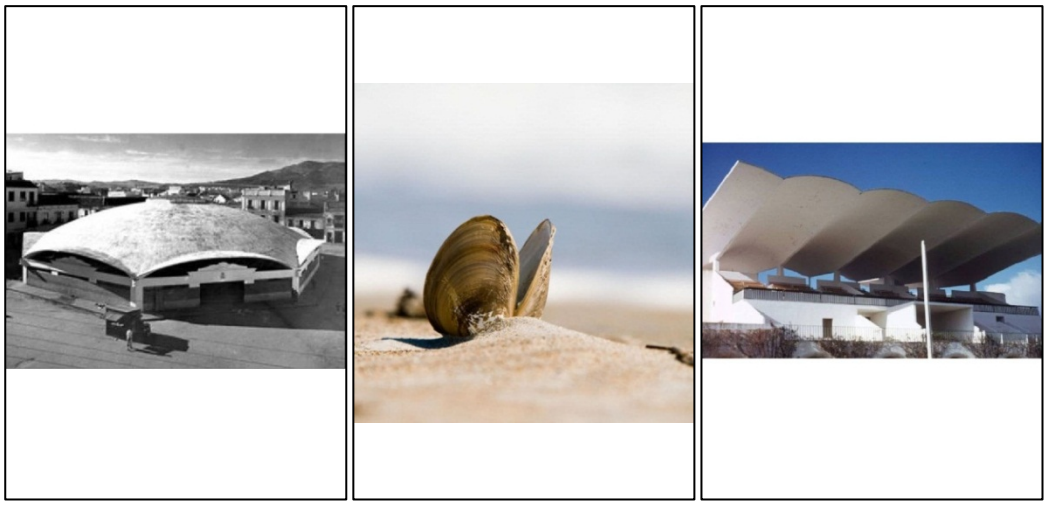


Figure 3.29.

a) Algeciras Market Hall - Eduardo Torroja
(https://fp.auburn.edu/heinmic/ConcreteHistory/images/Large/L%20%20Eduardo%20Torroja,%20Algeciras%20Market%20Hall.jpg)
b) A Clam
(http://gallery.photo.net/photo/7867251-md.jpg)
c) Zarzuela Hippodrome – Eduardo Torroja
(http://pc.blogspot.com/2009/05/zarzuela-hippodrome-eduardo-torroja.html)

French engineer Eugéne Freyssinet developed prestressed concrete by using tendons. Thus, he designed light, durable structures by using organic form (Figure 3.30) (Freyssinet, 1993; Curtis 1996).

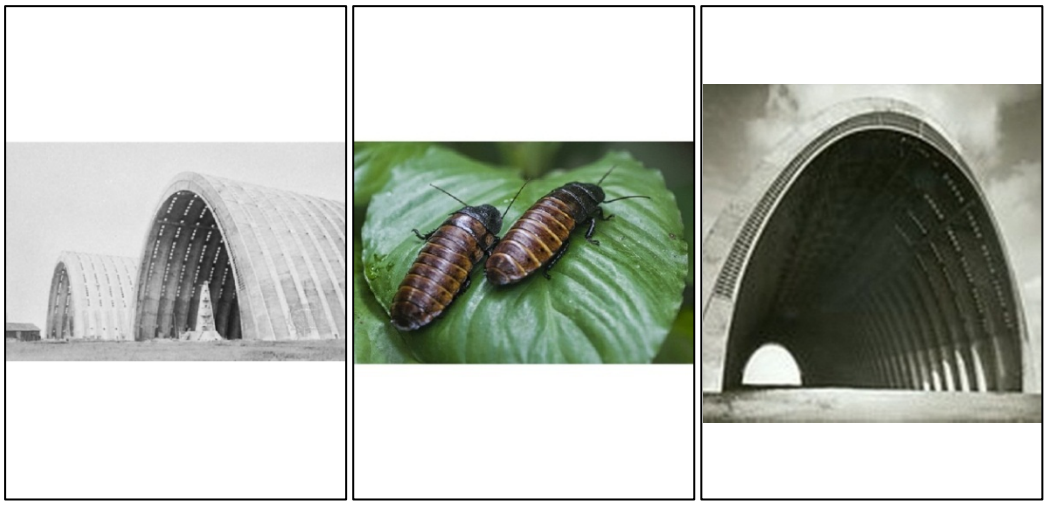


Figure 3.30.

a) Hangars At Orly Airport - Eugéne Freyssinet
(http://media-3.web.britannica.com/eb-media/07/24607-004-DB0D5ED5.jpg)
b) Roaches
(http://farm3.static.flickr.com/2756/4282167421_ee9a4c0246.jpg)
c) Hangars At Orly Airport – Eugéne Freyssinet
(http://www.scholarsresource.com/images/thumbnails/192/x/xir196914.jpg)

Italian designer **Pier Luigi Nervi**headed towards forms in nature to find the most appropriate structure for the function. He developed his constructional techniques by using these forms. Because of this the structures of Nervi have an aesthetics derived from and integrated to the structure. Both interior spaces and exterior view of the structure are under the effect of the balanced arrangement as a result of the strong structural design and loadbearing elements. With this respect, Nervi was one of the pioneers of the structural approach (Figure 3.31) (Iori; 2009; Alsaç, 1997).

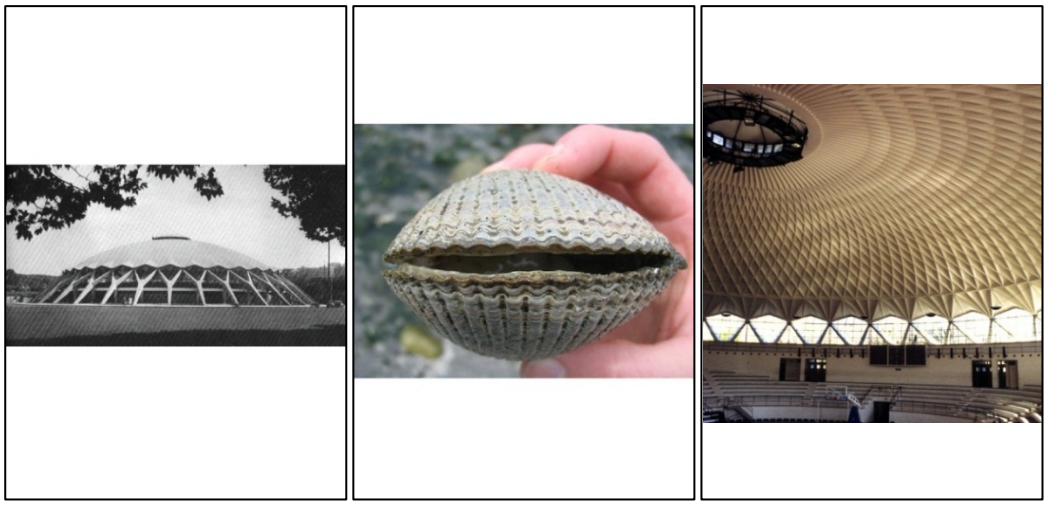


Figure 3.31.

a) Palazzetto Of Sport - Pier Luigi Nervi
(http://www.channelbeta.net/wp-content/uploads/2010/07/nervimall.jpg)
b) A Clam Shell
(http://www.shorpy.com/files/Clam_Shell.jpg)
c) Palazzetto Of Sport Interior - Pier Luigi Nervi
(http://jtnicol.files.wordpress.com/2011/01/nervi01.jpg)

Another shell designer architect Felix Candela worked in the fields of natural sciences and architecture in 1935. He created curvy, wavy, organic and crystalline forms in almost all of his designs influenced by nature. As a designer combining the forms influenced by nature with the structures designed by using iron and concrete, he was one of the most important structural reformists (Figure 3.32) (Curtis 1996; Alanis, 2008).

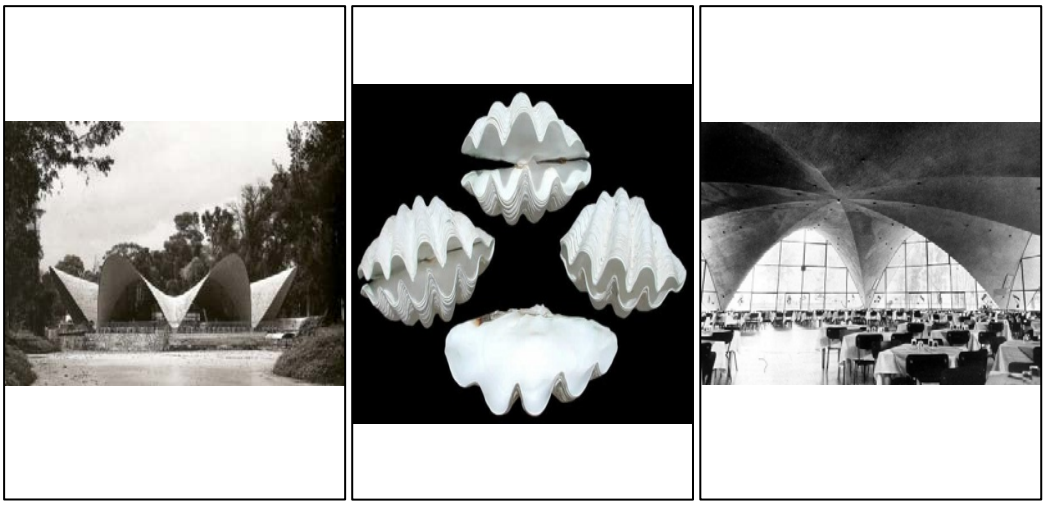


Figure 3.32.

a) Los Manantiales Restaurant - Felix Candela
(http://www.architecture-balar.com/2012/06/los-manantiales-xochimilco-mexico.html)
b) A Clam Shell
(http://www.seashellsindonesia.com/tridacna-gigas-clams-shells-from-indonesia.jpg)
c) Los Manantiales Restaurant Interior - Felix Candela
(http://www.architecture-balar.com/2012/06/los-manantiales-xochimilco-mexico.html)

Le Corbusier, one of the pioneers of modern architecture designed Notre-Dame-Du-Haut church influenced by the form of a clam by using amorphous, parabolic and organic forms with five different techniques that he developed with the utilization of concrete, steel and timber. The church in Figure 3.33, although looks different, is actually mathematically based on Le Corbusier's proportional modular grid system (Ford, 1996). This approach is based on the concept of modular design and golden ratio (Fi series) that is started from Vitrivius and modernized by Le Corbusier after. These concepts were developed from the mathematical observations of several living and non-living formations such as the alignment of the leaves on the stem of a plant, the spirals of the shells of mollusks, the genealogical tables of bees and rabbits and bronchial branching in the human lungs (Posamentier, 2007; Arslan, Gönenç and Akan, 2009). These concepts can be observed in Egyptian Pyramids, Greek Temples, Gothic Cathedrals in various periods. In this context**, Le Corbusier did not only influenced from nature as the source of the forms but he also consciously used mathematical relations of nature.** The well-known examples of these are the façades of Marseille Houses and the Villa Savoye as mentioned before (Figure 3.33) (Fletcher, 2001; Olsen, 2006).

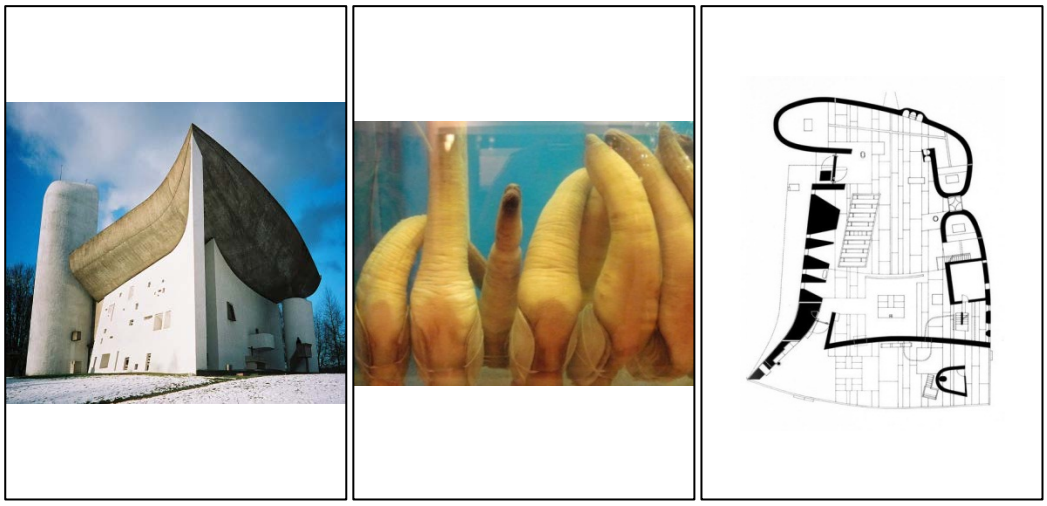


Figure3.33

a) Notre-Dame-Du-Haut - Le Corbusier
(http://www.bluffton.edu/~sullivanm/ronchamps/112.jpg)
b) A Geoduck
(http://flepi.net/wp-content/uploads/2009/08/geoduck-8.jpg)
c) Notre-Dame-Du-Haut Plan - Le Corbusier
(http://2.bp.blogspot.com/--hrtmRmgWUQ/T-vwko79OuI/AAAAAAAARsc/sWim7VJ_CkY/s1600/Ronchamp-plan.jpg)

Frank Lloyd Wright, who is another important architect of the era supported an architectural approach -in harmony with the nature- in his designs and ideas. He stated that he used tree branchings and mushroom abstractions in his designs. He was interested in spiral forms for defining spaces and for emphasizing vertical movement. In 1959, he designed the Guggenheim Museum in New York as a concrete structure in the form of a large ramp with the use of dynamic curves expanding outwards vertically (Figure 3.34) (Levine, 1996; Jordy, 1972).

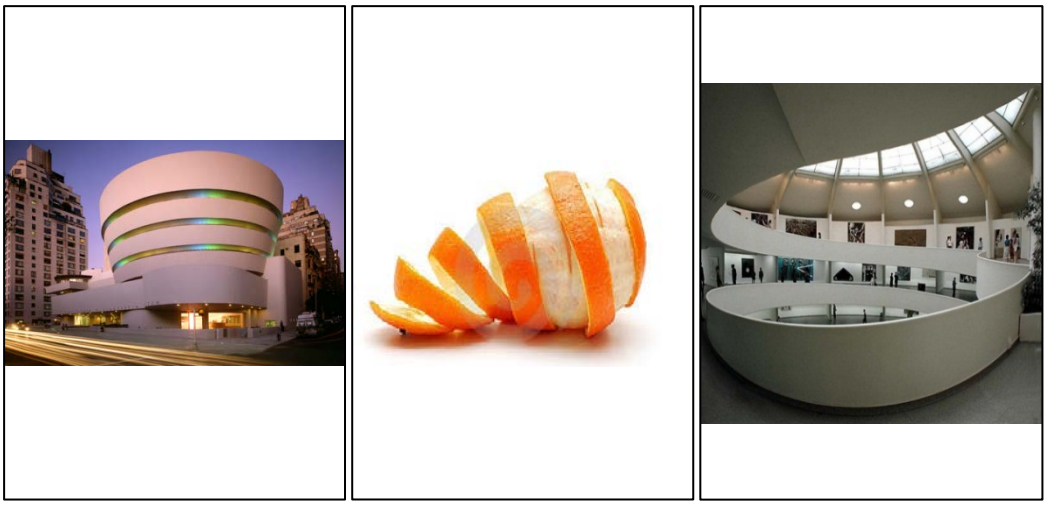


Figure 3.34

a) The Solomon R. Guggenheim Museum - Frank Lloyd Wright
(http://www.guggenheim.org/images/content/New_York/about_us/about_us_frank_lloyd_wright.jpg)
b) Orange and Its Rind Cutout In Spiral Form
(http://static5.depositphotos.com/1016860/397/i/450/dep_3974435-Orange-and-its-rind-cutout-in-spiral-form.jpg)
c) The Solomon R. Guggenheim Museum - Frank Lloyd Wright Interior
(http://www.shafe.co.uk/crystal/images/lshafe/Lloyd_Wright_Guggenheim_Museum_interior_1955-59.jpg)

Scandinavian designer Alvar Aalto created works in harmony with nature also by using forms influenced by nature. Aalto who designed the dormitories of Massachusetts Institute of Technology in 1946, created a wavy form considering the physical environment and the location of the university which is along the Charles River. Located between two existing buildings, the structure was built completely by using brick which is a traditional and natural material to solve the potential scale, texture and heating problems. Rough, unevenly shaped brick with varying colors were utilized instead of uniform bricks (Figure 3.35) (Fleig 1990, 1994; Curtis 1996).

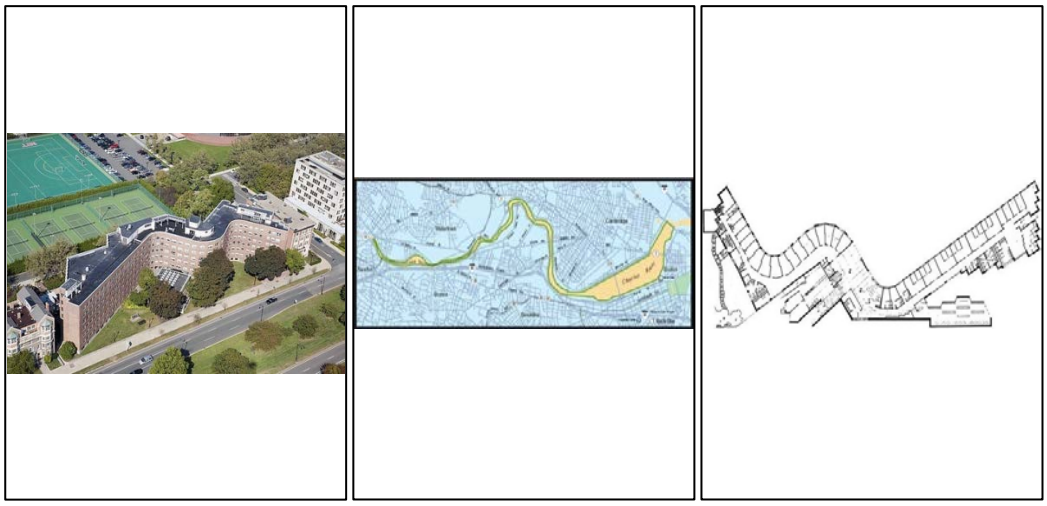


Figure 3.35.

a) MIT Baker House Dormitory - Alvar Aalto
(http://media.dwell.com/images/478*315/aalto-baker-aerial.jpg)
b) The Charles River Map
(http://massbike.org/wp-content/uploads/2009/09/crmap.gif)
c) MIT Baker House Dormitory Plan - Alvar Aalto
(http://www.metropolismag.com/cda/popup_image.php?image_id=784&slideshow_speed)

Eero Saarien(1910-1961), another Scandinavian designer, improves the new construction techniques of the pioneer architects and created organic and dynamic designs. He also used the same techniques for his industrial and furniture design works. Like Aalto, Saarinen used natural sources not only for design forms, but also for the materials. John F. Kennedy Airport designed in 1956, has the profile of a flying seagull with an array of organic and fluid shells (Figure 3.36) (Ford, 1996; Serraino, 2005).

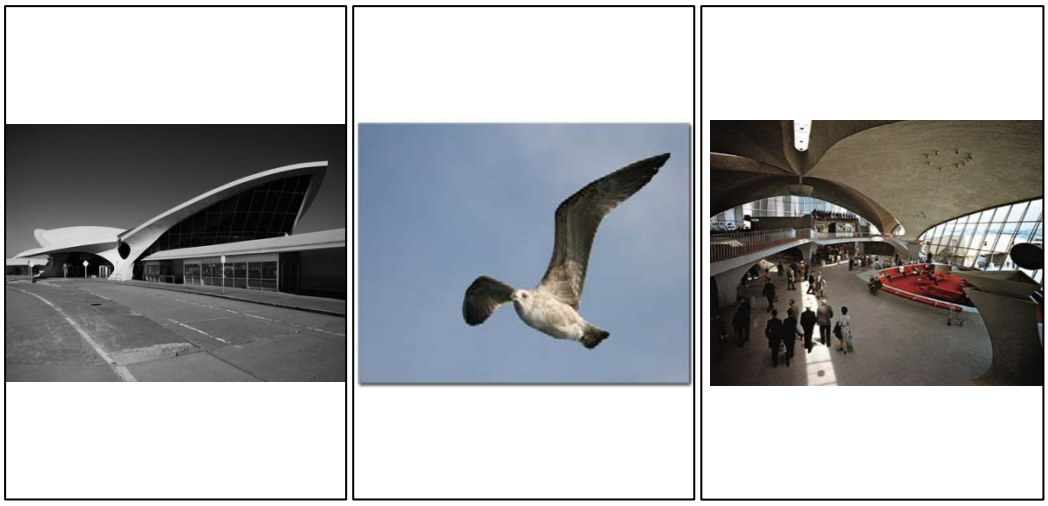


Figure 3.36.

a) John F. Kennedy Airport - Eero Saarinen
(http://checkmyhome.files.wordpress.com/2009/03/twa-terminal.jpg?w=500&h=334)
b) A Seagull
(http://www.itusozluk.com/gorseller/mart%FD/9954)
c) John F. Kennedy Airport Interior - Eero Saarinen
(http://media-1.web.britannica.com/eb-media/71/19671-004-792B26BC.jpg)

Hans Scharun, a German expressionist designed both sculpture-like and functional structures. The shell of his structures were created by combining crystalline and organic forms to reflect the integral functions. Berlin Philharmonic Concert Hall, one of the most important works of the designer were created considering music (Figure 3.37). The angled and curvy surfaces of the building was designed for the better diffusion of sound (Jones, 1997; Roth, 2000).

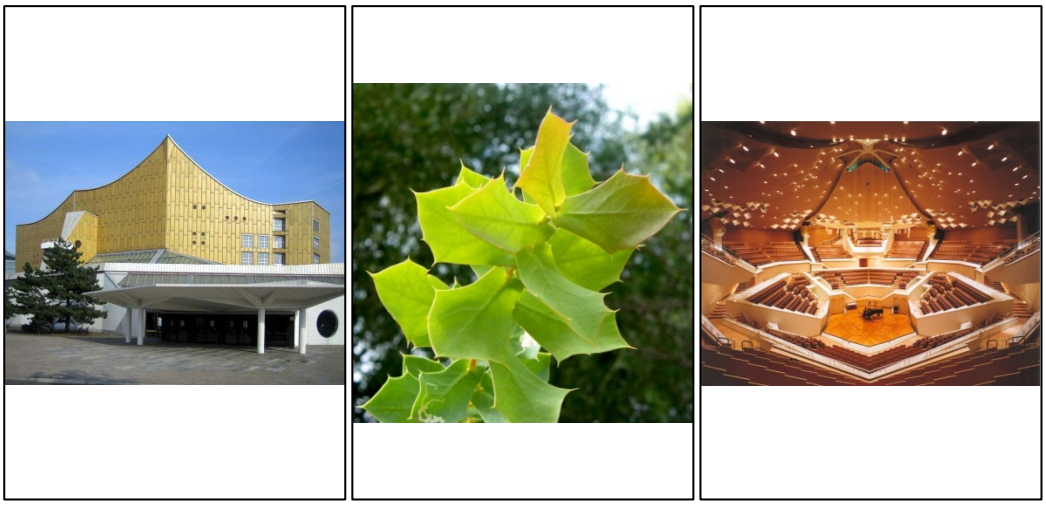


Figure 3.37.

a) Berlin Philharmonic Concert Hall - Hans Sharoun
(http://media-2.web.britannica.com/eb-media/40/121940-004-1EECA0F9.jpg)
b) Spiky Leaves
(http://openphoto.net/volumes/TALUDA/20080620/openphotonet_leaves%20that%20make%20a%20point.JP)
c) Berlin Philharmonic Concert Hall Interior - Hans Sharoun
(http://www.philharmonie.com/beta/images/concert/phpal.jpg)

Jorn Utzon (1918-2008), another Scandinavian designer, was also formed his design approach based on organic architecture. The Sydney Opera House was designed in 1957 with intertwined shell structures. The rising shells reminds the sails, waves and fin forms that were found around the harbor it was built in. At the same time the wavy ceilings of the auditoriums remind sound waves as they reminds water (Figure 3.38) (Fromonot, 1998).

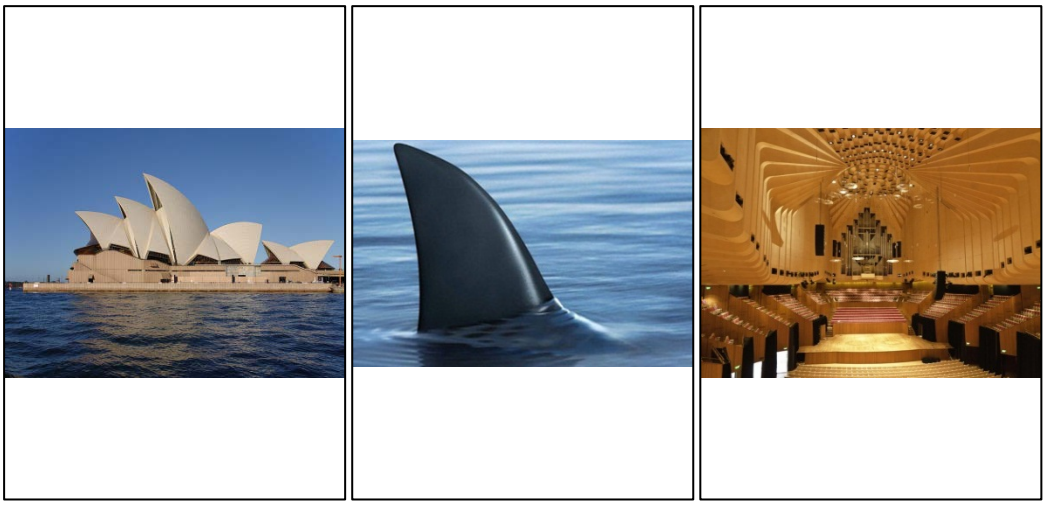


Figure 3.38.

a) Sydney Opera House - Jorn Utzon
(http://upload.wikimedia.org/wikipedia/commons/3/38/Sydney_opera_house_side_view.jpg)
b) A Shark Fin
(http://vegnews.com/web/uploads/asset/803/file/VND.Shark-Fin.jpg)
c) Sydney Opera House Interior - Jorn Utzon
(http://pcdn.500px.net/8381261/1a803c417fb334c8996d4b1f06d2e9eee2ecb26d/4.jpg)

The characteristic of the structural characteristics of the formations in nature was used as a model for the man-made structures. During the 20th century designers tried many morphological designs and structures based on formations in nature. When these trials are examined, it is observed that there are two ways of influence and practice based on nature. The first is the use of form of a natural object or formation purely by formal and analogical considerations and the second is transfer of an observed formation process (the formation process of a material, form and structure) into a design form by using experimental data (Arslan and Gönenç, 2004).

From the beginning of the architectural history to the first half of 20th century, generally the first practice were observed to be in common. The questioning approaches of Buckminster Fuller (1895-1983) andthen Frei Otto (1925-) to understand the process and the search for new forms and structures are considered to be the beginning of the period of conscious learning from nature for architectural design. In the geodesic dome of Buckminster Fuller and stretched-suspended tent systems of Frei Otto, the concern for covering large spaces with minimum material use and designing lightweight structures for environmental sustainability (Jirapong, 2002).

Buckminster suggested that there is a dynamic, functional, and light weight technology found in nature. In this context, natural formations with their optimum performance have important information for man-made structures (Fuller, 1969). Fuller who studied in several fields of science proposed the energy/synergy geometry by suggesting that stacked spheres interact during energy transfer and take stable forms (Figure 3.39). Later on this idea were utilized for explaining the atomic nucleus and structure of viruses. One of the most important inventions affecting architecture is the Geodesic Domes. An interesting fact is that Fuller used the “exohedral” forms in 1940s long before the discovery of the molecular structure C60 in 1985 which was considered as an important discovery by scientific authorities (Arslan and Gönenç, 2007).

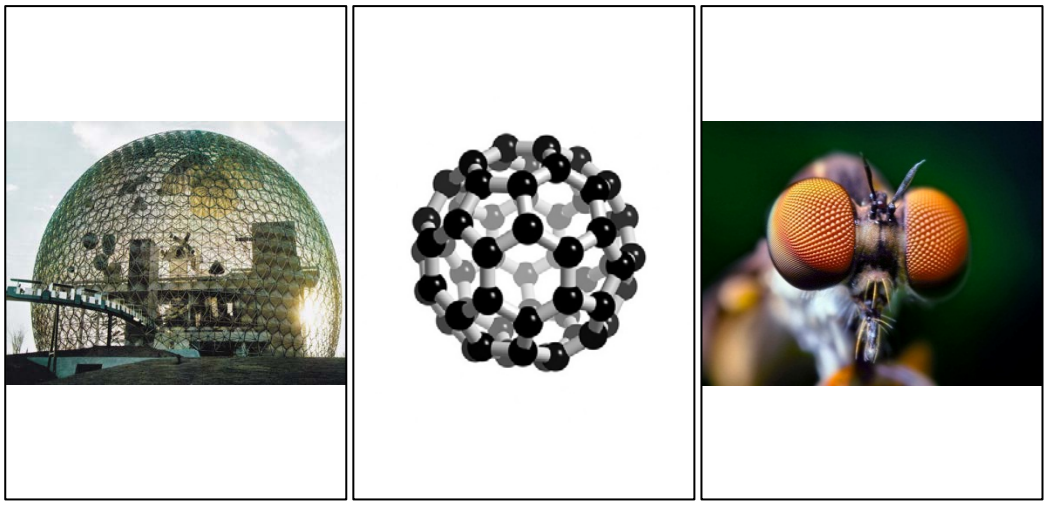


Figure 3.39.

a) The Montreal Biosphere - Buckminster Fuller
(http://www.m-gen.biz/resimler/fuller_pavilion.jpg)
b) C60 Molecular Structure
(http://www.3dchem.com/inorganics/c60.jpg)
c) Fly Eye
(http://farm4.static.flickr.com/3281/3085177911_81ccbaf9c0_o.jpg)

Frei Otto, established the Institute For Light Weight Structures in 1964, which conducted experiments on several natural objects and formations and he focused his researches on perfecting structural forms and constructing lightweight structures (Otto, 1995). He used several web systems to develop suspended and stretched systems and observed the forms formed by the gravity within these

systems. In his designs, he used suspended systems influenced by spider webs and created modern tents and pneumatic structures influenced by soap bubble which are identified with him (Figure 3.40). In this context, he was considered as a pioneer using the process as an influential factor besides form (Glaeser, 1977; Drew, 1976).

Figure 3.40.

a) German Pavillion - Frei Otto
(http://academics.triton.edu/faculty/fheitzman/frei%20otto%20german%20pavilion%201967%202.jpg)
b) Limpets Shells
(http://upload.wikimedia.org/wikipedia/commons/thumb/f/f4/Common_limpets1.jpg/275px-Common_limpets1.jpg)
c) German Pavillion Interior - Frei Otto
(http://quod.lib.umich.edu/cgi/i/image/getimage-idx?viewid=04_03616;cc=ummu;entryid=x-04-03616;quality=m600;view=image)

Tokyo Olympic Stadium designed by Kenzo Tange in 1964, influenced by natural formations and shells of mollusks is one of the impressive structures combining modernism with the Japanese traditionalism (Figure 3.41). The plan of the structure is composed of the relationship of the unconnected, extended, curvy corners and shifted axes of semi circles. The curvy roof of the structure is reinforced by two concrete columns against strong winds and storms. The structure is covered with steel cables and panels (Kultermann, 1958; Curtis, 1996).

Figure 3.41.

a) Tokyo Olympic Arena - Kenzo Tange
(http://nimg.sulekha.com/sports/original700/yoyogi-national-gymnasium-2009-4-18-4-50-32.jpg)
b) Snail Shell
(http://4.bp.blogspot.com/_qj7HUoyOG2Y/TLO-hhImpVI/AAAAAAAAAAY/rNTm1cyf5pI/s400/Cepaea_nemoralis.jpg)
c) Tokyo Olympic Arena Section Views - Kenzo Tange
(http://www.columbia.edu/cu/gsapp/BT/DOMES/TIMELN/tkyo_gym/tkyo-02.jpg)

Although he was a rational architect, Oscar Neimeyer (1907) from Brazil was bored from the right angled forms of concrete structures and used fluid, curvy, natural and organic forms in his designs. Neimeyer who was designing sculpture-like, monumental structures, designed the Cathedral of Our Lady Fatima Brasilia in 1959 by combining concrete, glass and metal with fluid, curvy forms (Figure 3.42) (Hasol, 1999; Khan, 2011).

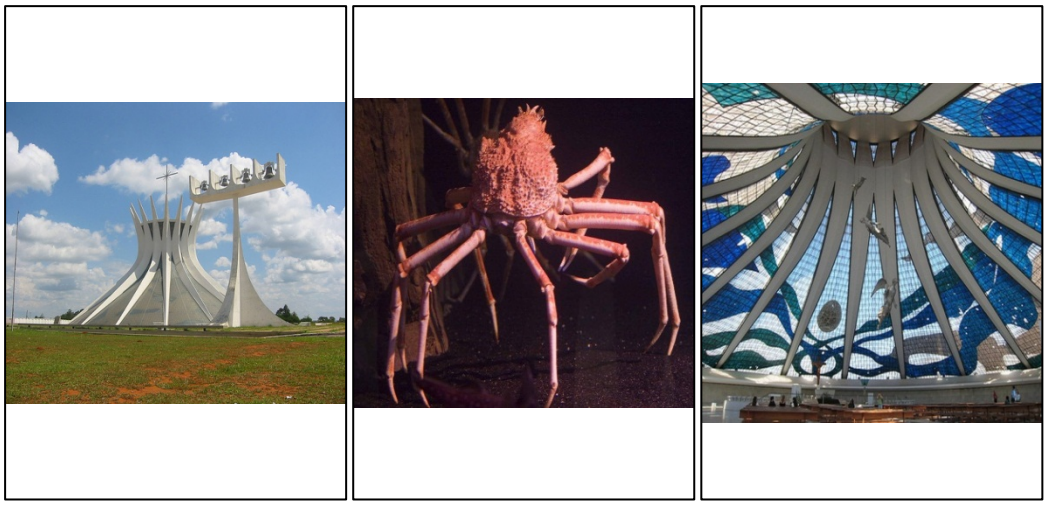


Figure 3.42

a) Cathedral Of Our Lady Fatima Brasilia - Oscar Neimeyer
(http://www.flickr.com/photos/hanneorla/71225829/sizes/m/in/photostream/)
b) A Spider Crab
(http://www.lowbyte.com/albums/2006-01-27-GaAquarium/web_jSpiderCrab_5017.jpg)
c) Cathedral Of Our Lady Fatima Brasilia - Oscar Neimeyer Interior
(http://planbox.files.wordpress.com/2012/01/interior-the-cathedral-of-brasilia.jpg)

Spanish architect Santiago Calatrava was another designer who stated that he based his design philosophy on influences from nature in his interviews and articles. Calatrava stated that understanding the language of the structure is as important as understanding geometrical language for comprehending architecture. In this context, he explains that both of these languages together with the characteristics of materials and natural formations are sources of influence for him (Figure 3.43) (Tazonis, 2004; Zardini, 1996).

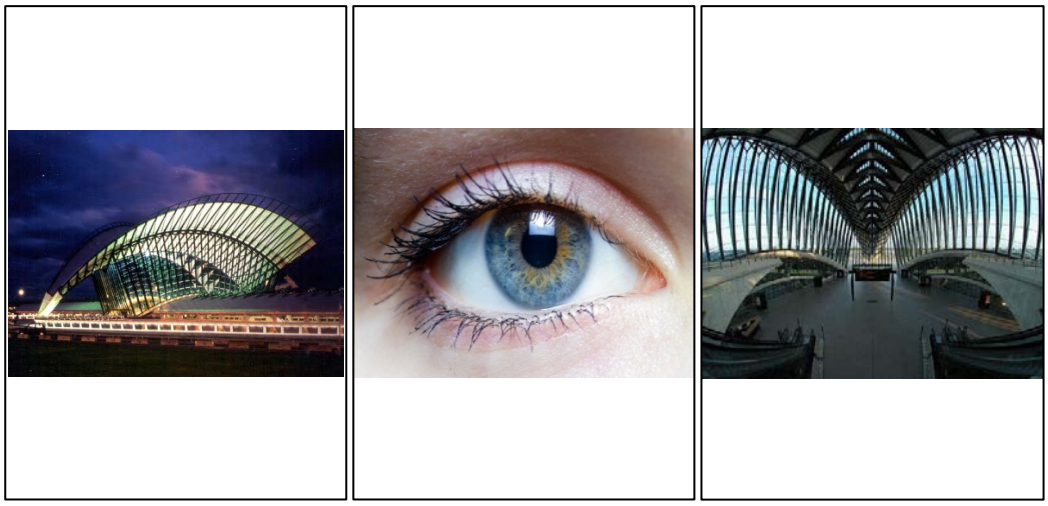


Figure 3.43.

a) Lyon Train Station - Santiago Calatrava
(http://smu.edu/newsinfo/releases/images/m0011r.jpg)
b) Human Eye
(http://upload.wikimedia.org/wikipedia/commons/6/64/Iris_-_left_eye_of_a_girl.jpg)
c) Lyon Train Station Interior - Santiago Calatrava
(http://farm1.staticflickr.com/221/501286170_5b657fa37f_z.jpg?zz=1)

He covered the BCE Place Complex with a 14 meter upper structure intersecting in the middle as a parabolic arch supported by eight concave columns. The structure creates an impressive atmosphere by the tree-like columns and the forest effect created in the intersection points by the nine arches. A similar effect can be observed in Lisbon Oriente Train Station. In the sketches of Calatrava, he was observed to use similar analogies and analyses and based his building and bridge designs on human and animal forms and skeleton systems (Figure 3.44) (Tzonis, 1999; Jodidio, 1998).

Figure 3.44.

a) BCE Place - Santiago Calatrava
(http://upload.wikimedia.org/wikipedia/commons/2/2d/Brookfield_Pl._1_06.11.04.jpg)
b) Wood Path
(http://4.bp.blogspot.com/_X9TNSg9U5jM/TNd7KEUSaxI/AAAAAAAAAcU/-87JREg6iLs/s1600/path.jpg)
c) BCE Place Interior - Santiago Calatrava
(http://www.galinsky.com/buildings/bce/BCE%20bay%20entrance.jpg)

At the same time, it was suggested that the forms and structures that he adopted in his designs that was a result of his search for conscious learning from nature does not reflect the process sufficiently and are exaggerated (Zandini, 1996).

3.3 SCANDINAVIAN STYLE APPROACH IN MODERN DESIGN

Changing aesthetical concerns and concepts in the beginning of 1890s, in Europe especially in Scandinavian countries promoted the new developments in ornamental arts. Nevertheless, the main ideas and forms feeding the changing approaches and reflected on designs were observed to emerge from the traditional approaches (Raizman, 2010).

The elements that shaped and individuate the Scandinavian architecture were a combination of the distinct cultural traces of the region. The main elements forming these traces were the natural formations, history, culture and economyof these countries. Scandinavian designers -the nurturers of modernism- are also

observed to form their designs in the light of these elements. In addition, the high mountain regions, fiords, waterfalls, melting icebergs, islands and lakes of the Scandinavian nature are in continuous motion. Scandinavian designers use these as sources of influence for their designs like Grieg and Sibelius use the same sources for their music (Tokyay, 2004).

As mentioned before, Finnish architect **Eliel Saarinen**showed the influence of nature on their designs in a romantic way by using natural materials. In addition, he created interior designs and furniture designs by combining curvilinear and organic forms with natural materials (timber, brick, granite) (see section 3.2.1). Also, he gave the general architectural emphasis on monumental impressions by dividing the masses via a rising vertical movement. In this context, he became one of the pioneers during the transition of Scandinavian architecture to Modernism (Salokorpi, 1970; Saarinen, 1985).

Swiss architect **Erik Gunnar Asplund** (1885- 1940), another pioneer of the modern Scandinavian design initially created his designs under romantic influences like Eliel Saarinen but then he reduced these romantic influences and adopted modern design. By using glass and steel in addition to the traditional materials such as timber and stone he lightened the structures, use natural light for illuminative purposes in buildings by the use of curvilinear forms and created large dynamic living spaces. By means of this, he has been in an effort to be integrated with nature with the use of a functional approach in his designs. Parallel to this, by using the same curvilinear and dynamic forms in his furniture designs he tried to reflect this natural effect. The Stockholm Exhibition Building which is completed in 1930, is one of the examples in which Gunnar Asplund reflected his design concept completely (Figure 3.45). At the same time, the same dynamic and curvilinear forms are observed in his chair design he created for Kallemo in 1930 (Figure. 3.45.c) (Wrede, 1980; Engfors, 1990).

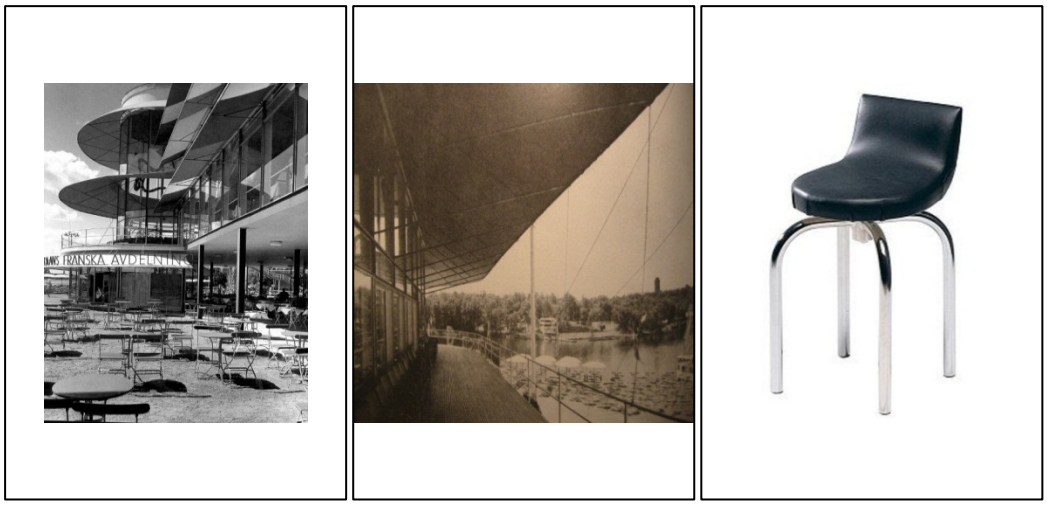


Figure 3.45.

a) Stockholm Exhibition Building – Erik Gunnar Asplund (http://payload.cargocollective.com/1/3/127803/1699748/1930%20GUNNAR%20ASPLUND%20paradise%20cafe.jpg)
b) Stockholm Exhibition Building Interior – Erik Gunnar Asplund (http://asplund-library.org/images/Stockholm_Exhibition.jpg
c) Chair Design For Kallemo – Erik Gunnard Asplund (http://www.tribu-design.com/collections/alpha.php?ac=f&pc=e&pict=3&ty=&st=624&lg=en)

Perhaps, one of the most sophisticated, versatile and diverse architects of the era was Finnish **Alvar Aalto**. The architecture of Aalto emphasizes significant changes in the new architectural approaches with his use of organic materials, harmony with the environment and with his approach rejecting every dogma. Integration with nature observed in his designs does not restrict himself. His rule for examination of material and adaptation to the natural environment does not change (Ragghianti, 1978).

While initially rejecting free forms, his designs bring a unifying plasticity in spite of their rectangularity. Later on, Aalto returns to free form again and reflects this to the mass from inside. The humanization of the strict architectural elements were sustained in this way. The curvilinear planes of Aalto can also be observed in the plans of a building, roof structures, furniture designs or product designs. Thus, it is understood that he established his design concept on the foundations of organic architecture. The organic influences and movements can be observed clearly in the walls, on the ceiling and in the roof of the church in Vouksenniska that Aalto completed in 1958.Similarly, the design of the separator element from 1938 that reflected the same design principles is observed to be a

combination of the same organic and dynamic effects with natural materials (Figure 3.46) (Hasol, 1996; Pearson, 1978; Kim, 2009).

Figure 3.46.

a) Church in Vouksenniska – Alvar Aalto
(http://www.arcspace.com/architects/aalto/22.jpg)
b) Church In Vouksenniska Interior – Alvar Aalto
(http://scanqueen.files.wordpress.com/2010/07/dsc02252.jpg)
c) Wooden Screen Design – Alvar Aalto
(http://img.archiexpo.com/images_ae/photo-g/design-wooden-screen-by-alvar-aalto-4051-1808375.jpg)

The design philosophy of the Danish architect **Arne Jacobsen** wasalso based on organic architecture. His philosophy of diversity with his functionalism resulted in from buildings designs to interior designs, from furniture designs to industrial designs. One of the most important characteristics of Arne Jacobsen is that he designed his buildings by himself to the smallest detail with the new materials approach of modernism (Beascoa De Corral, 1992).

He created his designs based on main principles of aesthetics with a functionalist approach. His interest in the botanic and organic elements played a central role in his design approach. He was influenced by the nature and the universe. He reflected the inspirations from nature consciously on interior, furniture and product designs. Thus, he tried to bring the warmth of human touch to the architecture by his selection of colors-materials (leather, timber etc.) and organic furniture designs (Sheridan, 2003).

The Royal Hotel that he designed in 1960 was the first result of the developing idea that the concept of design is a whole. The Royal Hotel is considered to be a classic structure of the modern Scandinavian architecture (Figure 3.47). The exterior structure of this hotel is no different than other skyscrapers, however, the difference of the building comes from the fact that the interior details, the furniture were all designed to be in harmony by Jacosen. The Egg Chair designed to be a part of a hotel in 1958, similarly has a simple, organic and sculpture-like structure. To warm up the cold ambiance of the hotel, it was used in the lobby. It invites the people to break the daily routine and to rest (Dachs and Hintze, 2007; Hansen, 2008).

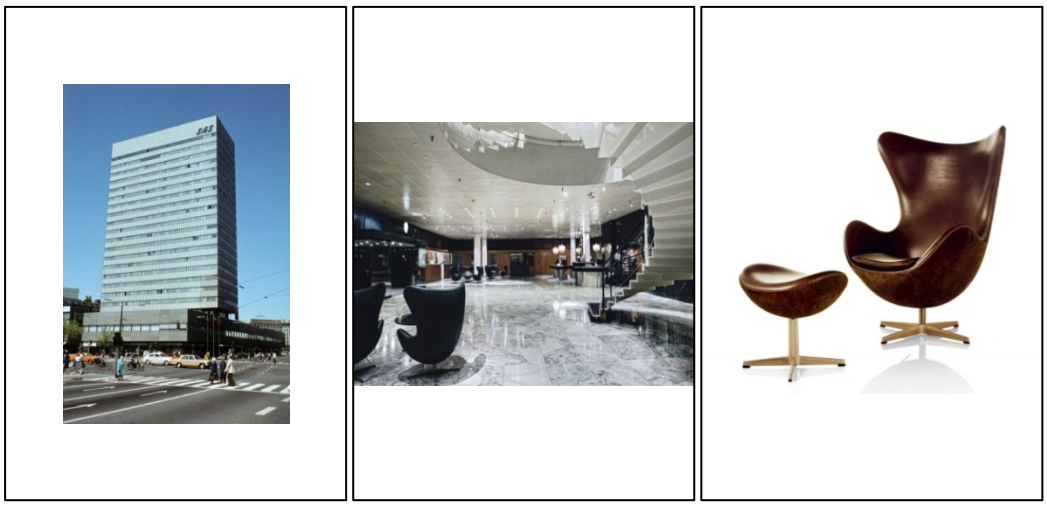


Figure 3.47.

a) The Royal Hotel Copengahen (SAS) – Arne Jacobsen
(http://larryspeck.com/wp-content/uploads/2012/05/2012-1464.jpg)
b) The Royal Hotel Copengahen (SAS) Interior – Arne Jacobsen
(http://i2.bookcdn.com/data/Photos/OriginalPhoto/172/17218/17218184/Radisson-Blu-Royal-Hotel-Copenhagen-photos-Interior-Lobby.JPEG)
c) Egg Chair Design – Arne Jacobsen
(http://latimesblogs.latimes.com/.a/6a00d8341c630a53ef0147e0e3d25a970b-600wi)

Danish industrial designer **Poul Henningsen** (1894-1967) is another personality during this modernism era. He was an important Scandinavian designer focused on the interior lightening and furniture design. He created his design approach based on influences from nature with the use of organic and plantal forms free from the simple geometric elements of modernism. By means of this he aimed at leading the Scandinavian design to a new direction with free

and more characteristic forms. By adopting the flexibility principle of the Scandinavian design principles he tried to use the interior spaces in a multifunctional, aesthetical and effective way. His Artichoke lampshade from 1958 influenced by an artichoke, Septima lampshade from 1929 influenced by a flower petal and spiral chair from 1932 influenced by plantal forms were observed a reflection of the modern design approach of Poul Henningsen (Figure 3.48) (Curtis, 1996; Abercrombie, 1994; Miller, 2012).

Figure 3.48.

a) Artichoke Lamp Design – Poul Henningsen
(http://www.danish-furniture.com/designers/poul-henningsen/#poul-henningen-artichoke)
b) Septima Lamp Design – Poul Henningsen
(http://www.danish-furniture.com/designers/poul-henningsen/#poul-henningen-septima)
c) Spiral Chair Design – Poul Henningsen
(http://www.danish-furniture.com/designers/poul-henningsen/#poul-henningen-spiral-chair)

Another Finnish designer **Eero Saarinen** also changed the strict geometric formsand functionality into a dynamic style with free, fluid and organic forms. He tried to reflect emotions and function in his designs with a plain and beautiful way. Eero Saarinen like Jorn Utzon (see section 3.2.2) improved the architectural form concept created by the use of new construction technologies in the Scandinavian modernism by combining form and function. He designed impressive sculpture-like structures and tried the use of new materials. In addition, he developed an approach combining different disciplines such as architectural, landscape and interior designs (Joseph and Thorndike, 1981).

One of the most prominent examples of his approach is the John F. Kennedy Airport in New York influenced by the silhouette of a seagull mentioned before (see section 3.2.2). In addition, he developed open plans, interior and exterior space relations, industrial designs and materials to improve modernist approaches. Similarly, the Kresge Auditorium in Massachusetts with its organic and curvilinear shell form built in 1955 reflects the design approach of Saarinen (Figure 3.49). Eero Saarinen also reflected the sculpture-like natural forms, new materials and production techniques that he had used in architecture to his furniture designs. In this context, his furniture designs have also organic design forms. The Tulip chair and the table that he designed in 1956 reflects this approach best (Saarinen, 1968).

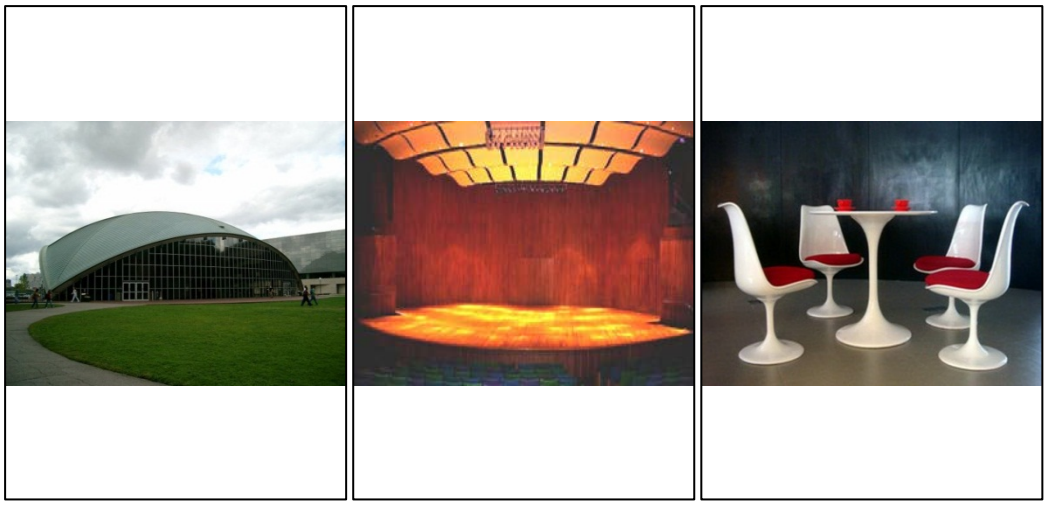


Figure 3.49.

a) Kresge Auditorium – Eero Saarinen
(http://files2.structurae.de/files/photos/1/imgp/imgp1160.jpg)
b) Kresge Auditorium Interior – Eero Saarinen
(http://www.bostonchambermusic.org/wp-content/uploads/2012/06/KresgeAuditorium1.jpg)
c) Tulip Chair Design – Eero Saarinen
(http://www.modernclassic.cn/images/products_picture/scene-picture/CF070_02.jpg)

Other Finnish designers that based their design approach on organic architecture are Pietila couple. **Reima** (1923-1993) **and Raili Pietila** (1926-) headed to a different direction because of the subjective aesthetical approach and the negligence of the effect of the social aspect of this fact in architecture in previous era. They emphasized organic and natural morphological forms in their

designs by softening the strict forms and principles of modernism. With these new forms they created sculpture-like structures by the use of experimental designs. They bring up a new point of view by combining complex geometrical drawings with analogies of nature. The walls with fluid forms in Kaleva church designed in 1966, and the shell effect and the forms used in the design of the Tampere City Library show the design concepts and approaches of the couple (Figure 3.50) (Quantrill, 1985; Connah, 1990).

Figure 3.50.

a) Kaleva Church – Raili And Reima Pietila
(http://3.bp.blogspot.com/_pKA34P4zFyw/S9MPibKAHkI/AAAAAAAAAFs/OD2BDJx8Jlc/s1600/Kaleva+Church+interior.jpg)

b) Kaleva Church Interior – Raili And Reima Pietila
(http://3.bp.blogspot.com/_pKA34P4zFyw/S9MPibKAHkI/AAAAAAAAAFs/OD2BDJx8Jlc/s1600/Kaleva+Church+interior.jpg)

c) Main City Library –Raili ANd Reima Pietila
(http://img.groundspeak.com/waymarking/display/db12486c-51fa-422f-90a5-5088dd499547.jpg)

Danish **Verner Panton**(1926-1998) is also one of the most important Scandinavian interior and industrial designers of the 20th century. He was an important pioneer of the era combining the organic and fluid forms in nature with striking colors. He push the boundaries of his designs in 1960s by using the new production techniques and materials of the era. He especially used the casting techniques and reinforced polymers and plastics developed in 1960s. He also developed Dralon, an acrylic fiber fabric, which is a strong and durable material, used as a coating material (Fiell and Fiell, 2000).

The Visiona 2, designed by Panton in 1968 combines several organic and fluid furniture designs, textiles and bold colors. The Panton Chair designed in 1960 and produced in 1967 by casting plastic as a mono block, can be considered as the reflection of organic and fluid influences on furniture design. The same influences can be observed on the Moon Lamp he designed in 1960 as a lampshade. Produced with aluminum pieces with varying sizes, it was influenced by the forms of different phases of the moon (Figure 3.51) (Fiell and Fiell, 2000; Panton, 2010).

Figure 3.51.

a) The Visiona 2 Design – Verner Panton
(http://www.feeldesain.com/feel/wp-content/uploads/2012/02/feeldesain-Verner-Panton-Visiona.jpg)
b) Panton Chair – Verner Panton
(http://www.danish-furniture.com/images/verner-panton-chair.jpg)
c) Moon Lamp – Verner Panton
(http://www.designaddict.com/img/pictures/radar2753_pic13667_normal.jpg)

Finnish interior and industrial designer **Eero Aarnio** (1932 -) was one of the pioneers of the Scandinavian design who used organic forms by the influence of nature on the basis of the design approach. He combined the modern material and techniques of the era with the nature inspired forms. Also he created functional designs and used bold colors and forms. Aarnio who was mostly focused on furniture design created the Mushroom Chair in 1960 by using fiberglass, a new material of the era, with forms influenced by nature. Similarly, the Bubble Chair (1966) influenced by soap bubbles and Pony Chair (1973)

influenced by a pony are important examples showing his design approach (Figure 3.52) (Fiell and Fiell, 2000, 2001).

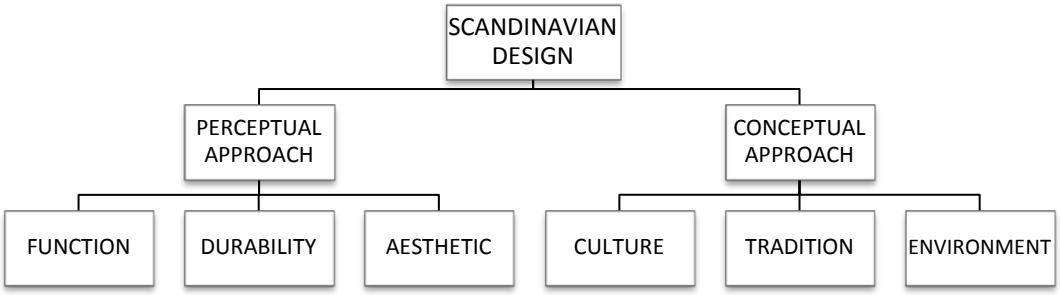
Figure 3.52.

a) Mushroom Chair – Eero Aarnio
(http://www.eero-aarnio.com/images/mushroom_gross.jpg)
b) Bubble Chair – Eero Aarnio
(http://4.bp.blogspot.com/_8mW8v7dcs0E/S82_BuvWWuI/AAAAAAAABvs/F3Zkxcr_Pl4/s1600/bubble+chair+eero+aarnio.jpg)
c) Pony Chair – Eero Aarnio
(http://static1.bonluxat.com/cmsense/data/uploads/orig/eero_aarnio_pony_chair_g4d.jpg)

3.4 ANALYSES OF SCANDINAVIAN DESIGN DURING THE MODERN ERA

In this section, Scandinavian designs will be analyzed to better understand with respect to their perceptual and conceptual aspects during the modernism era (Table 3.1).

Table 3.1. Analyses of Scandinavian Design



3.4.1 Analyses According to Perceptual Approach

The examination of the Scandinavian style approach in modern design reveals how Scandinavian designers interpret this process and what kind of designs they created. It will be useful to examine these approaches based on the three perceptual factors; (function, durability (material) and aesthetics) proposed by Vitrivius.

3.4.1.1 Analyses According to Function

The most important and distinctive characteristic of the Scandinavian designers is the fact that they reduced the mechanized, strict approaches of the modernism into a more humanistic dimension by using the systematics found in nature. They tried to integrate the human-nature relationship with the architecture-design relationship by making the strict, rigid and normative approach of the functionalism more dynamic and free. In this context, they transferred the free and fluid forms into furniture, interior designs, outer shells and mass and thus to the design as a whole by the efficient use of these organic architecture language (Leskinen, 1979; Dennis, 2006).

In addition to all of these effects, they utilized negative and positive effects of the nature, climatic conditions and flora of Scandinavian geography on humans

by combining them with the functionalism and create a design approach that result in useful products. They develop plain and simple functions and impose them on the design elements and created the Scandinavian approach in functionalism (Dennis, 2006).

3.4.1.2 Analyses According to Durability (Material)

Scandinavian designers also headed to a different direction in their approach for the use of new construction techniques and materials of the modernism era. Their designs show intelligent use of free plan solutions and smart combination of the new materials (glass, steel, concrete, plastic etc.) with the natural and traditional materials (timber, stone, brick etc.). He designs as a result of their approach are observed to include the contemporary and the new but at the same time have elements from Scandinavian history, culture and tradition (Pearson, 1978).

The diversity in their materials showed that Scandinavian designers searched their solution in nature and this search resulted in the freedom for the selection of materials. By this way, they softened the cold, strict and simple geometric forms of the era with an organic architectural language and with the use of natural materials and colors and brought a humanistic warmness to design and architecture. In addition, their use of natural materials for designing furniture, interior spaces and the entire structure resulted in the construction of buildings integrated with nature and exist in harmony with nature (Mikkola, 1981).

3.4.1.3 Analyses According to Aesthetic

The plain, simple aesthetical approach of the era was also adopted by the Scandinavian designers. But they combine the free forms inspired by the nature, natural materials, their natural colors and textures with their aesthetical approach

to create designs integrated with nature as a part of the nature and reflecting nature which can be considered as the factor that differs them from the era. In this context they are observed to have very distinct forms from the strict purism of the Modern Style. By the use of nature influenced forms and natural materials, they gave traditional materials a new meaning in the modern era (Quantrill, 1998).

The smart use of materials and the language expressed with the harmony of their designs with the natural environment were observed to soften the strict and cubic aesthetical concerns of the era and thus keep the humanistic warmth in their designs. In addition Scandinavian designers reflected their holistic design approach on furniture, interiors and building designs and used this approach for their solutions (Mikkola, 1981).

3.4.2 Analyses According to Conceptual Approach

There are conceptual factors feeding the designs of Scandinavian designers and these factors were reflected on their designs on a perceptual level. It is important to examine how these factors combine with the culture and environmental factors which the designer is born in and effect the Scandinavian design on an abstract level.

3.4.2.1 Analyses According to Culture

The most effective element in the identity search of the Scandinavian designers were observed to be the culture. Traces of their national identity and their romantic approaches can be observed in their designs from function and material selection to aesthetical concerns. They modernized the values of their cultural identities without abandoning them. By this protective approach they created warm, sincere, plain designs in harmony with nature in connection with humans. These elements can be observed in every dimension of the Scandinavian

design and differs them form the other modernist approaches (Aav and Stritzler-Levine, 1998).

They were observed to be very careful and selective when combining the cultural and romantic effects with the modern approach. In parallel, the factors that reinforced their cultural identity is observed to be their liberal approaches, their social awareness and developmentalist economic approaches (Raizman, 2010).

3.4.2.2 Analyses According to Tradition

Scandinavian countries having a tradition of local architecture and design approach were observed to utilize the modern era movements and adapted them to their traditions. Modern design approach can be considered to overlap the traditional Scandinavian design approach and observed to be reflected to designs integrated with the plain and simple approaches and nature influences. The more modest and limited ornamentation of the Scandinavian design continued this approach and the romantic effects in the modern era (Salokorpi, 1985).

In this context the attitude they formed from thisapproach is based mostly on the effects of natural materials, colors and texture. They succeeded to create an original interpretation from the influences of traditional architecture, romantic effects without discarding their national identity. By this original interpretation of the modern era they differed themselves from their counterparts and succeeded in reflecting their identity to the Modern approach (Salokorpi, 1985; Ahlberg, 1925).

3.4.2.3 Analyses According to Environment

The factors that shape the architecture and design approach of Scandinavian countries are observed to be originated from the prevailing elements in the region. The main factors affecting their design forms and intentions are

observed to be elements such as the sea, water, forests, islands, icebergs and natural light. The interaction and relationship between the human and environment can be considered as the most influential factor affecting the perceptual and conceptual factors that shapes the design approach (Tokyay, 2004; Jodidio, 2008).

At this point, the poetic beauty but at the same time the harsh nature of the environment can be considered to be the source of the formation of all of the aural and literary art forms of Scandinavians. The mountain regions, fiords, waterfalls, icebergs, islands and lakes have a continuous movement throughout days and seasons thus create a great diversity of colors. Scandinavian designers use these as sources of influence for their designs like Grieg and Sibelius use the same sources for their music (Tokyay, 2004; Jodidio, 2008).

3.5 CONCLUSION

Modern architecture has begun with the use of concrete and steel at the end of 19th century. These two new materials invented in the first half of the era gave the designers the ability to cover large spaces, construct high structures and create plans with flexibilities that were not possible before and helped the establishment of the foundaitons of the Modern Architecture (Pevsner, 1985).

Changing aesthetical concerns and concepts in the beginning of 1890s, in Europe especially in Scandinavian countries promoted the new developments in ornamental arts. Nevertheless, the main ideas and forms feeding the changing approaches and reflected on designs were observed to emerge from the traditional approaches (Raizman, 2010).

Transition to modern architecture realized only after the World War I. Previous attempts remained individual. At the end of the war, old traditions and taste had changed. As a result meeting the requirements of the society by using contemporary soluitons became a necessity. Rationalist architecture had emerged because of this need (Mutlu, 1996).

Then organic architecture appeared in addition to rationalist approach. It is proposed that form does not need aesthetical standards but serves as tool to create the design. This leads to the functionalism. Its main principles are observed to overlap with the principles of Modernism and Rationalism. This architectural approach proposed that every part of a building has its own identity and express its interconnections with the building. The necessity of the structure to be connected with its environment was emphasized. This was stated as the harmony with the nature and based on factors such as material used, the relationship of the forms with the environment, colors. The principle was to combine nature with the space, to integrate nature inside the house or building in an unobtrusive way. After the entrance of the functional architecture into the Scandinavian countries, the architects used its principles in accordance with their traditional methods. In this context, Scandinavian designers combined the principles of functional architecture with the approach of the organic architecture and created an original nature influenced design language (Julier, 1993; Tokyay, 2004; Goldhagen, 2007).

Throughout the history of architecture, many examples influenced from the nature can be observed. But, in the examples till the middle of the 20th century, the inspirations and applications were mostly limited to form. Through the Industrial Revolution and with the advances in technology, the forms of observing nature became varied and divided into different fields. The improved design techniques as a result of this variation and dividition moved the inspiration concept to different dimensions not only limited to form but also as the interpretation of color, pattern, mass, façade and decoration (Portoghesi, 2000; Hersey, 1999; Tsui, 1999).

The characteristic of the structural characteristics of the formations in nature was used as a model for the man-made structures. During the 20th century designers tried many morphological designs and structures based on formations in nature. When these trials are examined, it is observed that there are two ways of influence and practice based on nature. The first is the use of form of a natural object or formation purely by formal and analogical considerations and the second is transfer of an observed formation process (the formation process of a material,

form and structure) into a design form by using experimental data (Arslan and Gönenç, 2004).

The factors that shape the architecture and design approach of Scandinavian countries are observed to be originated from the prevailing elements in the region. The main factors affecting their design forms and intentions are observed to be elements such as the sea, water, forests, islands, icebergs and natural light. The interaction and relationship between the human and environment can be considered as the most influential factor affecting the perceptual and conceptual factors that shapes the design approach. Scandinavian designers use these as sources of influence for their designs like Grieg and Sibelius use the same sources for their music (Tokyay, 2004; Jodidio, 2008).

CHAPTER 4

4.1 INTRODUCTION

During the modernism era, Scandinavian designers were observed create an original language by combining the principle factors of plainness, functionality, rationality and aesthetics of the era with their identity, tradition and nationalistic approach and the nature influence of the environmental factors. In this context, the main aspects of their design philosophy was their expressionist organic architectural approach, their originality in using natural materials, and their efforts to soften the forms of functionalism in favor of a more humanistic approach (Julier, 1993; Tokyay; 2004).

Scandinavian designers **did not only reflect the nature influences to the form as an aesthetical concept,** but they also use these influences on functionality and the material aspects of the design. Nature influenced structure, interior, furniture, and industrial designs that is a result of this approach have become one of the most important characteristics of the Scandinavian design separating it from the other approaches of the Modern era (Aav and Stritzler-Levine, 1998; Hasol, 1996).

At this point, one of the most influential pioneers of the Scandinavian and Finnish architecture, Alvar Aalto comes to the stage. Aalto saw the concept of design as a whole and combined this with human and nature. He interiorized these inspiration sources and tools and reflected these on all of his designs. In this context, the continuity and holistic nature can be observed in his designs of structures, interiors, furniture and industrial objects. Also by using natural materials and integrating the natural processes into the structure, he created organic designs that are in harmony with nature. With this approach Aalto developed a distinct design attitude separating him from other designers of the Modern Era (Hasol, 1996).

4.2 ALVAR AALTO

Hugo Alvar Henrik Aalto was born in February 3rd, 1898 in the Kuortone region of Finland. Aalto, being an architect, city planner, furniture and product designer, is one of the most important names of the modern architecture and organic design in the world with his modernist approach, utilization of natural materials, original expressions of form and details (Charrington, 2012).

4.2.1 His Life

Aalto started his architectural education in Helsinki Technology Univerity after completing his primary education in Jyväskylä Lyceum School in Jyväskylä located in the middlesouth of Finland in 1916. He graduated from university in 1921 and returned to Jyväskylä in 1923 and opened his first architectural office. Jyväskylä is important for his architectural career because it houses many structures he designed. He married Aino Marsio who was also an architect in 1925. Alto and Marsio had been business partners until the death of Marsio in 1949 (Ray, 2005).

In 1927 Alvar Aalto moved his office to Turku and established a business partnership with Erik Bryggman. They were separated in 1933 and Aalto moved his office to Helsinki. In 1935 with his architect wife, he established the Artek Company which specialized in producing furniture from glued beech wood panels. In 1952 he married his second wife, architect Elissa Mäkiniemi and Mäkiniemi started to work as his assistant. Aalto was awarded many prizes and worked as president of Finland Academy from 1963 to 1968. He had been a member of the The International Congresses of Modern Architecture – CIAM in the years 1928-1956. His prizes include royal golden medal of Royal Institute of British Architects – RIBA, 1957 and golden medal from The American Institute of Architects – AIA, 1963. Alvar Aalto died in May 11th 1976 in Helsinki (Jetsonnen and Jetsonnen, 2011).

4.2.2 His General Design Concept

In Aalto's career the years 1927-1928 has great importance. With the design of three important structures he became one of the most important architects in Finland Scandinavia and started to be recognized as a world famous architect. These buildings are the Turun Sanomat Building in Turlu, Paimio Sanitarium and the Municipality Library in Viipuri. The main point of these three designs was the aspects of buildings reflecting the influences of the Modern Era, their functionality, plainness away from the historical references. Aalto designed these buildings with a modern approach using straight white surfaces, strip windows, flat roofs, terraces and balkonies leaving the general classical influences of the Finnish architecture of the era (Figure 4.1) (Fleig, 1994).

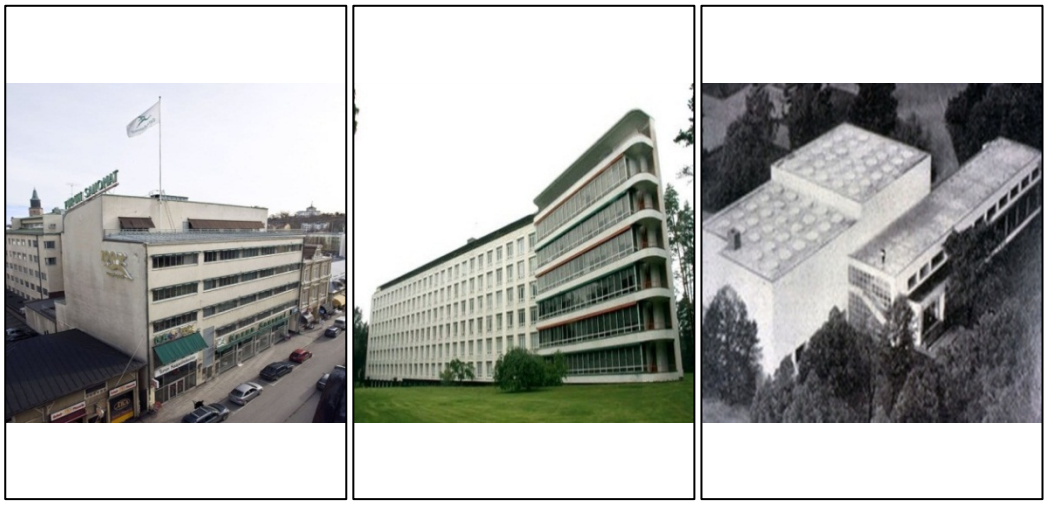


Figure 4.1.

a) Turnu Sanomat Building – Alvar Aalto
(http://upload.wikimedia.org/wikipedia/commons/7/7f/Turunsanomat.jpg)
b) Paimio Sanatorium – Alvar Aalto
(http://mw2.google.com/mw-panoramio/photos/medium/54715994.jpg)
c) Viipuri Library – Alvar Aalto
(http://o.quizlet.com/i/bfzX6XYld_DvH-uC_t_Gog_m.jpg)

Aalto took the path of a liberated Modernism in contrast to the standardized Modernism of the era. He tried to create functional meanings by experimenting with the forms. In this context, he diverted from rationalism and approached to the human and nature aspects of design. For example, he created an

ideal reading environment in Viipuri Library by providing natural illumination with the use of conical planes (Figure 4.2). At the same time, he performed experimental acoustic studies with organic movements on the ceiling. In the lampshade he created from the same organic movements in 1950, the same effects can be observed. While modernism advocated the use of new materials, Aalto used traditional materials in combination with the new materials. He approached the concepts of function, aesthetics and material in a holistic way and reflected this approach on his designs. Also, he carefully analyzed humans and their experiences. In his designs he created large and open spaces giving human routines, behavior, physical and psychological comport a priority. For this reason, he designed not only considering the apparent needs, but also subsequent ones (Goldhagen, 2007; Kim, 2009).

Figure 4.2.

a) Viipuri Library Interior – Alvar Aalto
(http://www.wmf.org/sites/default/files/imagecache/project/images/project/RUS-Viipuri-int-lendhll.jpg)
b) Viipuri Library –Alvar Aalto
(http://aasid.parsons.edu/decorationascomposition/sites/default/files/Alvar-Aalto-Library-IMG_1287-b_0.jpg)
c) Spot Light – Alvar Aalto
(http://scandinavia2010.files.wordpress.com/2010/08/aalto-profile.jpg)

His Finnish Pavilion designs for the Paris World Fair (1937) and New York World Fair (1939) had added to his fame as an original designer using free architectural forms (Figures 4.3.a and 4.3.b). In both of these designs Aalto used timber for structural and planar effects and established natural materials as an

inseparable part of his designs. Thus, his effort to be integrated with nature in his designs became prevalent. He constructed a design approach by combining free forms with materials. In this context, he humanized his designs by merging the functional approach with natural processes. One of the most important examples of this approach is Villa Mairea in Noormarkku (Figure 4.3.c) (Baird, 1971).

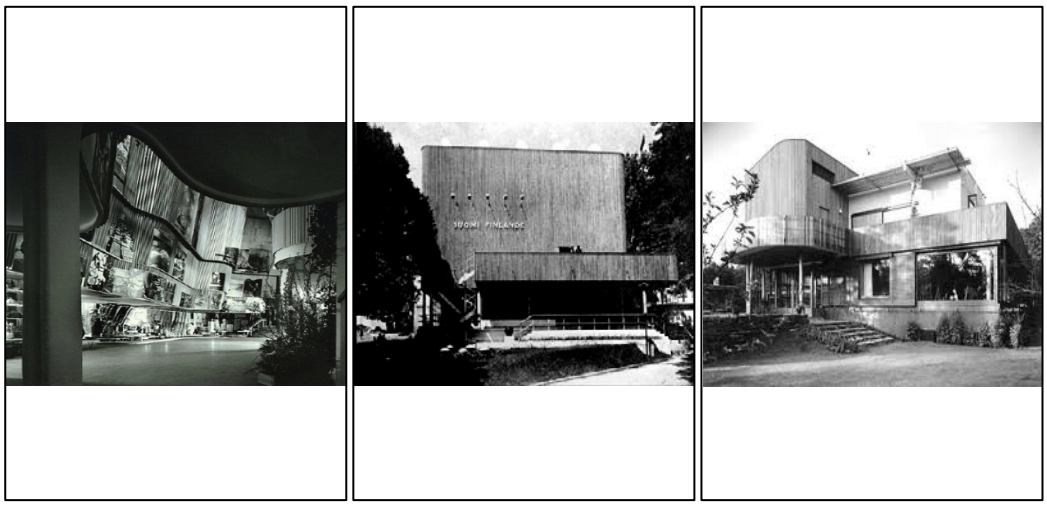


Figure 4.3.

a) Finnish Pavillion In New York – Alvar Aalto (http://greg.org/archive/aalto_finn39_stoller.jpg)
b) Finnish Pavillion In Paris – Alvar Aalto (http://file.alvaraalto.fi/upload/446_1.png)
c) Villa Mairea – Alvar Aalto (http://www.designboom.com/history/aalto/villa/01.jpg)

After 1950s which can be considered as the maturity period of Alvar Aalto there observed to be a differentiation and diversity in his designs. Among these multiplex Neue Vahr building (1958) in Bremen West Germany, Riola Parish Church (1966) in Bologna, Italy and Helsinki Technology University (1966) can be given as examples (Figure 4.4). He tried to reflect the differentiated and diversified attitudes of which he had matured the nature influences in his form, mechanism and material approaches (Gutheim, 1960).

Figure 4.4.

a) Neue Vahr Building – Alvar Aalto
(http://upload.wikimedia.org/wikipedia/commons/f/f8/AaltoVahr-02.jpg)
b) Riola Parish Church – Alvar Aalto
(http://farm5.staticflickr.com/4025/5168483409_15aab3c7e1_z.jpg)
c) Helsinki University of Technology – Alvar Aalto
(http://upload.wikimedia.org/wikipedia/commons/f/f8/AaltoVahr-02.jpg)

Aalto combined the organic design approach with nature and he created his nature influenced designs by unifying them with the inspirations he got from the human interactions, behavior and expectations that he observed and analyzed. He developed his design proficiency based on instinct and experimentation. He believed that nature should be embodied in human consciousness and he tried to reflect this thought in his designs. For example, he designed the loadbearing elements of the Riola church with organic forms and he created openings to direct the natural light to the interior of the building from the ceiling. In parallel to this, the reflection of the same dynamic forms can be observed in his chair (1932) and table lamp (1950) designs (Figure 4.5) (Goldhagen, 2007; Dachs and Hintze, 2007).

Figure 4.5.

a) Riola Parish Church – Alvar Aalto
(http://ad009cdnb.archdaily.net/wp-content/uploads/2011/08/1314723507-201009-riolaaalto-19-528x351.jpg)
b) Easy Chair – Alvar Aalto
(http://www.contemporist.com/photos/artek_1.jpg)
c) Table Lamp Design – Alvar Aalto
(https://d2mpxrrcad19ou.cloudfront.net/item_images/228309/5611082_fullsize.jpg)

In this period, Aalto involved in several large scaled public projects. Helsinki House of Culture (1958), Jyväskylä University (1957) and Essen Opera Building (1988) can be given as examples. Many projects of this period had the field plans of the building groups. His experience on planning was based on the Sunila Cellulose Factory that he started to design in 1930s. The maturity period of Aalto reflects his original themes and motifs in a more complex way. In his designs in 1950 and afterwards he generally transferred environmental effects into interiors and integrated the exterior and interior spaces with multi façade compositions. He also reflected the nature influences in his designs by using strong and durable natural materials such as red brick, cupper and stone (Figure 4.6) (Giedion, 1967).

Figure 4.6.

a) Helsinki House Of Culture – Alvar Aalto (http://upload.wikimedia.org/wikipedia/commons/d/d0/Aalto_cultural_house.JPG)
b) Main Building of the Jyväskylä University – Alvar Aalto (http://upload.wikimedia.org/wikipedia/commons/b/b2/University_of_Jyv%C3%A4skyl%C3%A4_main_Building.jpg)
c) Essen Opera House – Alvar Aalto (http://upload.wikimedia.org/wikipedia/commons/6/6c/Aalto-Theater_02.jpg)

The elements that shaped and individuate the Scandinavian design were a combination of the distinct cultural traces of the region. The main elements forming these traces were the natural formations, history, culture and economy of these countries. These elements fed the attitude of Aalto like many designers as he established his design approach on nature influences and organic architecture. **He believed that there is a direct connection between the traces of nature and shapes, so he utilized the rules of nature to improve the shapes used in architecture.** In this context, nature-human relationship was always a priority for him. The influences of natural shell-like forms can be observed in the interior design of both Finlandia Hall (1962) and Academica Bookshop Building (1969). The reflection of the same influnces can be observed in the design of his lampshade (1960) (Figure 4.7) (Tokyay, 2004; Cimcoz, 1998).

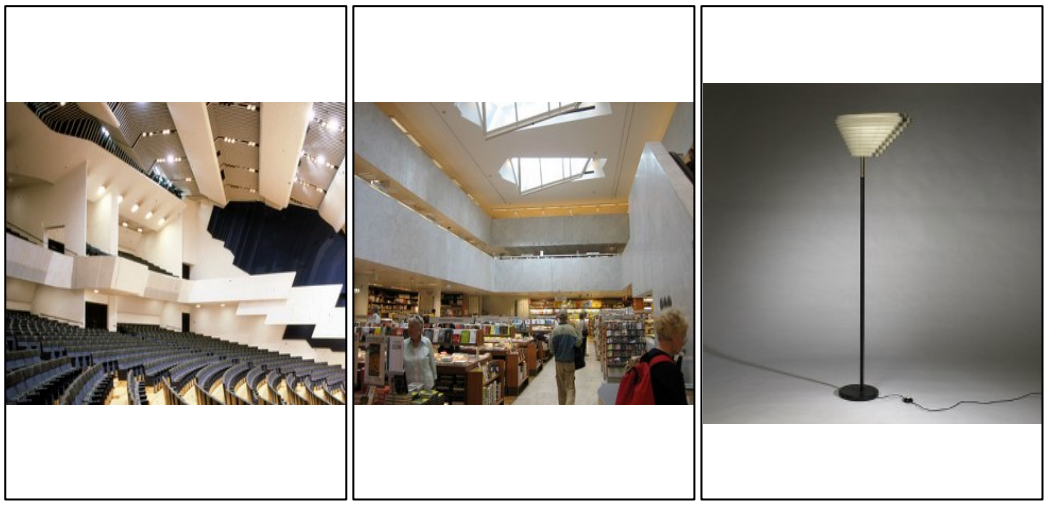


Figure 4.7.

a) Finlandia Hall Interior – Alvar Aalto
(http://3.bp.blogspot.com/_CeEgdbuN09Q/R-fY33Suf1I/AAAAAAAAALw/cB0xLGcoYx4/s800/main%2Bconcert%2Bhall.jpg)
b) Academic Bookshop Interior – Alvar Aalto
(http://www.galinsky.com/buildings/academicbookshop/academicbookshop2.jpg)
c) Standart Lamp Design – Alvar Aalto
(http://image.architonic.com/imgObj/wright0604sat/497_sq.jpg)

4.3. ANALYSES OF ALVAR AALTO DESIGNS WITH RESPECT TO THEIR PERCEPTUAL AND CONCEPTUAL ASPECTS

In this section, the designs of Alvar Aalto are given from a larger scale to a smaller scale, from the whole to the detail. In this context, the examples are examined with respect to their perceptual and conceptual aspects.

4.3.1 Analyses of Building Design: Paimio Sanitarium

One of the most important structural design examples of Alvar Aalto is the Paimip Sanitarium built in the beginning of 1930s in the southwest region of Finland. Aalto's Paimio Sanitarium was selected from 13 hospital projects designed for tuberculosis patients in 1929 for a hospital design contest. This building was designed with influences from nature for the requirements of

tuberculosis patients and considered to be one of the most successful structures of the times by the influential critics of the era (Figure 4.8) (De Swaan et al., 2006).

Figure 4.8.

a) Paimio Sanatorium A & B Wings And Entrance – Alvar Aalto
(http://www.flickr.com/photos/leonl/5687583895/sizes/m/in/photostream/)
b) Paimio Sanatoirum A Wing – Alvar Aalto
(http://3.bp.blogspot.com/NLspCBxFtIE/UClDtfKlFdI/AAAAAAAANxY/KqyNOKw2yt4/s1600/10.jpg)
c) Paimio Sanatorium A Wing – Alvar Aalto
(http://mimoa.eu/images/2872_l.jpg)

The hospital was designed as a center for the treatment and rehabilitation of 296 tuberculosis patients. Aalto quoted that the structure was considered as a medical tool. The building is designed as a combination of several distinct spaces like patient rooms, galleries, resting spaces, common and service spaces. The combined spaces were integrated in a circulation space according to their functions and a model structure was built for tuberculosis patients (Fleig, 1994).

4.3.1.1 Analyses With Respect to Perceptual Dimension

Aalto designed the Paimio Sanitarium considering the psychological and physical needs of tuberculosis patient. In this context, he planned the building to be in interaction with the outdoor environment to enable the patients to utilize the

open air and day light that they require during their long term treatment. For this reason he designed large terraces having forest view for the daily routines of the patients. In the garden there are walking areas and water elements to promote the patients to have a walk. To utilize the natural light effectively, balconies were used at the end of every floor (Figure 4.9) (Anderson, 2010).

Figure 4.9.

a) Paimio Sanatorium Roof Terrace – Alvar Aalto
(http://www.checkonsite.com/wp-content/gallery/paimio-sanatorium/paimio-balcony.gif)
b) Paimio Sanatoirum Walk Ways And Fountains – Alvar Aalto
(http://mw2.google.com/mw-panoramio/photos/medium/54634371.jpg)
c) Paimio Sanatorium Balcony – Alvar Aalto
(http://3.bp.blogspot.com/_Fy33tJ8YbCQ/TNMwZqrb5NI/AAAAAAAAAmc/H7-F08J686s/s1600/Paimio+5.jpg)

Every room were designed for two patients. For Aalto the primary condition for the recovery of a patient is a peaceful environment. For this reason the rooms were designed to be as comfortable and silent as possible. Every patient had his own sink and the sinks were designed to be inclined for minimizing the sound of water and spatter. All rooms were located to have morning light. In addition the illumination was provided indirectly from the bedhead to minimize the flare (Fleig, 1994).

To have a relaxing effect the color of the walls were preferred to be light and dark colors were used on the ceiling. The rooms were well insulated for sound. The closets were wall mounted to ease the cleaning process, windows were

well-insulated against air flow and the door knobs were designed ergonomically to be held comfortably. Similarly the seats were designed according to the requirements of the patients (Figure 4.10) (Ehrström et. al., 2005).

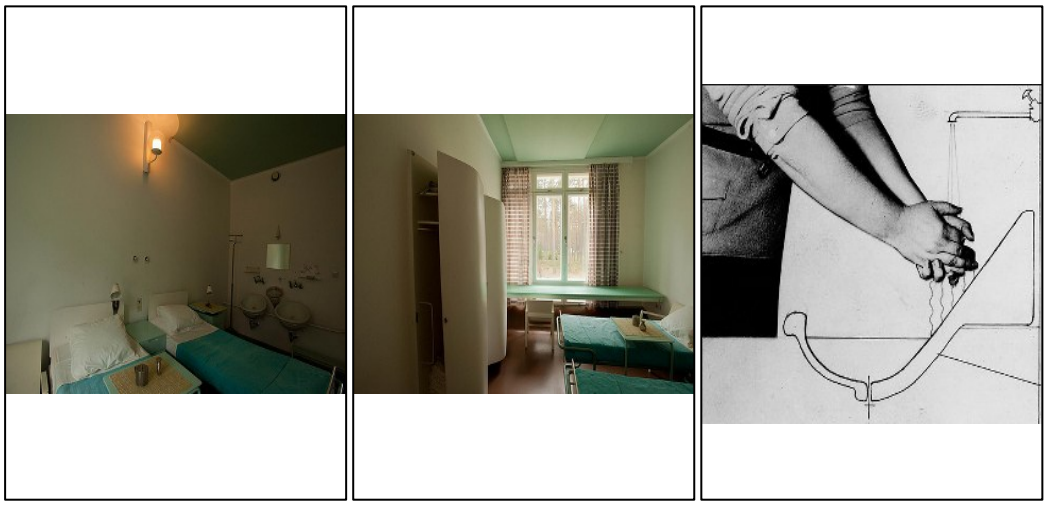


Figure 4.10.

a) Paimio Sanatorium Patient Room – Alvar Aalto (http://www.flickr.com/photos/leonl/5688141222/sizes/m/in/photostream/)
b) Paimio Sanatoirum Patient Room – Alvar Aalto (http://www.flickr.com/photos/leonl/5687572121/sizes/m/in/photostream/)
c) Paimio Sanatorium Patient Sink – Alvar Aalto (http://www.alvaraalto.fi/net/paimio/paimio.html)

Common spaces such as the restrooms and cafeterias were located in different areas to offer different choices for the patients. While some areas were getting direct sunlight throughout the day, some areas were able to stay under shade. There were large windows in the main stairwell and these windows were bringing the forest view to the interior. By his choice of colors in the common spaces, Aalto tried to create a comfortable and humanistic atmosphere. By the intermittent use of powerful colors in the corridors and stairs the effect of daylight were tried to be created (Figure 4.11) (Ehrström et. al., 2005, De Swaan et. al., 2006).

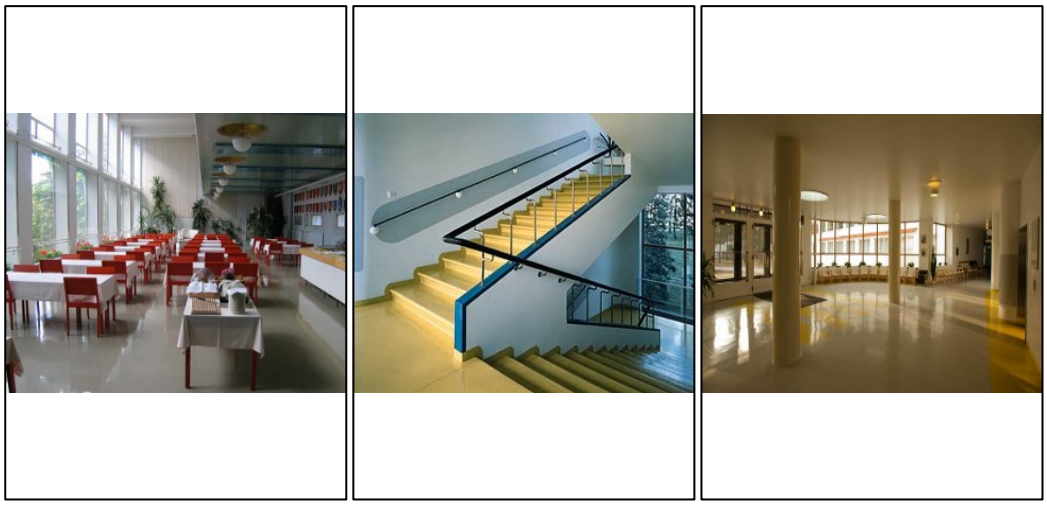


Figure 4.11.

a) Paimio Sanatorium Dinnig Room – Alvar Aalto
(http://www.johnburkhardt.com/ek/pics/Aalto_sanatorium_2.jpg)
b) Paimio Sanatoirum Stairway – Alvar Aalto
(http://www.moma.org/interactives/exhibitions/1998/aalto/timeline/images/paimio_sanat_stair.jpg)
c) Paimio Sanatorium Rest Area – Alvar Aalto
(http://upload.wikimedia.org/wikipedia/commons/1/16/Paimio_Sanatorium_interior.jpg)

The main functions of the hospital were divided into four major sections. Every major section were formed and located based on its function. For better utilization of sunlight the section-A of the building housing the balconies were positioned against south and formed the most important unit of the structure. Section-Awere composed of common areas including treatment rooms, cafeteria, library and resting rooms. The laundry, kitchen and the accommodation rooms for the personnel were located in the section-C. The boiler room and the heating facilities were situated in the section-D. The circulation center in the main entrance, the corridor between the sections A and B and the stairs connecting them were merged together to provide a passageway to the other sections (Figure 4.12) (Benevolo, 1977; Anderson, 2010).

Figure 4.12.

a) Paimio Sanatorium Plan – AlvarAalto (http://1.bp.blogspot.com/_QFPH1MxKGbc/ShCGkWMphkI/AAAAAAAAAA8/VX6psHISfwo/s320/Paimo_Main_Plan.jpg)
b) Paimio Sanatoirum Entrance – Alvar Aalto (http://farm3.staticflickr.com/2625/3714216361_57f97f51bf_z.jpg)
c) Paimio Sanatorium Chimney – Alvar Aalto (http://aedesign.files.wordpress.com/2010/08/02.jpg)

The building was completely built by using concrete. The terrace found in all six floors were formed with asymmetrical forms by using concrete frames and covered with glass. Also, Aalto used the fluid plastic forms for the first time at the roof terrace of the sanitarium. The natural form of the pentice located at the entrance of the Paimio Sanitarium inspires a fluid and dynamic effect. This natural effect were used in the sun terraces in section-A and in the form of the chimney of the boiler room. Thus, the asymmetrical forms used throughout the building bring up a harmonic form to the building (Fleig, 1994).

The common areas in section-B carries opens to the exterior landscape via the large windows which carry the nature to the interior. From the exterior the windows have a plain and functional view. These windows rising slightly from the surface prevent the perception of the loadbearing elements. Yet the loadbearing elements were exposed asymmetrically in the east side for aesthetical purposes (Fleig, 1994; Connah, 2006).

The functionalism of the structure, use of metal elements on the façades and in interior detail, elevator shaft surrounded by glass walls reflect the technological elements of the era. Although the modernist approach of Aalto hosts

the technological elements of the era, he almost always gave the human element the highest priority (Connah, 2006).

4.3.1.2 Analyses With Respect to Conceptual Dimension

Aalto, designed Paimio Sanitarium by combining Finnish romanticism with the modern design approach. In this context, he used modern materials in combination with traditional materials. The sanitarium is located in the southwest region of Finland inside a forest area composed of pine trees. It was constructed in a sandy, dry location surrounded by trees suitable for tuberculosis patients. It is also located in a remote area isolated from the city as it is required by its function. Thus, the hospital resides in an atmosphere that is governed by calmness, beauty and quietness of nature (Ehrström, et. al., 2005).

Aalto designed the hospital considering the topography of the area and connected the exterior and interior spaces by the use of several circulation areas and thus making the transition from the exterior spaces to the interior natural. At the same time, he tried to make a psychological connection with the nature by the sights of interior and exterior walls of the building designed with the use of sculpture-like, fluid and organic forms. The connection between the hospital and nature were realized with the use of large windows opening from interior spaces to the exterior. The position and the direction of the building was planned to transfer the natural light and its psychological effects to the interior spaces (Figure 4.13) (Anderson, 2010).

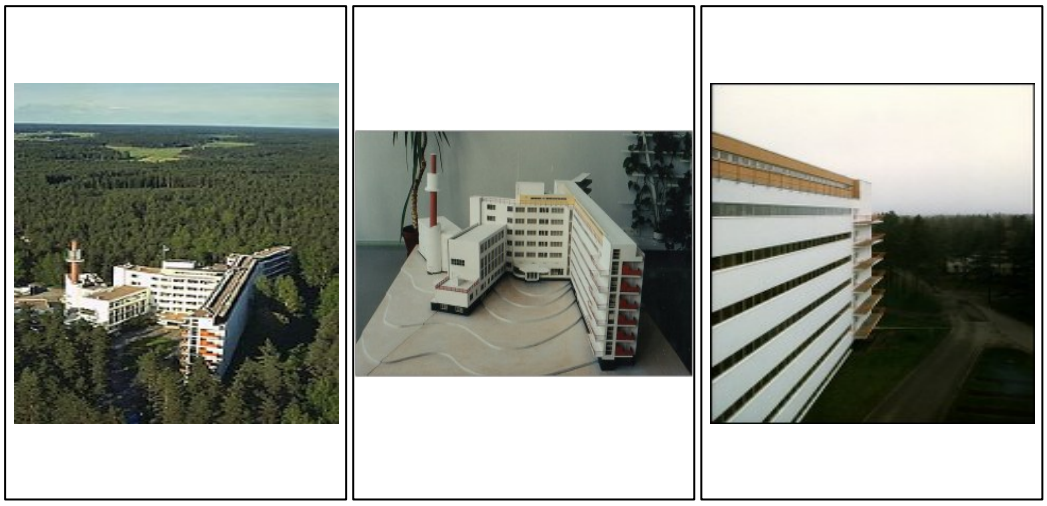


Figure 4.13.

a) Paimio Sanatorium – Alvar Aalto (http://4.bp.blogspot.com/-T6hSrtaaQVA/UClDt20sUCI/AAAAAAAANxc/ruPygh9QSdI/s1600/4.jpg)
b) Paimio Sanatoirum Scale Model – Alvar Aalto (http://www.cmaj.ca/content/182/11/E535/F5.large.jpg)
c) Paimio Sanatorium Windows And Forest View – Alvar Aalto (http://www.flickr.com/photos/schroeer-heiermann/4187542464/sizes/m/in/photostream/)

The façades of the building were white colored to contrast with the dark green color of the surrounding forest area. In addition the open and closed spaces of the structure were integrated with the forest area and forms a compositional integrity. The structure is observed to be a part of the green texture of the nature and the view of pine trees constitutes the dominant texture of the landscape (Weston, 2003).

Aalto also designed water channels in harmony with nature and curved pathways that reach the fountains for patients to have a walk in the garden of the south facing section-A. These curved pathways and water elements construct an original composition and forms a visual and spatial perception with the balconies of the patients and exterior spaces. These indispensable elements are essential rehabilitations of the patients (Bunning, 1940).

4.3.2 Analyses of Interior Design: Villa Mairea

Alvar Aalto designed one of the most important structures of him, Villa Mairea, in 1937 as a seaside house for the wealthy couple Harry and Maire Gullichen in therural of Noormarkku. Aalto designed the house with an experimental approach in regards to the Gullichens' request. By way of this, he had the opportunity to realize his ideas and themes that he could not materialize before (Figure 4.14) (Jetsonnen and Jetsonnen, 2011).

Figure 4.14.

a) Villa Mairea – Alvar Aalto
(http://www.flickr.com/photos/27655859@N06/3538448310/sizes/m/in/photostream/)
b) Villa Mairea – Alvar Aalto
(http://www.public.iastate.edu/~pnandi/pics/3538481128_0d0a02b881.jpg)
c) Villa Mairea – Alvar Aalto
(http://upload.wikimedia.org/wikipedia/commons/thumb/e/e7/Villa_Mairea.jpg/400px-Villa_Mairea.jpg)

Several clues of Aalto's interest in Japanese architecture, sustainable architecture, plainness, nature and the use of natural materials can be observed in the experimental approaches during the design of this house. Also, he was seriously influenced by the Fallingwater House and the design approach of Frank Lloyd Wright. In this context, Villa Mairea was born as a result of these influences and considered to be one of the most important structures of the 20th century (Weston, 2002).

4.3.2.1 Analyses With Respect to Perceptual Dimension

Villa Mairea was designed as an L-shaped structure which was previously tried by Aalto. As a natural result of this plan one side of the structure was located to provide this part of the house privacy. At the same time, the privacy provided by the form separates the house from the public space. By this way, the grass areas and pool element was located in the private part of the structure (Figure 4.15) (Weston, 2002).

Figure 4.15.

a) Villa Mairea Garden View – Alvar Aalto
(http://www.kubodo.com/wp-content/uploads/2011/11/Villa-Mairea-by-Alvar-Aalto-10.jpg)
b) Villa Mairea Garden View – Alvar Aalto
(http://farm4.static.flickr.com/3123/2655595936_8815cb5e10.jpg)
c) Villa Mairea GArden View – Alvar Aalto
(http://www.kubodo.com/wp-content/uploads/2011/11/Villa-Mairea-by-Alvar-Aalto-15.jpg)

The entrance of the house opens to a small hall. A transition to an open corridor is performed by the guidance of a curved wall at the end of the hall and is located four steps below the main elevation. The free timber columns on the continuation of the axis where the dining table was placed separates the spaces and defines the living room and the dining room spatially. Another curvy wall located in the lower elevation is positioned diagonally against the organic formed fireplace to create a natural perceptional focus. Thus, the living room is

emphasized and an inviting effect is created. A similar diagonal effect is created between the study room, library and the winter garden. These spaces separated by stairs hidden by asymmetrical timber columns create a perception of integrity (Figure 4.16) (Weston, 2002; Ford, 1996).

Figure 4.16.

a) Villa Mairea Plan – Alvar Aalto (http://2.bp.blogspot.com/n4liK6Bgf9w/TYh8vCObetI/AAAAAAAAAac/OGGYznJ4Cxk/s1600/Aalto_Villa_Mairea%2BGround%2BFloor.jpg)
b) Villa Mairea Entrance – Alvar Aalto (http://blog.ounodesign.com/2009/06/20/aaltos-villa-mairea-in-finland/)
c) Villa Mairea Living Room View – Alvar Aalto (http://blog.ounodesign.com/2009/06/20/aaltos-villa-mairea-in-finland/)

The open planned living room is positioned structurally on a linear grid system and in line with positions of the rooms upstairs. Aalto used this grid system in several directions. In this context the circular steel columns were positioned randomly and a visual uniformity and texture with timber and concrete columns were obtained. The dining room consists of three square parts. Two of them is for dining and entertainment and other one is reserved for service and kitchen spaces. In addition by the help of the large windows, openings, timber columns and well-thought axes, the other spaces of the room are perceived as a whole, and the forest view can also be appreciated within this integrity (Figure 4.17) (Jetsonnen and Jetsonnen, 2011).

Figure 4.17.

a) Villa Mairea Dining Room – Alvar Aalto
(http://4.bp.blogspot.com/uyXCPa3X74s/TYs_Qs_IHrI/AAAAAAAAAd4/K5hH7jV39vc/s1600/3.JPG)
b) Villa Mairea Library And Study Room– Alvar Aalto
(http://blog.ounodesign.com/2009/06/20/aaltos-villa-mairea-in-finland/)
c) Villa Mairea Living Room View – Alvar Aalto
(http://www.mid-century-home.com/wp-content/uploads/2011/03/ph-flygel_alvar-aalto_2-546x404.jpg)

The roof the dining room is designed as a flat roof and utilized as a terrace and combined with the irregular roof of the sauna. On the floor of the terrace which is reached by the stone stairs, timber decks were used and was decorated with the stone texture of the fireplace. Upper floor is designed as the section having the bedrooms. Master bedroom, its bathroom and fireplace are located over the exact location of the fireplace in the ground floor. In addition, there are rooms for children and a playroom to which these rooms open. Guestrooms are located against main door and directed to the garden and the forest view with large windows (Jetsonnen And Jetsonnen, 2011; Ford, 1996).

The concept of natural light and forest space developed together for Aalto. Aalto searching the origins of architecture in nature, realized the forest space concept in its most mature form in Villa Mairea. In addition to the impressions of the static presentation of the natural views of Frank Lloyd's Fallingwater house, the effort to create a nature symbol obtained by the perception of the growing and developing processes in nature played an important role during the design of this villa (Tokyay, 2004).

With the elements such as the internal shell produced by the transformation of the deaf and transparent areas, interior-exterior continuity, the journey of light across the different parts of the space and with use of the tree metaphor the structure had become one of the best designs of Aalto reflecting the main ideas of him about the forest space and organic architecture. Even the windows dashing form the walls emphasize the approach to the house from the forest. Also he was observed to use cubist approaches during the design of skylights or windows which defines the interior of the house (Figure 4.18) (Tokyay, 2004; Weston, 2002).

Figure 4.18.

a) Villa Mairea Window Detail – Alvar Aalto
(http://www.placeluxury.com/villa-mairea-by-alvar-aalto-in-finland/villa-mairea-by-alvar-aalto-2)
b) Villa Mairea Fire Place Detail – Alvar Aalto
(http://upload.wikimedia.org/wikipedia/commons/2/20/Alvar_Aalto,_Villa_Mairea_08.jpg)
c) Villa Mairea Entrance Detail – Alvar Aalto
(http://www.scandinaviandesign.com/arkitekturmuseet/0802/400/84-004-005.jpg)

Aalto distinguished exterior walls, interior walls, columns and roof-ceiling shells with different textures and materials. In his curvilinear exterior shells of some his structures he used the traditional brick and in some of them he preferred to use white marble. For Villa Mairea he used timber extensively. In the interiors he used white walls spreading-filtering natural light and straight or curvilinear timber ceilings (Tokyay, 2004).

He tried to connect the scale of the structure with human scale, Aalto utilized natural and traditional materials and to express the symbolic relationships of the outer shell with nature (mountains, forest etc.). He used white texture in this example and to emphasize the forest space impressions he used timber as the loadbearing and decorative element. In this context although the system-architecture integrity was at the highest level in this structure, Aalto used a series of elements (usually timber) as a metaphoric and symbolic expression of his architectural philosophy. The timber elements that he used in the interior of the building are a reflection of this approach (Ford, 1996; Tokyay, 2004).

4.3.2.2 Analyses With Respect to Conceptual Dimension

The most important element of organic architecture in Scandinavia is the natural light. This approach with its influence sources of nature, forests and the distribution of light among seasons lead to the formation of the Nordic Light concept. Nordic light is an impression perceived by the observation of the light through clouds and leaves of trees. A homogeneous, lively and undisturbing illumination is obtained by transferring the Nordic lights directly to the interiors (Figure 4.19) (Tokyay, 2004).

Figure 4.19.

a) Villa Mairea Entrance – Alvar Aalto
(http://farm2.static.flickr.com/1354/982159106_b3b83e5fd8.jpg)
b) Villa Mairea Stairway – Alvar Aalto
(http://www.arch.mcgill.ca/prof/mellin/arch671/winter2003/studentwork/Rosaeg/web/photos/photo_06.jpg)
c) Villa Mairea Stairway – Alvar Aalto
(http://ad009cdnb.archdaily.net/wp-content/uploads/2010/10/1288246150-untitled-2-892x1000.jpg)

Aalto presented his forest space concept with its most mature form in Villa Mairea. By the examination of the Scandinavian nature he suggested that the internal nature of the architecture follows the fluctuations and developments of the organic life. The effect of tripping in the forest was tried to be achieved when walking around the different parts of Villa Mairea. These impressions were reinforced by the powerful effects produced by the extensive use of traditional and natural materials such as stone, timber and brick (Tokyay, 2004; Weston, 2004).

Aalto diverted from statements such as modern architecture and international architecture and tried to bring the real richness to the modern architecture once again by his design of this house reflecting his nature influenced design philosophy (Tokyay, 2004; Jetsonnen and Jetsonnen, 2011).

4.3.3 Analyses of Furniture Design: Paimio Chair

Aalto being a versatile designer, did not only designed buildings, but he also brought out furniture and industrial design works. As a result of his experimentation with timber in 1930s, he designed the Paimio Chair in 1931 for Paimio Sanitarium (Armchair 41). In the design of this chair influences of the Wasilly Chair by Marcel Breuer (1925) can be observed. However Aalto's design has more humanistic, natural and organic forms (Dachs and Hintze, 2007).

4.3.3.1 Analyses With Respect to Perceptual Dimension

Aalto, designed this chair for the Paimio Sanitairum giving the hygiene and comfort a priority. The back of the chair were constructed from plywood at an angle to provide best breathing position for the tuberculosis patients. The skeleton of the chair were composed of a portion made of plywood bended form the upper and lower parts, armlets and loadbearing parts (Figure 4.20) (Dachs and Hintze, 2007; Anderson, 2010).

Figure 4.20.

a) Paimio Chair – Alvar Aalto (http://cache.wists.com/thumbnails/5/0d/50d47e03f9c6a175c01856c7eb739ffe-orig)
b) Wasilly Chair – Marcel Breuer (http://www.uvhaze.com/storage/wassilychair.gif?__SQUARESPACE_CACHEVERSION=1290133475038)
c) Paimio Chair Section – Alvar Aalto (http://designmuseum.org/media/item/4213/-1/33_5.jpg)

Aalto used birch wood in addition to plywood to create a natural effect on the user. Also he emphasized his design philosophy based on organic design by the use of natural and organic forms for the design of this chair (Dachs and Hintze, 2007).

4.3.3.2 Analyses With Respect to Conceptual Dimension

Aalto like the other designers adopting organic architecture used the laws of nature to improve his design forms. During the design of Paimio Chair he examined the biological structure of the tree instead of its nostalgic aspects and reflected his philosophy by protecting the integrity between nature-human and architecture-design. At the same time by using hush, the traditional material of Finland, in a modern sense he combined the old and new, the traditional and modern (Tokyay, 2004).

4.3.4 Analyses of Industrial Design: Alvar Aalto Tea Trolley

Alvar Aalto's Tea Trolley designed in 1937 for the Paris World Fair was his most well-known industrial design example. This service car designed by him for the Artek Company that he established was also used in the living room of Villa Mairea. Also in this design the influences of the Tea Cart (1928) by Marcel Breuer can be observed. However the design of Aalto is more humanistic, natural and governed by organic forms (Dachs and Hintze, 2007).

4.3.4.1 Analyses With Respect to Perceptual Dimension

Aalto designed Tea Trolley suitable for home use. He created the principle idea for this design with inspirations from the service car used in Paimio Sanitarium (1933). The skeleton of the car was produced by a frame made from birchwood. The wheels were made from plywood, the top surface was thought to be white laminate, ceramic or black linoleum (Figure 4.21) (Dachs and Hintze, 2007).

Figure 4.21.

a) Tea Trolley – Alvar Aalto
(http://ep.yimg.com/ca/I/yhst-51380637824827_2227_68073090)
b) Tea Trolley – Marcel Breuer
(http://www.posterlux.ru/new/1/big/marcel_breuer/posterlux-marcel_breuer-tea_cart.jpg)
c) Tea Trolley – Alvar Aalto
(http://minimalissimo.com/2011/02/tea-trolley-901/)

4.3.4.2 Analyses With Respect to Conceptual Dimension

In this design Aalto once again emphasized the use of traditional materials and utilized timber. He was observed to reflect the elements and material approach that shapes his architectural on this industrial design work (Dachs and Hintze, 2007).

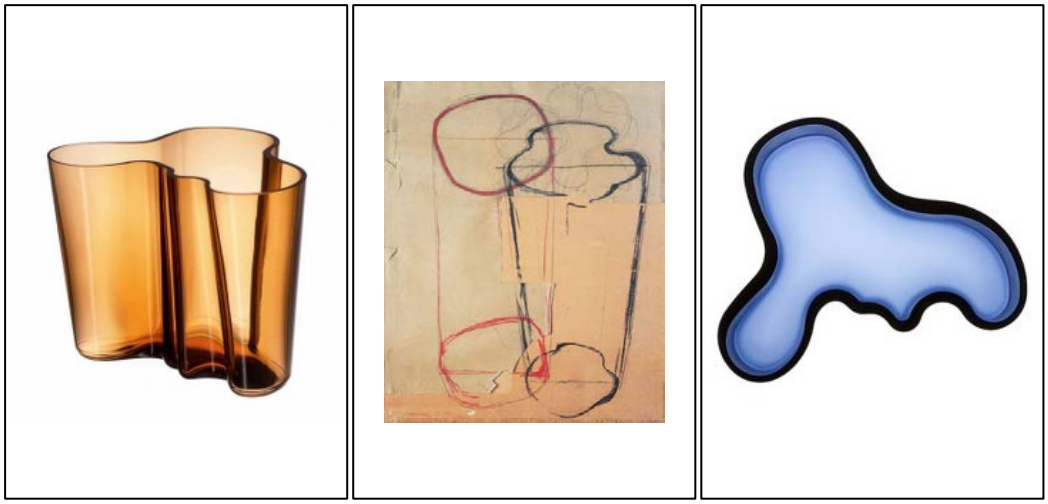
4.3.5 Analyses of Object Design: Aalto Vase

The glass vase known as the Aalto Vase or the Savoy Vase designed by Alvar Aalto and his wife Aino Marsio in 1936 is one of the most iconic Finish design. This vase was first designed for a contest of Karhula-Littala glassware factory in 1936. Also it was exclusively produced for the luxury Savoy Restaurant opened in 1937. It gained popularity during the Paris World Fair in France and

considered to be the most popular glass product of the 20th century (Dachs and Hintze, 2007).

4.3.5.1 Analyses With Respect to Perceptual Dimension

Aalto combined the straight forms of the modern movement with nature figures. The vase has an organic and fluid form with a length of 140 mm (Figure 4.22) (Dachs and Hintze, 2007).



Figurel 4.22.

a) Aalto Vase – Alvar Aalto
(http://img254.imageshack.us/img254/8052/74696e5fd4bbz5.jpg)
b) Original Sketches Of Aalto Vase – Alvar Aalto
(http://www.treadwaygallery.com/ONLINECATALOGS/March2004/modWEB/0874.jpg)
c) Aalto Vase – Alvar Aalto
(http://rebeccalibermann.files.wordpress.com/2010/02/aalto-300.jpg)

4.3.5.2 Analyses With Respect to Conceptual Dimension

There are two different opinions with regard to the inspirational source of Aalto's Savoy vase. The first one is the form of the dresses of Sami women. The

second one is the Fin Lake. Whatever the source of inspiration is, the undeniable fact is that the beauty of the Savoy vase is undisputable (Dachs and Hintze, 2007)

CHAPTER 5

5.1 CONCLUSION

This thesis study covers the era of Modernism in which the design awareness is formed conceptually and internationally and based on a certain basis for the first time. In this sense, the modern period, of which the designs were influenced by the nature, were examined through the investigation of the designs of Alvar Aalto who is chosen as a designer representing the Scandinavian designers of the Modern Era. To better clarify the subject, concept of design, the factors affecting the design concept, visual perception and Gestalt Principles of Perception were examined in details. These concepts and phenomenons are important to understand how the designer is influenced by nature and reflects the effect of nature his or her designs.

Since ancient times, mankind had been in an effort to keep up with the order and environment in which he lives in. By using his intellect, he has been solving the problems and difficulties he encountered during this process. Since the source of the ability to solve problems is based on the concept of creativeness, this context makes human a creative entity. In an individual or social sense, creativity is the ability to imagine and realize a concept. Humans are observed to feed the inspirations that result creativity from nature. From this point of view, creativity doesn’t mean creating something from nothing; it is the process of innovation of new products with the available processes and resources by combining them with new ideas. As a result, the designer identity of the creative human being these factors in a common point.

The concept of design emerges at the intersection point of creativity and human. In its simplest form, the design is the utilization of the human ability. In a more holistic sense, it is the total of ideas and concepts to fulfill the required functions to meet the needs. The identification the characteristics and qualities of the concepts are based on some principle conceptual and theoretical elements.

As a result of these elements, the concept of design can be considered as the point where an abstract concept transforms into perceptual expressions. The perception is the synthesis of the stimuli perceived by the sensory organs considering the expectations, past experiences and social influences. In this context, perception develops with the effects of principle conceptual and perceptual factors. The effect of these factors on the designers takes form with the direct and indirect influences of the nature in which the human exist.

According to the Gestalt Theory of Perception, the element that attributes a meaning to the whole is not the parts that constitute it, but the way how the pieces come together and their interaction with each other. Thus, the designer is the person who arranges the pieces of nature in a coherent way and creates meaningful connections between the pieces that make up the whole. In addition, the elements such as complexity and the contradiction are observed to be created by the designer with principles such as invariance of the perception, illusions and perceptual organizations.

When considered with a holistic approach, the designers feeding with inspiration from nature are observed to be in an effort to realize their imaginations by forming them based on the perceptual and conceptual factors that affect their design. Till modern times, designers are observed to create their designs as a result of these approaches and factors consciously or unconsciously. The developments starting with the industrial revolution in 19th century and Modernism era afterwards can be considered as a milestone in the world of architecture and design. As a result of the developing technologies, the emergence of new materials and artistic searches, the designers freed themselves from the restrictions of the past.

Until Modern Era, there observed to be many examples inspired by nature. Since the industrial revolution and the following technological developments, the observations of nature diversified into different branches. As a result of this diversity, the development of design concept carried the concept of influence of nature to new dimensions not only in the sense of form but also as the interpretation of color, texture, mass, façade and patterns.

Until the first half of 20th century, the inspiration and influences of nature were observed to be reflected on designs as the exemplifying of form alone as a result of formal concerns and analogical approaches. Later, in an effort to include the process of formation of a form or structure into the design form based on experimental data was observed. Especially, the new form and structure searches of Buckminster Fuller and Frei Otto are considered to be the starting point of the era of conscious learning from nature in the architectural design.

This study especially in Scandinavian countries, the factors that shape their architecture and design approach are observed to be originated from the prevailing elements in the region. The main factors affecting their design forms and intentions are observed to be elements such as the sea, water, forests, islands, icebergs and natural light. The interaction and relationship between the human and environment can be considered as the most influential factor affecting the perceptual and conceptual factors that shape the design approach. From this point of view, it can be stated that parallel to the Modernism Era, like the past Scandinavian cultures, Art Nouveau and National Romanticism before Modernism the most important inspiration source for the Scandinavian design approach is observed to be the nature.

This thesis study, it is stated that Scandinavian designers, that based their design approach on the foundations of nature influence, reflected an organic architecture approach on their designs emphasizing expressionist and naturalist attitudes beginning form 20th century. This approach was created with the examination of the forms and laws of the nature and imposing and practicing the curvilinear forms and planes in modern architecture. Additionally, during this research the designers are observed to provide the clues, inspirations and metaphors about subjects such mass and space organization, use of natural light, materials for interior and exterior shells, color and texture. The solid reflections of this approach are encountered from furniture designs to industrial object designs and building designs.

In the modernism era the designers were observed to base their designs on principle concerns of the era such as plainness, aesthetics, rationalism and functionalism. The main distinctions of Scandinavian designers were their efforts

for reflecting and emphasizing the human and nature aspects in their design aspects. Instead of designs disconnected from nature, they created designs under the concept of organic architectural approach in harmony with nature protecting the integrity of the natural environment.

In this context of the research, Alvar Aalto, who has based his design philosophy on the foundations of organic architecture, internalized the inspiration sources of humans and nature and used these to improve the forms of architecture. The curvilinear forms and planes of nature were not only used as expressions in the designs of his buildings, but also reflected on interior, furniture and industrial object designs. He formed his design approach as a result of the dialectic characteristics of the nature-human and architecture-design relationship based on nature and biological structure of humans. Thus he became a pioneer for other designers who based their design approach on anti-Euclid geometry in the architecture of 21st century.

At the same time, he formed a holistic design approach from industrial design to furniture and building design by combining material, form and structure and his expressionism during the 20th century. Thus, he did not only used inspirations from nature and humans, but also internalized these elements and influences and observed to be in an effort to create designs that are in harmony with nature and humans. Moreover, Alvar Aalto diverted from the classical definitions of the Modernism in all of his designs and tried to bring back the real sources and richness to the modern approach.

As a result of this thesis, the greatest contribution of Alvar Aalto -as one of the most important architects of the 20th century- to the world of architecture and design is the result of his efforts to soften and humanize the strict architectural elements of the Bauhaus and international style and derivatives during the Modernism era by combining them with nature. He stated his design philosophy as: “It is the task of the architect to give life a gentler structure”.

5.2 FURTHER RESEARCH

In order to broaden the research horizon, following interesting concepts can be further investigated. The comparison of the modernist designers in Europe with the Scandinavian designers of the modernism era would be useful to understand the influences of Scandinavian designers on European designers. The effect of nature can be evaluated with respect to different periods. In addition, the influence of the design approach of Alvar Aalto on contemporary Scandinavian designers can be investigated.

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