

A VISUAL ANALYSIS OF LIBESKINDS ARCHITECTURE: DESCRIPTION OF
SELECTED BUILT WORKS

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ABSTRACT

A VISUAL ANALYSIS OF LIBESKINDS ARCHITECTURE: DESCRIPTION OF SELECTED BUILT WORKS

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This thesis is a visual analysis of Libeskind's works, addressing formal elements as well as historical context and interpretations of meaning. In a speech about his architecture, Libeskind claims that in his designs he is inspired from concepts which he calls "17 Words of Architectural Inspiration". He also claims that he is inspired from the roots of the cultures and uses different forms to symbolize different concepts in his buildings. Yet, he has been criticized due to the formal clichés he uses in his architecture. The aim of this study is to comprehend how Libeskind uses forms and their compositions to convey a specific meaning or symbolize a specific concept. To reach this aim, thirteen selected buildings of Libeskind are first studied individually through their planimetric and volumetric compositions, openings, additive and subtractive volumes. The selected buildings are then categorized according to formal similarities in their formation process, openings, additions, subtractions and types of extensions. This categorization was done to understand if similar forms also have similar meanings and concepts or not. The study confirms that the seventeen words he mentioned are implied in his buildings. Regarding forms and the meanings they convey, although in some cases similar forms have similar meanings, there are also cases where this does not hold true.

Keywords: Libeskind, Plan Analysis, Volumetric Compositions, Extensions,
Openings, Additions, Subtractions, Symbols

ÖZ

LIBESKİND MİMARİSİNİN GÖRSEL ANALİZİ: GERÇEKLEŞMİŞ YAPILARINDAN BİR SEÇKİNİN BETİMLENMESİ

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Bu tez Libeskind'in yapılarında biçimsel elemanlar, tarihi bağlam ve anlam yorumlarına yönelik görsel bir analizdir. Bir konuşmasında Libeskind, tasarımlarında “17 mimari ilham kelimesi” olarak adlandırdığı kavramlardan ilham aldığını söylemektedir. Bir binayı tasarlarken kültürlerin köklerinden ilham aldığını ve farklı formları farklı konseptleri sembolize etmek için kullandığını da iddia etmiştir. Ancak kendisi, mimarisinde biçimsel klişeler kullandığını için bir çok kez eleştirilmiştir. Bu tezin amacı, Libeskind'in formları ve onların bileşimlerini, belli anlamlar aktarmak ve kavramları sembolize etmek için kullanıp kullanmadığını anlamaktır. Bu amaca ulaşmak için Libeskind'in on üç binası seçilmiş ve ilk olarak herbirinin hacim ve plan kompozisyonları, açıklıkları, eklenmiş ve eksiltmiş hacimleri analiz edilmiştir. Daha sonra, oluşum süreçlerinin, eklemelerin, eksiltmelerin ve ek olarak tasarlanmış binaların biçimsel benzerliklerine göre sınıflandırılmıştır. Bu sınıflama, benzer formların benzer kavramlara ve anlamlara sahip olup olmadıklarını anlamak için yapılmıştır. Çalışmanın sonunda, bahsedilen on yedi kelimenin binalarda uygulandığı görülmektedir. Ancak, formlar ve onların ilettiği anlamlar hakkında, bazı örneklerde benzer formların benzer anlamları olsa da, bu tüm benzer formlar için geçerli değildir.

Anahtar Kelimeler: Libeskind, Plan Analizi, Hacimsel Kompozisyonlar, Ekler, Eksiltmeler, Semboller

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CHAPTER 1

INTRODUCTION

1.1. Aims and Objectives

Daniel Libeskind is a contemporary architect who has designed sculptures and buildings all over the world. He is mostly known by Jewish Museum Berlin.

His buildings have been praised and also criticized due to their forms. He has been praised because of his brave performance in his first residential project (Glancey, 2003) and breaking norms of traditions (Idzerda, 2012) in some of his buildings.

On the other hand, he is criticized for having a cliché of pointy edges (Curtis, 2011) and slanted walls, aggressive designs and putting money before architecture (Winston, 2014). Lord Rees-Mogg writes these words about the V&A design by Libeskind in The Times: "It was an assault, he wrote, on five centuries of humanism, a deconstructionist aesthetic of aggression, an attack on culture (Mackenzie, 2002)". Glancey writes these words about Libeskind's second building in England: "Set in a hard landscape, this harshly metallic museum blossoms like some savage fortification or expressionist engine of war. Composed of what Libeskind describes as three "interlocking shards," the great aluminum-clad, steel-framed building is as polite as a Grand Slam bomb (Glancey 2002)." Micheal Kimmelman states that architecture of Berlin Jewish Museum, trivializes and overwhelms the history (Kimmelman 2014). Philip Kennicott, an architecture critic, severely criticized Royal Ontario Museum by calling it "both ugly and useless (Brearton 2016)".

Libeskind defines seventeen words of architectural inspirations for his architecture, in a TED Talk in 2009. According to him these seventeen words are applied in all of his buildings. He has also described other inspirational points for each of his buildings in

his website. These inspirational points are individual and differ in every building. The words and inspirational points are studied more extensively in chapter 2 and 3.

Regarding the similar forms he uses in his different buildings and Libeskind's claims about his buildings, this thesis aims to understand whether, despite the general similarities in the formal elements of Libeskind's buildings, he uses specific forms to convey particular meanings or symbolize similar feelings. To reach this aim, visual materials (images of selected buildings, simplified outlines of volumes and plans) are analyzed in this thesis. The fourth chapter studied the selected buildings individually. The fifth chapter examined the formal similarities among the buildings and their meanings.

1.2. Research Questions

Considering the criticism on similar forms in Libeskind's buildings and Libeskind's definition of his architecture, this thesis aims to answer these two main questions:

What are the formal similarities in Libeskind's works? Do similar forms convey similar meanings or not?

To be able to answer this question, first the following sub-questions are also posed:

1. What are the sources of inspiration for each building?
2. Which similar forms can be identified among buildings?
3. Do the similar forms also have the same inspirational points and similar meanings, or not?
4. How does Libeskind use forms to imply specific meanings?

1.3. Scope

Thirteen buildings for this analysis are selected among the architect's forty four completed works. In the process of selection, monuments, pavilions, high rise buildings and building complexes are eliminated. In the case of universities and shopping malls, one building is selected among the ones with the same functions. The other building that is not included is the Jewish Museum Berlin, due to the numerous analyses that have been made on it. The list below includes the selected buildings for this study, given in chronological order:

1. Felix Nussbaum Haus and Extension to Felix Nussbaum Haus (Germany, 1998, 2011)
2. Imperial War Museum (United Kingdom, 2001)
3. Studio Weil (Spain, 2003)
4. London Metropolitan University Graduate Centre (United Kingdom, 2004)
5. Extension to the Denver Art Museum, Frederic C. Hamilton Building (USA, 2006)
6. Royal Ontario Museum (Canada, 2007)
7. Westside Shopping and Leisure Centre (Switzerland, 2008)
8. Contemporary Jewish Museum (USA, 2008)
9. The Villa, Libeskind Signature Series (Germany, 2009)
10. 18.36.54 (USA, 2010)
11. Military History Museum (Germany, 2011)
12. Magnet (Albania, 2004)
13. Vitra (Brazil, 2015)

1.4. Thesis Structure

In the first part of chapter 1, some criticism towards Libeskind's architecture, specifically the formal elements in his architecture are mentioned. Later it was referred to Libeskind's own statements about his architecture. These statements are going to be studied more thoroughly in chapter 2 and 3. It was followed by highlighting the aim of this study and the main research question, which was to understand if Libeskind uses formally similar elements in his architecture, to convey similar meanings or symbolize similar concepts. The sub-questions of the study were also mentioned in chapter 1.2. The following part was about the case studies for the thesis.

The second section provides a literature review of formal analysis of buildings, analysis on Libeskind's architecture and a methodology for the analysis and categorization in this study. In the third chapter, the method and process of visual analysis are defined. In the fourth chapter planimetric and volumetric compositions, also openings, additive and subtractive forms of buildings, meaning and symbols that they are conveying are studied individually. The fifth chapter studies the buildings through some of their common formal points. Analyzing common aspects in different buildings shows if Libeskind uses specific forms in specific situations.

CHAPTER 2

LITERATURE REVIEW

The first part of this section is a review of the literature on the visual analysis of architecture. The second part includes an analysis of Daniel Libeskind's works.

2.1. Literature Review on Visual Analysis of Architecture

This part includes the terminologies and methods of analysis covered in four books, which are:

- *Architecture, Form, Space, and Order* by Francis D. K. Ching (2014)
- *Precedents in Architecture, Analytic Diagrams, Formative Ideas and Partis* (2005) by Roger H. Clark and Michael Pause
- *Analysing Architecture* (2010) by Simon Unwin
- *Design Strategies in Architecture: An Approach to the Analysis of Form* (1989) by Geoffrey H. Baker

Architecture, Form, Space, and Order by Francis D. K. Ching (2014) illustrates the ways, the fundamental elements and principals of architectural design over the course of human history is. According to the author, "the first part of any design process is the recognition of a problematic condition and the decision to find a solution to it. Designers instinctively prefigure solutions to problems they confront with them. If one's understanding of design language is limited, it will affect the issues they confront and suggested solutions (Ching, 2014, p: IX). Ching describes the book in these words:

“This book focuses on enriching a vocabulary of design through the study of its essential elements and principals and the exploration of a wide array of solutions to architectural problems developed over the course of human history (Ching, 2014, p: IX)”.

The book starts analyzing the basic elements in architecture. The chapter titles and a brief explanation of the relevant parts of this study are as follows:

“1. Primary Elements”: This chapter analyzes primary elements of architecture, which are: point, line, plane, and volume. Since a point does not have any dimension, vertical linear elements must project it. Vertical linear elements are used to emphasize points, or they may be a support for the surface above them. Horizontal linear elements or organizations are mostly used to define paths. Repeated parallel lines reinforce our perception of the plane. A line extended in a direction other than its intrinsic direction becomes a plane. A plane serves to define the limits or boundaries of a volume. A plane extended in a direction other than its intrinsic direction becomes a volume.

“2. Form”: According to the author, form often includes a sense of three-dimensional mass or volume. He introduces properties of form as a) Shape: The characteristic outline or surface configuration of a form. B) Size: The physical dimensions of a form. C) Color: a phenomenon of light and visual perception that may be described regarding an individual’s perception of hue, saturation and tonal value. D) Texture: the visual and especially tactile quality given to a surface. Texture also determines the degree to which the surfaces of a form reflect or absorb incident light.

Besides these properties, forms have relational properties that govern the pattern and composition of elements, which are: a) Position: The location of a form relative to its environment or the visual field within which it is seen. B) Orientation: The direction of a form corresponding to the ground plane or the person’s viewpoint. C) Visual Inertia: The degree of concentration and stability of a form. The visual inertia of a form depends on its orientation relative to the ground plane, the pull of gravity and our line of sight.

After studying singular forms in this chapter, also the ways of combining forms are analyzed. A subtractive form is when solid forms have fragments missing from their volumes. The solid forms retain their formal identities by removing portions of their volumes without deteriorating their edges, corners, and overall profile. Ambiguity regarding the original identity of a form will result if the portion removed from its volume erode its edges and drastically alters its profile.

“3. Form and Space”: This chapter analyzes how different forms are created and affect spaces; for instance, how vertical and horizontal planes define a space. Here it has been mentioned that our visual field consists typically of heterogeneous elements that differ in shape, size, color or orientation. In a visual field, we tend to organize its elements into two opposing groups: positive elements, which are perceived as figures and negative elements, which provide a background for the figures. Our perception and understanding of a composition depend on how we interpret the visual interaction between positive and negative elements. In all cases, however, we should understand that these elements form an inseparable reality, a unity of opposites.

“4. Organization”: This chapter explains how to organize spaces to create a unified space organization. It also describes how different methods of an organization affect the unified spaces in different ways. These organizations are named as centralized, linear, radial, clustered and grid organizations.

“5. Circulation”: This chapter analyzes different parts of a path to a place, which the first part is approach and the second part is the entrance to a place. Then the configurations of the path have been described, which are: a) Linear, b) Radial, c) Spiral, d) Grid, e) Network, f) Composite.

“6. Proportion and Scale”: Here the author also writes about human proportions and how it affects the proportion of designs of materials and forms.

“7. Principles”: While chapter four was about geometric organizations of form and space, this chapter is about additional principles that can be used to create order in architecture. These principles are a) Axis, b) Symmetry, c) Hierarchy, d) Datum, which is organizing a random pattern of elements through its regularity (for instance placing random shapes in a random pattern but through

a line), e) Rhythm, f) Repetition, and g) Transformation (such as getting inspired from a form and transform it into another).

In the book entitled *Precedents in Architecture, Analytic Diagrams, Formative Ideas and Partis* (2005) by Roger H. Clark and Michael Pause, the authors seek a way of thinking about architecture that emphasizes the same essence rather than differences. The book does not look for a repetitive style in architecture, but it assists the understanding of architectural history, to study through a study of fundamental similarities of architects' designs over time (Clark and Pause, p: v).

This book includes plans, site plans, sections and elevations of 104 buildings. The buildings are analyzed through formal diagrams of structure, plan to section, circulation to use, unit to whole, additive to subtractive, repetitive to unique, symmetry and balance, hierarchy, massing, geometry, parti and a diagram which shows the natural light of buildings. After the analysis, common patterns are identified, and these patterns are discussed under the title of formative ideas. These are common ideas of formation of buildings; a brief explanation of some of them are listed below:

“Plan to Section or Elevation”: It discusses proportions and relations between horizontal and vertical configurations of buildings.

“Unit to Whole”: It discusses different ways of making a whole from units.

“Repetitive to Unique”: This unit is about different relations of unique forms and repetitive forms in a building.

“Additive and Subtractive”: Different methods of subtracting or adding volumes to create a single volume as a building.

“Symmetry and Balance”: Balance is evident in symmetric buildings, but a balance can exist in an asymmetric building; for instance a balance between several small spaces and a single big space.

“Geometry”: The ways of using basic geometry to create more complicated forms are discussed.

“Configuration Patterns”: Different configurations such as linear, central and double centered configurations are discussed.

“Progression”: This chapter is about hierarchy, transition, transformation, and mediation in patterns of designs.

“Reduction”: It is discussed how a part of a building is repeated in a smaller proportion or a building is formed from similar shapes in different sizes.

Simon Unwin, the author of *Analysing Architecture* (2010), used a notebook to analyze the works of architecture and through this analysis, he could see how different architects face the challenges. The author claims that architecture is a definition of a place and we can recognize a place by its basic architectural elements. These elements include ground, defined area of ground, raised or lowered area, marker, focus, barrier, roof, path, and openings. After describing basic elements, the author writes about the modifying elements of architecture, which are: Light, color, ventilation, sound, texture and touch, smell and scale. The chapters of this book that are named below are chapters related to this thesis.

In a chapter of the book titled “elements doing more than one thing,” Unwin writes about multifunctional elements; for instance, an element may be important concerning organizing space, or it may contribute to the structural stability. In addition to such functional aspects, it may be used as allegory or metaphor. The use of architectural elements as symbols goes back to the prehistoric era, and it continues. The problem with symbolism in architecture is when the architect uses symbols that are not widely known. Although unfamiliar symbolism may get accepted by time, different people would have different understandings about an unfamiliar symbolism in a building; like the Eiffel Tower that now has become the symbol of Paris, but it was not when it was built (Unwin, 2014, pp: 61-63).

In the chapter titled “using things that are already there,” Unwin claims that things that are already in a space may be natural elements such as rocks and trees or existing buildings. Sometimes instead of restoration, architects design new buildings as extensions to existing ones. This act helps the architect to use remains of the past as a stimulus to present aesthetic interest (Unwin, 2014, pp: 75- 76).

In the chapter “ideal geometry” the author states that although in some people’s idea ideal geometry is a geometry defined by mathematical disciplines (such as the golden ratio), others think predictability of these disciplines could make architecture boring. According to the idea of the second group, like music, which combines a predictable

beat with an irregular melodic line, in architecture ideal geometry should be played against irregularity. Twentieth century's architects make more complex irregular relations between regular shapes. In some cases, they distort regular shapes (Unwin, 2014, pp: 165- 168).

After analyzing forms in architecture, Unwin provides a number of themes in spatial organization, which are listed below with short descriptions:

“1. Space and Structure”: Relationship between these two media of architecture is not always straightforward. There are three broad categories of relationships: the dominant structural order, the dominant spatial order and the harmonic relationship between the two.

“2. Parallel Walls”: Although architects of this century use many hybrid and variant forms, the potential of parallel walls is not exhausted. Its power lies in its control over directions, it can create a sense of security, direction, and focus.

“3. Stratification”: Regardless of the many improvements made in technology, due to gravity, horizontal planes have a significant role in architecture.

“4. Transition, Hierarchy and Heart”: Some places like living rooms are static places. However, we need pathways to move in between these places (transition). These static places have a hierarchy. The core of static places is the heart.

Design Strategies in Architecture: An Approach to the Analysis of Form by Geoffrey H. Baker is divided into two parts. The first part summarizes the philosophical background which has informed the analytical approach. In part two the case studies demonstrate how to apply the technique to aspects of the city and to individual buildings.

The first three chapters of the first part are about principles of analysis, the other two of the second part are analytical studies. Each chapter refers to some keywords. The following paragraphs provide the keywords relevant to this thesis with brief explanations. Since the second part of the book is related to specific case studies, that part is not included.

“1. The role of Architecture”

Meaning in Use: In addition to their functions, buildings must be intelligible and communicate their purpose within a culture.

Materials and Meanings: Materials have psychological effects; for instance, reinforced concrete may appear hostile. Mirror glass gives a feeling of impenetrability and glass is a symbol of the twentieth century.

Monumental Architecture: This architecture represents abstract theories and idealistic principles rather than practical issues but because of the need to communicate meanings shared by all.

Culture and Meaning: For a culture to exist, the individual must become integrated into a world based on meaningful interactions. Non-verbal forms of communication are used to clarify certain intangible phenomena and architecture gives meaning to aspects of life that cannot appropriately be conveyed by words.

“2. Aspects of Forms”

Architecture and Culture: A culture is made up. It is an intangible pattern for human activities. Yet the architect creates an image of characteristics of that pattern.

Tension and Harmony: The pattern of life is to strive to reach a goal and have a feeling of satisfaction and fulfillment after achieving it. The artist translates these feelings to harness the energy of life.

“3. The Analysis of Architecture”

Analysis: In this chapter primary organizational factors of projects are analyzed to reveal the preoccupations of the designer. This analysis is done by the process of dissection, which charts the existence of such factors as volumetric disposition, the circulation pattern and structural system. An essential feature of this analytical methodology is the way a building is considered in relation to the topographical factors of its site.

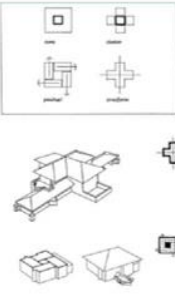
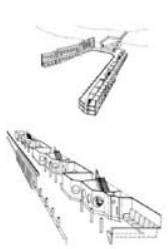
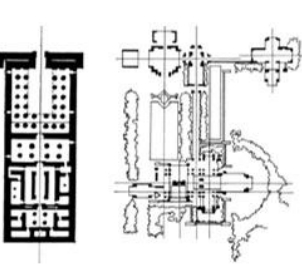
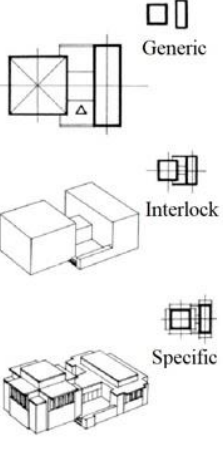
Diagrammatic Thought: In the author's method diagrams are the primary means of communication. They help the analyst to grasp the essence of a concept and through this understanding to fully develop an idea, which is the center of the designing act.

Generic and Specific Form: Architectural form may be thought as generic, in its original state, and specific when the final form has been manipulated to satisfy a functional demand.

Mass and Surface: Mass can be regarded as the solid part of the form. In contrast, some buildings may look as a juxtaposition of planes.

The following keywords are some of the systems for creating forms: core systems, linear systems, axial systems, and interlocking systems. The table below shows the author's drawings and diagrams related to each of these systems.

Table 2.1. Drawings and Diagrams Provided by Baker for Describing Systems

 <p>Pinwheel System Arthur Heurtly house: Frank Lloyd Wright</p>	 <p>James Stirling Residential expansion for St. Andrew University 1964</p>	 <p>Frank Lloyd Wright Darwin D. Martin House 1904</p>	 <p>Generic Interlock Specific</p> <p>Frank Lloyd Wright Unity Church Oak Park Illinois 1906</p>
Core System	Linear System	Axial System	Interlocking System

2.2 Literature Review on Daniel Libeskind's Architecture

In this section of the thesis first some works of Libeskind, which he designed when he was a "paper architect" are analyzed. Here it has been referred to the books titled: The Architect's Eye by Tom Porter (2014), Daniel Libeskind by Antonello Marotta (2013). Later briefs about the "Deconstructivist Architecture" in 1988, the formal similarities of projects of the exhibition and Libeskind's project, the "City Edge" are presented.

After examining the unbuildable works of Libeskind, his first built project which is Jewish Museum Berlin has been studied regarding its symbolism. After seeing how Libeskind uses symbolism in materials in a building, the way he uses structural materials as symbols in his architecture is concisely studied. The last part of this section includes the dimensions

that Libeskind himself in a speech (Daniel Libeskind's 17 Words of Architectural Inspiration, 2009) claims that they are the main inspirations of his design.

2.3. Paper Architecture

Based on *The Architect's Eye* book, for three thousand years after the first known architectural drawing in Egypt, the act of drawing remains central to the act of designing a comfortable place (Porter, 2014, p: 22). Yet some architects such as Peter Eisenman and Daniel Libeskind have established themselves by producing “paper architecture” before they become involved with construction. The “paper architecture,” as Antonello Marotta’s describes it, is a debate that was raised at the end of the Seventies and in the Eighties on the visual means of architectural production. “Paper architects” rethought the architectural theories and principles by using design as an exploratory device, not a means for crystallization of form. These architects design utopian, dystopian or fantasy projects that are not meant to be built (Marotta, 2014, pp: 22- 23). In 1978 Daniel Libeskind drew “The Micromegas” series. The author explains the series in these words:

Daniel put worldview into them. In these labyrinthine compositions, space organization follows the crossing of lines and trajectories that generate encounters, structures, impossible machines, unintentional signs, areas of tension and multiple levels in which distance, discontinuity, and endless spatial divisions are perceived (Marotta, 2013, p: 22).

He also writes that in these paintings lines are showing three-dimensional divisions, they create spaces above and below of themselves, but they are not limited to an individual space or time (Marotta, 2013, pp: 24- 25).



Figure 2.1. Micromegas, *The burrow laws*, 1978 (libeskind.com)

Later in 1988, a model designed by Libeskind was included in the “Deconstructivist Architecture” exhibition in MoMA. The term “Deconstructivism” refers primarily to two inspirations (compiled from Fiederer’s article): The first—deconstruction—is a form of philosophical and literary analysis created in the 1960s, which questions and dismantles traditional modes of thought. In its suspicion of objectivity, this particular strain of critical thinking encourages one to think not just of what a text says, but what it does – and what the relationship between the two may be. The latter inspiration is Constructivism, Russian artistic and architectural movement that was first influenced by Cubism and Futurism (Fiederer, Archdaily, 2017). One of the directives of the Constructivist movement was “to construct” art. Because of their admiration for machines and technology, functionalism, and modern industrial materials such as plastic, steel, and glass, members of the movement were also called artist-engineers (Encyclopedia Britannica., 2015).

In the catalog of the exhibition Philip Johnson describes Deconstructivist architecture in these words (Johnson and Wigley, 1988, p: 7):

Deconstructivist architecture is a confluence of a few important architects’ works of the years since 1980 that shows a similar approach with very similar strains from various parts of the world. Since no forms come out of nowhere but are inevitably related to previous forms, it is perhaps not strange that the

new forms of deconstructivist architecture hark back to Russian Constructivism. I am fascinated by these formal similarities, of our architects to each other, on the one hand, and to the Russian movement on the other.

He also claims that the most obvious repeated theme by the artists is the diagonal overlapping of rectangular or trapezoidal bars, which is also clear in works of Russian avant-gardes. In the catalog, Wigley states that: "Deconstruction gains all its force by challenging the very values of harmony, unity, and stability, and proposing instead a different view of structure: the view that the flaws are intrinsic to the structure (Johnson and Wigley, 1988, p: 11)." About the deconstructivist architect he writes:

A deconstructive architect is therefore not one who dismantles buildings, but one who locates the inherent dilemmas within buildings. The deconstructive architect puts the pure forms of the architectural tradition on the couch and identifies the symptoms of a repressed impurity. The impurity is drawn to the surface by a combination of gentle coaxing and violent torture: the form is interrogated (Johnson, Wigley, p: 11).

The name of Libeskind's project was "City Edge" which was an office and residential development for Berlin. The project exploits the logic of the Berlin Wall, which is violently slicing up the territory. It subverts the logic of the wall by lifting itself and creating a new public street below. Its form is transformed by being broken into pieces, which are then twisted against each other (Johnson and Wigley, 1988, p: 34).



Figure 2.2. "City Edge" Project by Daniel Libeskind 1987 (pinterest.com)



Figure 2.3. “City Edge” Project by Daniel Libeskind 1987 (frac-centre.fr/)

Although this project had a function and was designed for a specific place, it was unbildable. As Tanyeli writes in his book, (Tanyeli, 2001, p: 10-20) in the chapter entitled “from non-architectural symbolism to architecture of symbolism,” this project was a non-architectural symbolism. He claims that although the “City Edge” is an architectural model, it is not designed to be built in a real space since it is mostly made of collages of journals and newspapers and has some hovering parts that are unbildable in real life. Libeskind did not make models to represent a “symbolic architecture,” he designed a project to “symbolize” specific things. Besides, the symbols that Libeskind used are not known by many people, even by the architects.

Libeskind’s symbolism is also continued in his buildable projects. The architect’s most known project in terms of his symbolism is “Jewish Museum Berlin.” In an article named Broken Symbolism: memory and history in Libeskind’s architecture (Maden and Şengel, 2009) links between history, music and their symbolism in Jewish Museum Berlin are discussed.

Libeskind uses symbols that are not common in architecture; they are symbols that are used only by himself. For instance, the entrance of the extension to the Jewish Museum is under the ground, through the building of the older museum. Here he wants to show that Jewish history is not something superficial and solitary, it is a part of Berlin’s history and cannot be separated (Maden and Şengel, 2009, p: 52).

Other essential means for Libeskind to express his symbolism are “lines.” Libeskind named this project “Between the Lines,” where plans are formed of broken lines with interrupted but direct voids within these lines. Referring to Naomi Stead’s criticism, broken and continuous lines may be a symbol for Berlin’s history with its ups and downs; and that fragmentary yet direct void is a symbol for Jewish history within the general history that suddenly comes to an end (Maden and Şengel, 2009, p: 52).

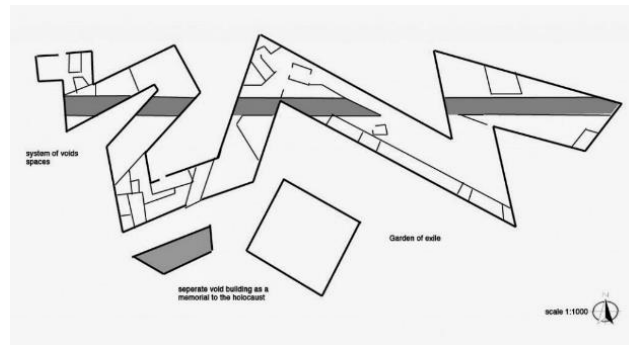


Figure 2.4. Plan of Jewish Museum Berlin (pinterest.com)

In general, Libeskind is not concerned with preserving the traditional architecture; he is concerned with preserving the history and its memory; therefore we do not come across familiar traditional symbols of architecture in Libeskind’s works (Maden and Şengel, 2009, pp: 51- 55).

Another effective factor in this design is Libeskind’s career before architecture when he was a musician and a virtuoso. According to the website of the Berlin Jewish Museum (2018), he used atonal music as an inspiration for this design. An example of this inspiration is the opera of “Moses and Aaron” which ends with an unfinished sentence: “oh, word, thou word, that I lack!” He uses this incompleteness in the form of “voided voids,” which is now the Holocaust Tower. As the mentioned opera finishes unexpectedly, while walking in this 27 meters high tower with its only light source that is on the roof, and hearing footsteps and whispers, suddenly the museum employee will close the huge metal gate on you. After whispers and footsteps, unexpectedly you will hear the echo of the metal gate, after that loud sound you will experience a remarkable silence (Jmberlin.de, 2018).



Figure 2.5. Inside of Holocaust Tower
(libeskind.com)



Figure 2.6. Outside of Holocaust Tower
(wikipedia.com)

A necessary means for Libeskind to express his symbolism is the structure of a building. The book titled *Structure as Architecture: A Source Book for Architects and Structural Engineers* presents an analysis on principles that relate to both architectural concepts and structural engineering. It explores how form and function blend, where structural and architectural concepts interweave and support each other for a technically and aesthetically enhanced work (Charleson, 2014, p: 3). Here Felix Nussbaum Museum, Jewish Berlin Museum and Imperial War Museum by Libeskind have been analyzed.

The author claims that Libeskind uses structural elements in his building in a way that they look like aesthetical elements rather than structural elements. According to the author in addition to museums' architectural design, the materials are also significant factors to narrate. An example is a structural wall (Figure 2.7) in Felix Nussbaum Haus. Libeskind designed a very sharp angle on that wall to symbolize terror during the war. Also, the structural members that are passing through the windows on the roof are reminiscent of jails' bars (Charleson, 2014, p: 222).



Figure 2.7. Felix Nussbaum Museum (osnabrueck.de)

The other elements that were used in all museums as a symbol in addition to its structural function are beams. The harshness of the gray concrete beams that are placed in a dim and narrow corridor in Felix Nussbaum Haus, without any architectural detailing, are helpful to narrate Nussbaum's difficult life (Charleson, 2014, pp: 156-157). In Jewish Museum Berlin, concrete beams with different angles with varied cross-sectional shapes above the main stairs, are symbols of historical dislocations and horrors that German Jews experienced during the war (Charleson, 2014, p: 155).

In Imperial War Museum, the name of a part of the building is "Air Shard." This part with its aluminum cladding battens as exterior walls and steel tubes placed in different angles above the visitors, look like a three-dimensional structural map of trajectories of warplanes and is a symbol of conflict in the air (Charleson, 2014, p: 158).



Figure 2.8. A corridor in Felix Nussbaum Haus
(libeskind.com)



Figure 2.9. Stairs of Jewish Museum
(archiposition.com)



Figure 2.10. Inside of the Air Shard (libeskind.com)

Antonello Marotta in his book “Daniel Libeskind” analyzes Libeskind’s works and his architecture thoroughly. Marotta mentions some of Libeskind’s critical points in his designs and explains how he uses some elements as means for symbolism.

A feature of Libeskind’s architecture is understanding and redefining the relation of inside and outside. For instance, he changes the wall’s traditional function of separating spaces; especially in his 18.36.54 project, walls are not used necessarily to

separate spaces (Marotta, 2013, pp: 14- 15). The window is another element that Libeskind does not use as traditional means. The traditional function of a window is to link inside and outside, it provides a view of outside and let the light in, to make inside a brighter place. Yet in Jewish Museum Berlin we can see that windows are in the form of thin lines that show the impossibility of a relation between inside and out. They are also not used to brighten the inside, but they are used to emphasize the darkness of inside. To summarize, he uses them according to the project as a means for his symbolism (Marotta, 2013, pp: 89- 90).

The other common feature in Libeskind's projects that the author mentioned about is "void." Again opposed to its traditional meaning, which is absence and hollowness, in Libeskind's architecture it is as important as solid elements such as windows and walls. Mostly in museums, voids, just like the other elements, are used consciously to symbolize mostly a hash memory, and in fact, it is the place of metaphysical presence (Marotta, 2013, p: 91).

2.4. 17 Words of Architectural Inspirations

In a speech (Daniel Libeskind's 17 Words of Architectural Inspiration, TED Talks, 2009), Libeskind, himself claims that there are seventeen dimensions that he believes in and they are the necessary oxygen for us to live in buildings, to live in cities, to connect ourselves in a social space. The title of each dimension includes two opposite terms; the first words in every pair are Libeskind's inspirations for designing and the second ones are concepts that he disagrees with. The dimensions and a brief description of them in the architect's own words are listed below:

Optimism vs. Pessimism: Optimism is what drives architecture forward. The great cities and buildings were built in times that were not the best of times in a certain way. Yet that energy and power of architecture have driven an entire social and political space that these buildings occupy.

Expressive vs. Neutral: Expression has been missing in much of the architecture because we think architecture is the realm of the neutered and the kind of a state that has no opinion. Expressive spaces are not spaces that merely confirm what we already know. Expressive spaces may even disturb us.

Radical vs. Conservative: Radical is something which is rooted deep in a tradition. And I think architecture is radical. It is not just a conservation in formaldehyde of dead forms. It is actually a living connection to the cosmic event that we are a part of it.

Emotional vs. Cool: The confrontation of the cool, the unemotional with emotion, is a conversation that I think cities themselves have fostered. I think that is the progress of cities. It is not only the forms of cities, but the fact that they incarnate emotions, not just of those who build them, but of those who live there as well.

Inexplicable vs. Understood: The important thing is to introduce the actual architectural dimensions, which might be inexplicable in words, because they operate in proportions, in materials, and in the light.

Hand vs. Computer: The computer should not just be the glove of the hand; the hand should be the driver of the computing power.

Complex vs. Simple: Our lives, our emotions, and our intellectual desires are complex. So I do believe that architecture needs to mirror that complexity in every single space that we have and in every intimacy that we possess.

Political vs. Evasive: I have always believed that the act of architecture, even a private house, when somebody else will see it, is a political act because it will be visible to others. And we live in a world which is connecting us more and more.

Real vs. Stimulated: The reality of architecture is visceral, not intellectual. It is the reality that we touch. And I try, in every building, to take that virtual world, which is so enigmatic and so rich, and create something in the real world.

Unexpected vs. Habitual: Habits are enforced by architecture. When we see the same kind of architecture we become immured in that world of those angles, lights, and materials. We think the world looks like our buildings. And yet our buildings are pretty much limited by the techniques and wonders that have been part of them.

Raw vs. Refined: The raw, is the naked experience, untouched by expensive materials and the kind of refinement that we associate with high culture. A raw space is a space that does not always follow us like a dog that has been trained to do so but moves ahead into directions of demonstrating other possibilities and experiences that have never been part of the vocabulary of architecture.

Pointed vs. Blunt: And so I do like something which is pointed, not blunt; something which is focused on reality, and has the power, through its leverage, to transform even a very small space. Often it takes just a building to change our experience of what could be done, what has been done, how the world has remained both in between stability and instability.

Memorable vs. Forgettable: I have never been interested in the forgettable reuse, rehashing of the same things over and over again. I rather play something completely unheard of, even with flaws, than repeat the same thing over and over which has been hollowed by its meaninglessness.

Communicative vs. Mute: Architecture an art of communication. The notion that the best architecture is silent has never appealed to me. Cities should be full of vibrations. The architectural mission that is important is to create spaces that are vibrant, pluralistic and can transform the most prosaic activities and raise them to a completely different expectation.

Risky vs. Safe: I think architecture should be risky and should not play it safe. Risks really move architecture, even with all its flaws, into a space which is much better than the ever again repeated hollowness of a ready-made thing.

Space vs. Fashion: It is about creating something which cannot be repeated, cannot be simulated in any other sphere, with minimal means. It is not about the changing fashions and theories. It is about carving out a space for trees. It is carving out a space where nature can enter the domestic world of a city.

Democratic vs. Authoritarian: I do not like beautiful buildings built for totalitarian regimes, where people cannot speak, cannot vote, cannot do anything.

2.5. Methodology

A visual analysis addresses an artwork's formal elements and may also include historical context or interpretations of meaning (Duke University, 2018). The first step of this study is doing a formal analysis of the selected buildings. Marjorie Munsterberg, in her book titled *Writing About Art*, explains the formal analysis in these words (Munsterberg, 2009, p: 17): "A formal analysis is an explanation of visual structure, of the ways in which certain visual elements have been arranged and function within a composition. The purest formal analysis is limited to what the viewer sees". The formal

elements included in this thesis are plans, volumes, corridors, windows, openings, subtractive and additive volumes.

The next step is to research meanings and symbols in the forms. According to Rose Gillian, the philosopher, a symbolic analysis expands beyond formal analysis, focusing on subject matter in artwork, specifically symbols (Rose, 2016, p: 202). The meanings that are analyzed in this study include symbols, historical and religious references and in some cases the shapes of forms inspired from shapes of things in nature or man made tools.s

The process of this thesis is first to study buildings individually. Each section of the fourth chapter is about a single building. The first stage of the study contains Libeskind's description about the selected building. Then the volume of the building is broken down into the nearest simple forms so that the primary volumes of a building become obvious. Next step is to reveal a simple outline of the plan. The aim of simplifying forms after the architect's description is to understand the relation between the forms of buildings and their concepts, which have been pointed out by the architect.

In some cases, interior pictures are added in order to help the visualization of interior spaces of buildings. The last step here is to point out the characteristics of opening and subtractions of buildings. Openings contain windows and other gaps in the buildings' facades. In some cases that are formed of subtracted volumes, these subtractions are studied as well as the openings.

After studying buildings individually, for cataloging the buildings, in the fourth chapter, all buildings are analyzed and compared according to some of their formal and functional similarities. This comparison aims to understand how Libeskind uses specific forms to symbolize specific events and concepts.

The first aspect that is analyzed is the Formation Process of Buildings. In this section, designs are placed into two categories:

1. Buildings transformed from surfaces to volumes
2. The buildings designed as volumetric compositions

The second aspect is the Extensions designed by Libeskind. In this section, designs are placed into two categories, as well:

1. Intertwined Extensions

2. Extensions attached by corridors

At the end of the section similarities and differences among the buildings of each category are analyzed, in order to show how Libeskind prefers to use particular ways of adding extensions in particular cases.

The third aspect is about Solids and Voids. In this part, formally similar openings are divided into four categories, which are:

1. Linear windows
2. Irregular windows
3. Full glass surfaces
4. Semi-transparent surfaces

Lastly, the Subtractive and Additive forms are shown in separate tables according to their formal similarities.

CHAPTER 3

Cataloging of the Built Works

Under this title, chosen projects are explained based on Libeskind's official website; then they are analyzed through their volumes, plans, interior pictures openings, and in some cases subtractions. Projects are analyzed in chronological order according to the date of their completion.

3.1. Felix Nussbaum Haus (Osnabruck, Germany, 1998, 2011)



Figure 3.1.1. Felix Nussbaum Haus (Extensions designed by Libeskind in 1998 (architizer.com))



Figure 3.1.2. Felix Nussbaum Haus by Libeskind in 2011 (archdaily.com)

Felix Nussbaum Haus museum is dedicated to the oeuvre of a Jewish artist put to death at Auschwitz. It is an extension to the Cultural History Museum in Osnabrück, Germany, where is the hometown of Nussbaum. As well as housing the paintings created by Nussbaum, the museum holds exhibitions focusing on the themes of racism and intolerance.

“With sudden breaks in its pathways, unpredictable intersections, claustrophobic spaces, and dead ends, the structure of the building reflects the Nussbaum's predicament as a

Jewish painter in German before WWII (Libeskind, 2018)". Visitors enter the museum through a tall and narrow corridor, whose concrete exterior is a blank canvas and interior is a constricted space without horizon, and this evokes a visceral sense of how Nussbaum painted during his incarcerations, which is necessary to understand his oeuvre. The corridor connects with building's other sections; one of the sections contains artist's early works and the other section, which is a metal clad bridge, contains newly discovered works of Nussbaum. The experience of walking through these connections is like going backward and forward in time (Libeskind, 2018).

Previous paragraphs were about the first extension designed by Libeskind in 1998, but he designed another extension to the museum in 2011. The latter extension is attached to the Kunstgeschichtliche Museum and connected to the Felix Nussbaum Haus by a glass bridge. The new building transforms the existing buildings into a cohesive complex by acting as a gateway. Besides the gateway, an entrance hall with a museum shop and learning center are added to the building (Libeskind, 2018).

Felix Nussbaum

Felix Nussbaum (1904 – 1944), the Jewish-German surrealist painter was born in Osnabrück. In 1933 when the Nazis came to power, Nussbaum and his wife started to live in exiles, first in Italy, then in Belgium. After the German occupation of Belgium in 1940, Nussbaum was arrested and thrown into the internment camp of Saint Cyprian in southern France. Later he managed to escape to Brussels, but after that, with the fear of being discovered, he had to rely on his friends to shelter him. In 1944 he was arrested by the Nazis and deported to his death in Auschwitz (Panayi, 2003).

The Nussbaum's most widely known works are: "Self-Portrait in the Camp (1940)", "Self-Portrait with Jewish ID Card (1943)" and "Triumph of Death (1994)". His paintings, especially last paintings, are mostly described as fractured allegories, evoking traditional associations only to deconstruct them (Schults and Timmes, 2009, p: 23).

Volumetric Composition

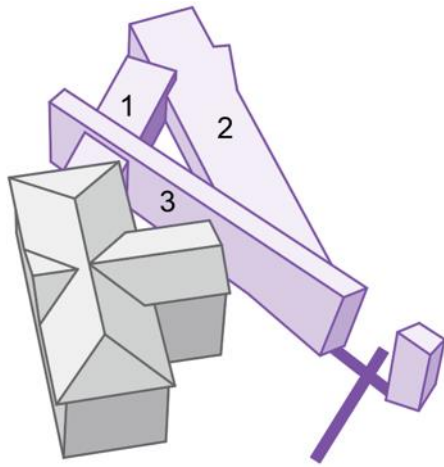


Figure 3.1.3. Felix Nussbaum Haus 1998
Volumes (by author)

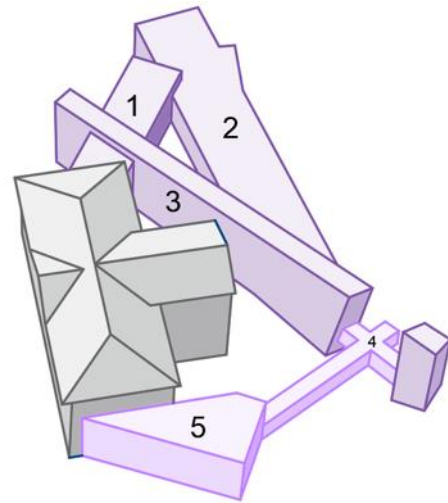


Figure 3.1.4. Felix Nussbaum Haus 2011 Volumes
(by author)

Apparent differences between existing building and volumes that are added by Libeskind are modern materials, patternless windows and in general asymmetry. These volumes are not only different from the first building, but also they are different from each other; they do not look like a single extension to a building, because they are a group of volumes. Their most noticeable similarity is their linear forms. Volume 1, 2 and 3 are penetrating each other. Also, it looks like volume 3 is broken by volume 4. Volume 4 is built in 2011, previously two pieces of volume 3 were separated by a pathway. The similarity between the pathway and volume 4 is that they both look like a distorted cross, which according to One for Israel Ministry website, for Jews cross is a symbol for cruelty (One for Israel Ministry, 2018). Volume 5, which is also built in 2011, is attached to the Cultural History Museum building and placed farther from other extensions, and its forms look like a cut rectangle. Libeskind claims that even the unfinished works of Nussbaum should be displayed in the museum, so he used the concept of unfinished forms to refer to the unfinished works (Libeskind, 2011).

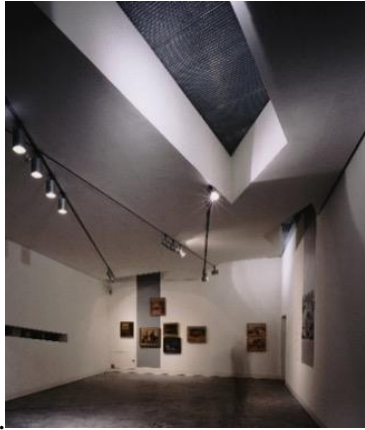


Figure 3.1.5. Inside volume 1
(libeskind.com)



Figure 3.1.6. Inside volume 2
(osnabrueck.de)



Figure 3.1.7. Inside volume 3
(inexhibit.com)



Figure 3.1.8. Inside volume 4
(jewishjournal.com)

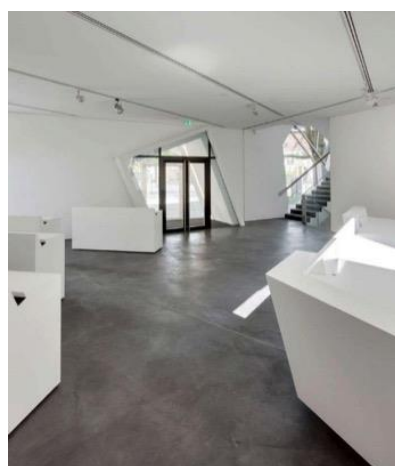


Figure 3.1.9. Inside volume 5 (archdaily.com)

Planimetric Composition

As it was mentioned, added volumes do not look like a single building, but each volume has its features. This individuality can also be sensed inside the volumes. The volumes have level differences and different heights, and each of them has a various number of floors.



Figure 3.1.10. An example of level differences between volumes (tripadvisor.com)



Figure 3.1.11. An example of level differences between volumes (architizer.com)

What makes the connection among volumes stronger is the circulation. The entrance of the museum is in volume 5 (the most recent extension), and the last volume that one can enter is the Cultural History Museum building; so it is like moving from present to past.

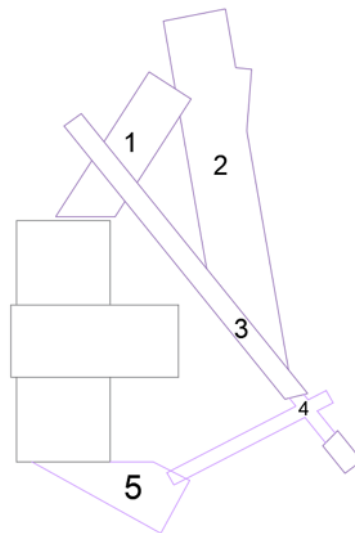


Figure 3.1.12. General Plan of Felix Nussbaum Haus (by author)

Volume 5 is the entrance, shop and learning center. Volume 4 is a glass corridor and bridge. Volume 3 is a corridor and display area. Volume 2 is mostly a display area. Volume 1 is display area and an entrance to Cultural History Museum.

Openings

In the first extension that was built in 1998 windows are in the forms of irregular polygons with sharp angles. Libeskind uses sharp angles often to symbolize difficulties (figure 4.1.11). In the last extension, forms of windows are like abstracted figures of Nussbaum's auto-portraits.



Figure 3.1.13. An auto-portrait of Nussbaum
(by Felix Nussbaum)



Figure 3.1.14. The 2011 Extension to Felix Nussbaum Haus
(nicoleheptner.wordpress.com)

3.2. Imperial War Museum North (Manchester, United Kingdom, 2001)



Figure 3.2.1. Imperial War Museum North (shutterstock.com)

The Imperial War Museum North tells the story of the war and how it affected the lives of British and the Commonwealth citizens since 1914. The concept of this building is a globe shattered into fragments and then reassembled. The building is formed from interlocking of these three fragments which present air, earth, and water.

“The Earth Shard forms the museum space, signifying the open, earthly realm of conflict and war; the Air Shard serves as a dramatic entry into the museum, with its projected images, observatories and education spaces; and the Water Shard forms the platform for viewing the canal, complete with a restaurant, cafe, deck and performance space (Libeskind, 2011) ”.



Figure 3.2.2. Imperial War Museum North (libeskind.com)

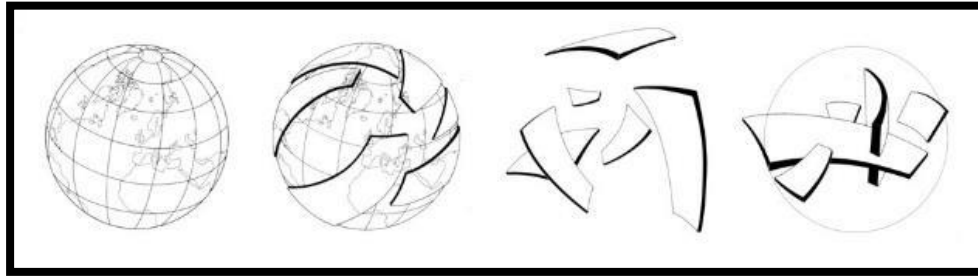


Figure 3.2.3. Shattered globe and formation of the building (libeskind.com)

Volumetric Composition

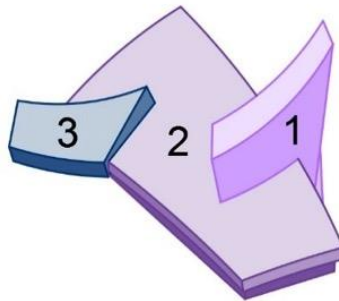


Figure 3.2.4. Imperial War Museum North Volume (by author)

Volume 1 is Air Shard, 2 is Earth Shard and 3 is Water Shard. These volumes will be analyzed individually.

The Air Shard, which is the entrance of the building, has holes in its roof and walls, so that people inside the museum can feel the weather outside, the rain and wind ; in this volume there are air tubes flying in the space that reminds us of the three dimensional maps of warplane trajectories (Charleson, 2015, p:158).



Figure 3.2.5. The Air Shard (www.iwm.org.uk)



Figure 3.2.6. Flying tubes in space (libeskind.com) Figure 3.2.7. Map of war plane trajectories
(mh370investigation.com)

The Earth Shard looks like a hill island coming out of the water. Unlike The Air Shard that is linked to the outside world, the Earth Shard is the volume with least openings. After the Air Shard visitors directly enter to the Earth Shard and its isolation from the outside world becomes more apparent.



Figure 3.2.8. The Earth Shard (archdaily.com) Figure 3.2.9. Inside the Earth Shard (iwm.org.uk)

The Water Shard is the closest volume to sea. It looks like a raising wave from the sea, and it covers a part of the Earth Shard. It has a long horizontal window on one side of it, which continues through the corner of the volume, providing a sea view through two sides of the volume.



Figure 3.2.10. The Water Shard (archdaily.com) Figure 3.2.11. Inside the Water Shard (kland.co.uk)

Planimetric Composition

Each of the spaces of the Museum is placed in one of the shapes. Air shard is the entrance. Water Shard is Restaurant. Other parts of the museum such as galleries, offices, and classrooms are placed in the Earth Shard.

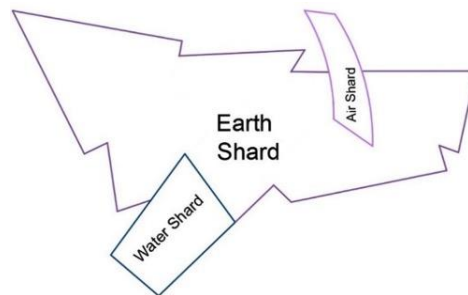


Figure 3.2.12. General Plan of the building (by author)

Although Libeskind mentions that the form of this building is inspired from a shattered globe, the overall form is also reminiscent of wars; for instance, the planimetric outline looks like British warships.



Figure 3.2.13. A British Warship
(wikipedia.org)

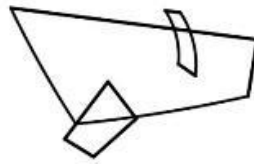


Figure 3.2.14. Outline of plans
(by author)

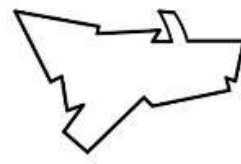


Figure 3.2.15. Outline of plans
(by author)

Another point is that when we rotate the plan to the left, it looks like the map of England.



Figure 3.2.16. Map of England
(www.charismaticrenewal.com)



3.3.17. Outline of plan, rotated to left
(by author)

Openings

The form of windows in the Earth Shard is like broken rectangles, like in the tectonic formation of continents. The single window of the Water Shard is a horizontal linear rectangle that continues in two facades; it looks like the endless horizon of the sea. The Air shard itself is, in fact, a semitransparent volume because of vertical linear gaps on its surface; when visitors enter the air shard, they can feel real weather conditions, such as wind and rain.



Figure 3.2.18. The Earth Shard (architectism.com) Figure 3.2.19. The Water Shard (architectism.com)



Figure 3.2.20. The Air Shard (libeskind.com)

3.3. Studio Weil (Illes Balears, Spain, 2003)



Figure 3.3.1. Studio Weil (libeskind.com)

Studio Weil is a painting and sculpture studio designed for the American painter and sculptor Barbara Weil overlooking the sea in Port d'Andratx in Mallorca, Spain. During the design process, Daniel Libeskind worked with Weil in order to design a building that responds to the surroundings and creates a space that completes and contrasts Weil's works. Libeskind chose the form of an arc for this design. This arc is cut through with a pair of stairs. On top of the roof, there are large-scale sculptures designed by Weil, which can be seen from a distance (Libeskind, 2003).



Figure 3.3.2. Studio Weil (pinterest.es)

A brief look at Barbara Weil's works will be helpful in analyzing this building.

Barbara Weil

Barbara Weil was born and raised in Chicago. After living and working in Southern California, she moved to Mallorca, Spain. She defines her works as "abstract expressionism." Her designs had abstract shapes with sharp colors. In some of her works, she combined paintings and sculptures. "Weil explored the occult philosophy and employed the circle as a basis for her forms with the intention of creating an intense universal emotion through this domain (Studioweil.com, 2017)".



Figure 3.3.3. Emotional Gigabytes Series (studioweil.com)



Figure 3.3.4. Four sculptures of “7 Sculptures” Series (studioweil.com)

Volumetric Composition

This building is composed of curved layers placed on top of each other. This characteristic can be seen also in Weil’s works. As it is evident in two series of her works, she paints irregular curvy shapes beside each other. Consequently, Libeskind applies this feature to three-dimensional space, which Weil applies in 2-dimensional space. However, as it was mentioned, this building is also a response to Weil’s works; white interior and exterior may be a response to Weil’s colorful works.

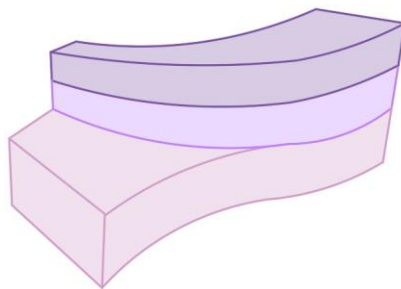


Figure 3.3.5. Studio Weil Volume (by author)

Another similarity between this building and Weil’s work is the subtraction factor. We can sense subtracted parts in Weil’s mentioned works. Libeskind made three-dimensional subtractions in this building. But as a response to Weil’s works, its subtractions are mostly angular shapes, rather than curvy ones.

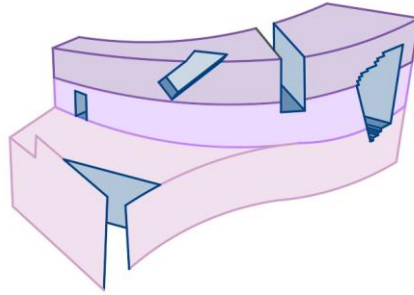


Figure 3.3.6. Studio Weil Volume (by author)

This response can be sensed in pictures below, as we see curvy forms of Weil inside and near Libeskind's opening with many angles.

According to Jonathan Glancey, this building is far removed from most people's dreams of what a house should be. This building is located in Mallorcan Beach in Spain, and it is dissimilar to other houses on the beach in different ways. First of all, the appearance of this house is far from the colorfulness of the other houses, beach, and sea. Also unlike the other houses that have balconies and large windows, this house does not have any balcony, and it has only a few windows, which none of them are obvious from outside. The aim of not using too many windows is to disconnect from the outside world in order to focus on the artworks in the studio (Glancey, 2003).



Figure 3.3.7. One of Weil's statues
(abc-mallorca.es)



Figure 3.3.8. Exterior of Studio Weil (mallorcamagazin.com)



Figure 3.3.9. Inside of Studio Weil (architektura.info)

Planimetric Composition

According to Antonello Marotta, the idea of this building's design is based on a series of concentric rings with an imperfect shape. In designing this structure, Libeskind was inspired by Ramon Llull, the mystic and theologian, who lived on the island in the Thirteenth Century. He was the inventor of a "logical mechanism," which we would nowadays call the computer. "The mechanism was made of concentric discs of wood and metal piled one on top of the other, which had keywords engraved on them and if used correctly, worked as a superior mnemonic device." That device was called a Volvelle. This is the world that fascinates the architect: mechanisms for text organization and astronomic devices, which come to life in this space for art (Marotta, 2013, p: 150)." The idea of using materials correctly would make a mnemonic device, may refer to Libeskind's architecture and Weil's artworks.

Because in a number of works of Libeskind, especially in museums, memory and remembering concepts have significant roles in his architecture, here it can be seen

that he implies these concepts by getting inspired from the shape of a “mnemonic” device rather than any other devices.



Figure 3.3.10. An example of Lull's Volvelles (drc.usask.ca)

Marotta did not explicitly explained how Libeskind uses the shape of those rings in his design, but by taking a look at the plan, the pictures below may be a possible process of shaping the plan. The figure 3.3.12 shows the final shape of the plan.

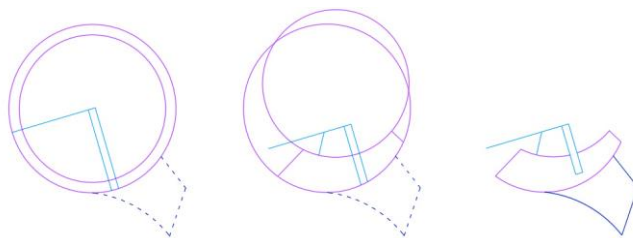


Figure 3.3.11. Comparisson of Building's plan and form of Volvelles (by author)

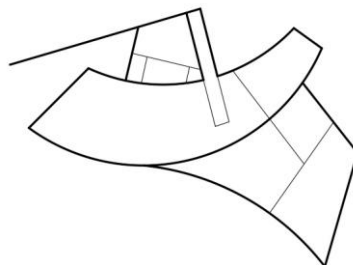


Figure 3.3.12. The outline of the final plan (by author)

Openings and Subtractions

As Studio Weil is designed for Barbara Weil, who is a painter and sculptor, the form of this building looks like a sculpture. Most of the windows cannot be seen from outside; the building has mostly roof windows. In an article Jonathan Glancey, writes that the aim of placing only a few windows in this building is to disconnect the visitors from outside and make them focus on the artworks inside the studio (Glancey, 2003). A hole through the volume is the most noticeable opening of this building. This opening is placed near the entrance like a connection point for the work of two artists because this hole is a showcase for one of Weils' sculptures. In the same article Glancey likens this hole to a spray booth.



Figure 3.3.13. Interior of Studio Weil
(libeskind.com)



Figure 3.3.14. Interior of Studio Weil
(tecnne.com)



Figure 3.3.15. The hole in the volume, near the entrance (immozentral.net)

3.4. London Metropolitan University Graduate Centre (London, United Kingdom, 2004)



Figure 3.4.1. London Metropolitan University Graduate Centre (libeskind.com)

Graduate Student Centre for the London Metropolitan University is another extension designed by Libeskind. The building is formed from three intersecting volumes, clad with embossed stainless steel panels for a shining and ever-changing surface (Libeskind, 2014).

Volumetric Composition

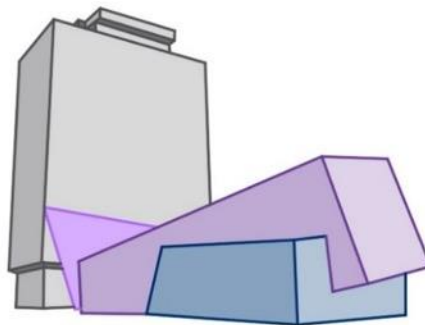


Figure 3.4.2. London Metropolitan University Volumes (by author)

In this building, we can see three penetrating irregular and complex volumes attached to a building that is formed of simple irregular shapes. Previously some of Libeskind's other buildings that were formed of penetrated irregular shapes were analyzed. In this building, this penetration is more evident because they have a larger common area. A reason for this strong penetration may be a confines of the parcel that was considered for this building.

Jonathan Glancey, in his article about this building makes the following observation: “When you visit the area, you immediately realize that Libeskind’s explosive building acts not only as a junction box for the university but as a landmark for the entire street (Glancey, 2004)”. As a result, for creating a “building” and a “landmark,” Libeskind designed a more compact building that also looks like a sculpture.

Although Libeskind became famous for his projects that were related to tragedies and wars, such as the Jewish Museum Berlin and master plan for the World Trade Center, this building is like an explosion of joy. Unlike the mentioned difference of this building, it is similar to many other projects of Libeskind regarding shiny materials, pointy edges and volumes that look like as if they are collapsing. Considering such similarities, Glancey claims that “Libeskind is the architect not simply of tragedy, memory and the Holocaust, but also of wandering souls and immigrants;” since the architect himself was an immigrant once and the Holloway Road is home today to thousands of immigrants from all over the world (Glancey, 2004).

Planimetric Composition

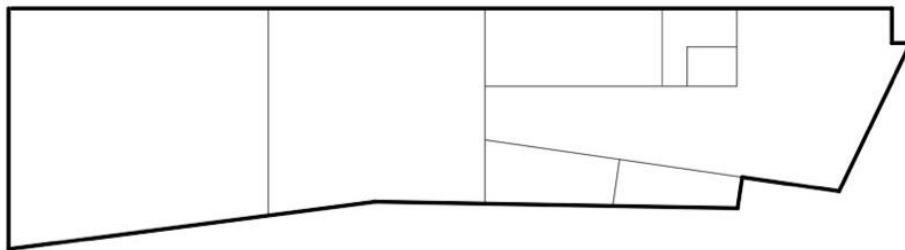


Figure 3.4.3. Outline of Ground Floor Plan of Graduate Centre Building (by author)

As we see in the plan, vertical planes of volumes do not continue inside the building; as a result, the plan of the building looks like a single distorted shape, rather than three interlocking volumes.



Figure 3.4.4. Inside of the Building (sto.de) Figure 3.4.5. Inside of the Building (sto.de)



Figure 3.4.6. Inside of the building (toothpicnations.co.uk) Figure 3.4.7. Inside of the Building (toothpicnations.co.uk) Figure 3.4.8. Inside of the Building (londonarchitectureblog.com)

Openings

In this extension, like other extensions designed by Libeskind, both the general form and windows of the new building are in complete contrast with the older building. Unlike the main building that has a repetitive window pattern in all of its floors, Libeskind has designed disharmonic windows for his building. Visitors inside the building would feel the incompleteness and continuity of windows since each window continues among different floors.



Figure 3.4.9. Interior of London Metropolitan
University Graduate Centre (www.sto.de)



Figure 3.4.10. Interior of London Metropolitan
University Graduate Centre (libeskind.com)



Figure 3.4.11. Interior of London Metropolitan
University Graduate Centre (www.sto.de)

3.5. Extension to Denver Art Museum, Fredric C. Hamilton Building (Denver, USA, 2006)



Figure 3.5.1. Denver Art Museum (archute.com)

This building is Libeskind's first completed building in the USA. The design is placed against the majestic backdrop of the Rocky Mountains and it is formed from a series of volumes that are inspired by peaks and valleys of mountains. A sharply angled cantilevered section continues across the street, pointing towards the existing building that is designed by Gio Ponti in 1971 (Libeskind, 2006).

Volumetric Composition

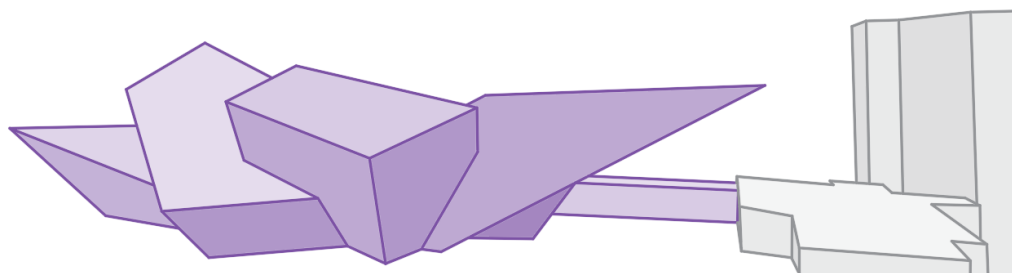


Figure 3.5.2. Denver Art Museum Volume (by author)

As it is shown in the picture above, a corridor attaches Libeskind's extension to the main building. Libeskind claims for designing this building he was inspired by Rocky Mountains of Denver and designed the shape of this building by folding a paper. Instead of designing numerous surfaces, he used only one continuous surface to show the continuity of spaces in this design. According to the Denver Art Museum's official website, Libeskind describes Denver as "a dynamic place, the people are dynamic. Moreover, that is part of the

composition of the building (Denver Art Museum, 2009)". So he shows dynamism by continues movement of a line that fist makes a plane and then by breaking in different directions makes more planes and these planes form a complex volume.



Figure 3.5.3. Rocky Mountains of Denver (photography.josephlekas.com)

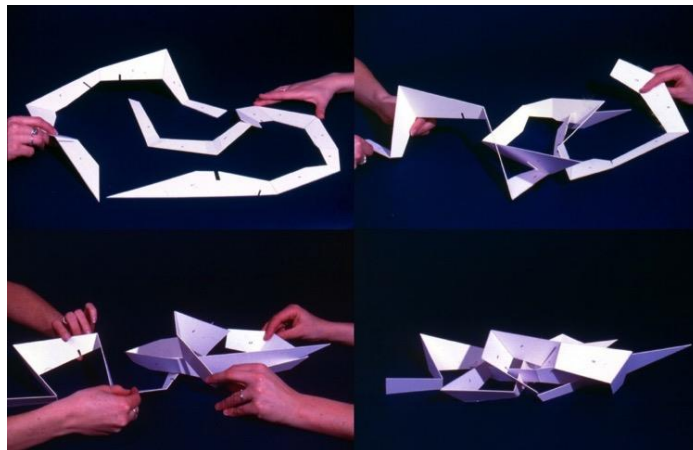


Figure 3.5.4. Making the volume by folding the paper (archdaily.cn)

In “The Architecture of Art Museums: a Decade of Design: 2000 - 2010” by Ronnie Self, the author writes that Libeskind’s design is an extension to a seven-story building, designed by Gio Ponti in 1971. This building has an appearance of a castle because in Ponti’s idea a museum is like a castle that protects the objects inside of it. In the counter side, there is Libeskind’s building that looks like inverted pyramids and gives a sense of instability (Self, 2014, p: 146). A reason that Libeskind won the competition for designing an extension for DAM is that unlike the other participants, he designed a building that contradicts the values of the previous building, so in

general, they neutralize each other (Self, 2014, p:152). Besides the mentioned subject, the other similarity between DAM and the Jewish Museum is the use of lines. Libeskind named that project as “between the lines,” the author sees this project’s concept as “two lines going for a walk.” This concept may be a referring to Libeskind’s own words in describing this project “a composition of two lines of a nexus coming together that tie downtown Denver and the Civic Center Park with the Golden Triangle neighborhood to the south (Self, 2014, p: 155)”.

Planimetric Composition

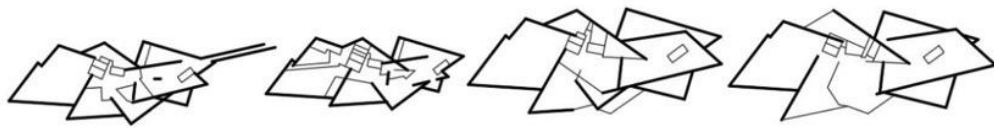


Figure 3.5.5. Outline of Floor Plans of Fredric C. Hamilton Building (by author)

In plans, we can sense the continuity between volumetric and planimetric composition. Spaces are divided according to the “moving surface.” Although in plans we can see other walls, besides the main surfaces, many of them are not separating two spaces thoroughly, and mostly visual continuity remains beyond these separating walls.



Figure 3.5.6. Inside the Building (arcspace.com)



Figure 3.5.7. Inside the Building (pinsdaddy.co)



Figure 3.5.8. Inside the Building (archdaily.cn)

Openings

This extension is attached by a glass corridor to Gio Ponti's concrete building with few, linear windows. The extension itself has few but large windows. There is a linear L-shaped window on the edges of one of the volumes. This window looks like a breakpoint among surfaces of the volume. Since the other surfaces of the volume are formed of a single plane moving around itself, the protruding linear shapes on the ceiling are attaching this surface to the others to make the final shape of the volume.



Figure 3.5.9. Extension to the Denver Art Museum (thetech.site)

3.6. Royal Ontario Museum (Toronto, Canada, 2007)



Figure 3.6.1. Royal Ontario Museum (euromaidanpress.com)

“The extension to the Royal Ontario Museum (ROM), now named the Michael Lee-Chin Crystal, is situated at one of the most prominent intersections in downtown central Toronto (Libeskind, 2007)”.

A significant point about the museum is that it was expanded four times through a century. According to the website of the museum, the first part was built in 1912-1914 and the second part was built in 1930’s during the depression, so an effort was made to use mostly local building materials. The excavation was done by hand, using picks, shovels, and horse-drawn wagons. Another major expansion of the museum was made in 1978-1984 (Royal Ontario Museum, 2018).



Figure 3.6.2. First Wing (1912-1914)

(blogto.com)



Figure 3.6.3. East Wing (1930’s)

(tayloronhistory.com)



Figure 3.6.4. A part of expansion of 1978-1984. In 2006 this part was destroyed and Libeskind's design were added to museum. (scribd.com)

Volumetric Composition

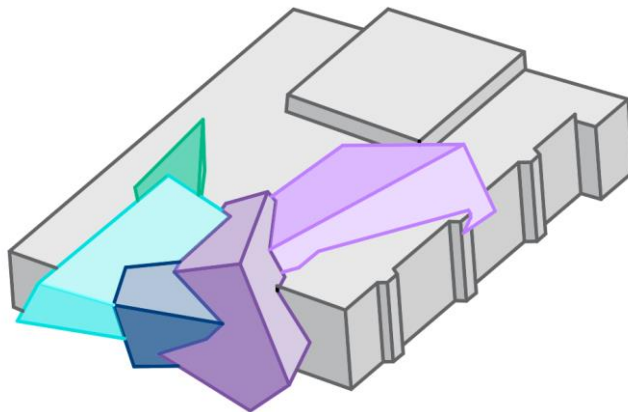


Figure 3.6.5. Royal Ontario Museum Volumes (by author)

Libeskind's design is made of five intersecting shiny volumes that look like a crystal; the number of volumes may be referring to the number of parts that this museum initially hosted when it was built in 1912: the Royal Ontario Museums of Archaeology, Paleontology, Mineralogy, Zoology, and Geology.

According to Antonello Marotta ROM is like two metaphors of desert and crystal (Marotta, 2013). Libeskind defines two themes of the Museum, Nature, and Culture (Libeskind, 2007). In this museum he interrupts the former building to contrast the linear design of it; just like Crystal Mountains in deserts, hard crystals come out from soft sand.



Figure 3.6.6. Crystal Mountains in deserts
(azuretravel.co.za)



Figure 3.6.7. The Extension designed by Libeskind
and the Old Building (m.architektura.info)

The elevation of this building gives a sense of continuity; because it seems like only some parts of volumes are visible, and they continue inside the building, unlike the façade of the previous building that is symmetrical and looks finished.



Figure 3.6.8. Elevation of Royal Ontario Museum (claudecormier.com)

Planimetric Composition

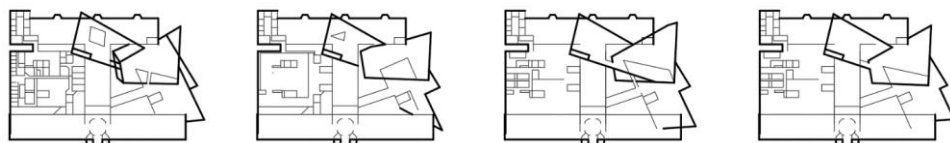


Figure 3.6.9. Outline of Museum's Floor Plans (by author)

The picture above shows the floor plans of the museum. As we see, vertical planes of volumes continue inside the building.



Figure 3.6.10. Inside of the Museum
(orontocityguide.com)



Figure 3.6.11. Inside of the Museum (russianexpress.net)

Exhibition galleries inside Libeskind's volumes are about nature and mostly contain extinct species such as dinosaurs. Libeskind's extension to the museum, which also looks like collapsed cubes, may be a symbol of this extinction.

Openings

According to Antonello Marotta, in the lighting of this museum, Libeskind is inspired by his "Chamberworks" drawings. Here he created "unusual apertures, as narrow as blades or wide over the street, to respond to the museum functions (Marotta, 2013, p: 168)".

Chamberworks

"Chamberworks" is a series of 24 drawings made in 1983, which reveals all Libeskind's subsequent pathways and are a testimony to his reading of the world (Marotta, 2013, pp: 16-17).

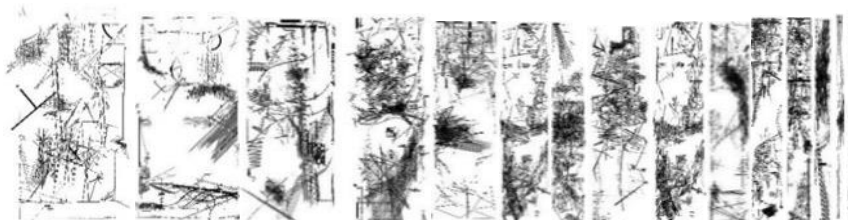


Figure 3.6.12. First 15 drawings of "Chamberworks" (libeskind.com)

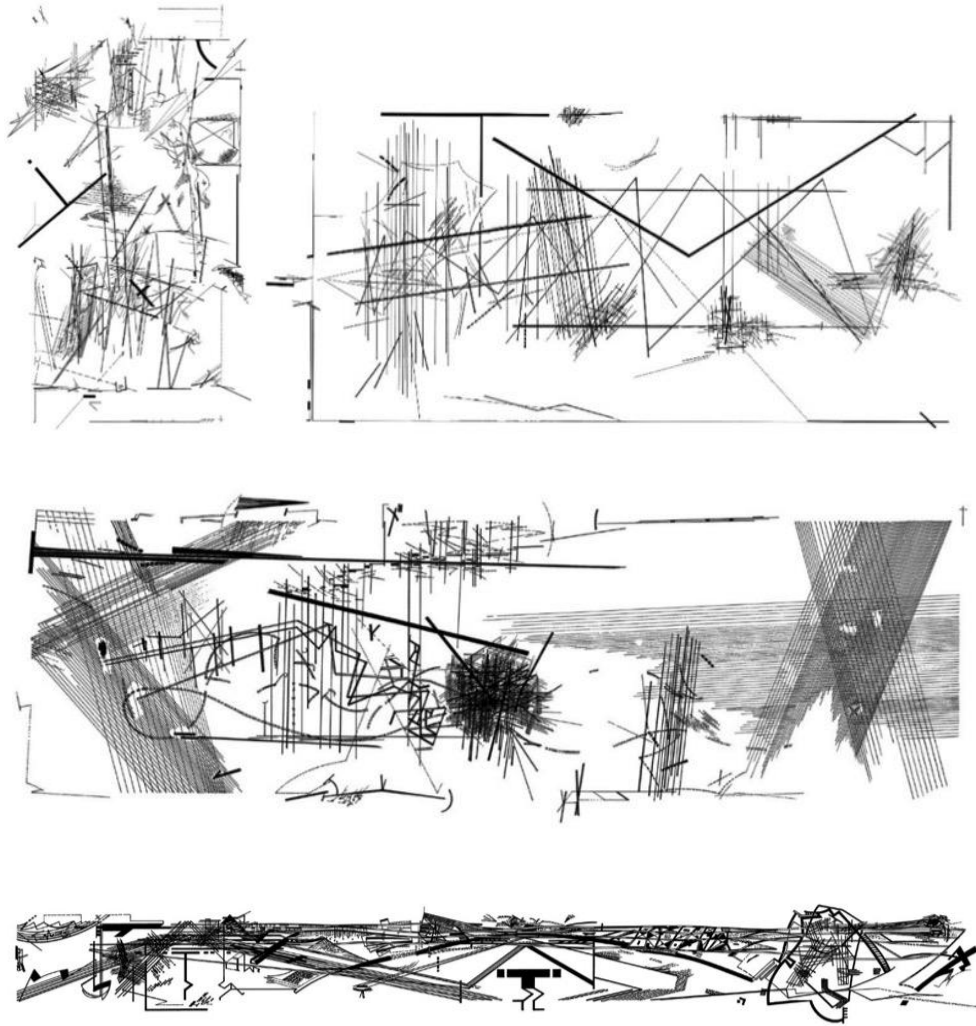


Figure 3.6.13. Other Examples of “Chamberworks” (libeskind.com)



Figure 3.6.14. Extension to Royal Ontario Museum (thecanadianencyclopedia.ca)

3.7. Westside Shopping and Leisure Centre (Bern, Switzerland, 2008)



Figure 3.7.1. Westside Shopping and Leisure Centre (nuesch.ch)

The Westside Shopping and Leisure Centre in Bern-Brunnen, Switzerland, is remarkable for its integration of architecture and landscape and the ways of inviting glimpses of the natural world into the indoor space of a large urban shopping complex.

The volumetric composition of the retail space of the Westside project is organized in the well-tested convention of boxes and their effective relationship between retail, circulation, and delivery. As dialogue and contrast to this convention, the Westside “mall” is developed into a structure that articulates public spaces and leisure facilities in a sculptural architecture; even the columns with right angle break into floors like massive rocks (SWI swissinfo.ch - English, 2008).



Figure 3.7.2. Westside Shopping and Leisure Centre (designboom.com)

Volumetric Composition

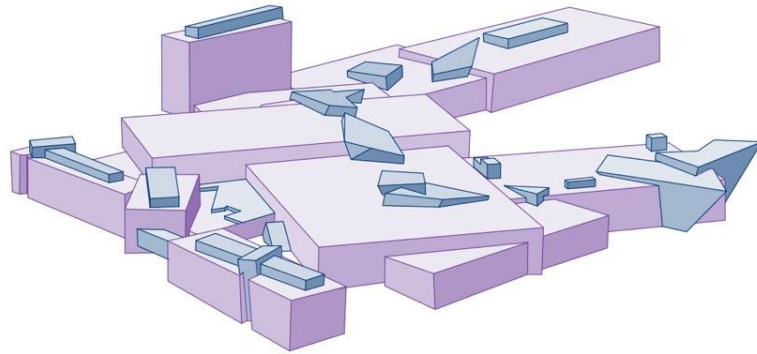


Figure 3.7.3. Westside Shopping and Leisure Centre Volumes (by author)

In this design, Libeskind combines simple shapes, mostly cubes, and cuboids. The form of each volume is distinctive because of its height difference with other volumes. Several irregular volumes are added to mentioned shapes. However, since they are smaller and have light color materials, they draw less attention in comparison with other shapes. These volumes have ceiling windows and provide natural light for the interior space.

In an interview with Swiss Broadcasting Corporation, Libeskind says that he wanted to change the idea of placing building next to highways as if they are irrelevant, so he considered the highway as an influencing factor while he designed the building. Another connection of the building with its site is its wood claddings which harmonize with the surrounding countryside, while the pointy edges of volumes with metal claddings are in modern urban style (SWI swissinfo.ch - English, 2008).

Planimetric Composition

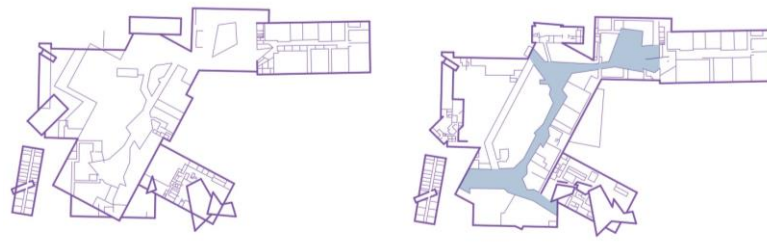


Figure 3.7.4. Westside Shopping and Leisure Centre's Floor Plans (by author)

In plans, we can see that most of the vertical surfaces of volumes do not continue inside the building. Inside the building, there is a corridor that connects all volumes, (which is shown in blue). The interior spaces (rooms) are mostly rectangles that are connected by irregular spaces. The patterns on floors and lights make these spaces seem more irregular.



Figure 3.7.5. Westside Shopping and Leisure Centre's Interior (fotocommunity.de)



Figure 3.7.6. Westside Shopping and Leisure Centre's Interior (raisedgardenbed.club)

Openings

This building has large linear windows on its cuboid volumes, and the irregular volumes have skylights. The slanted bold linear windows on cuboids, lessen the emphasis on the cubic volumes of building and make a balance between the simple forms of cubes and slanted lines. Here Libeskind wanted to have glimpses of natural light into an urban space. In the interview with Swiss Broadcasting Corporation, he claims that interiors are bathed in daylights due to massive ceiling windows (SWI swissinfo.ch - English, 2008).

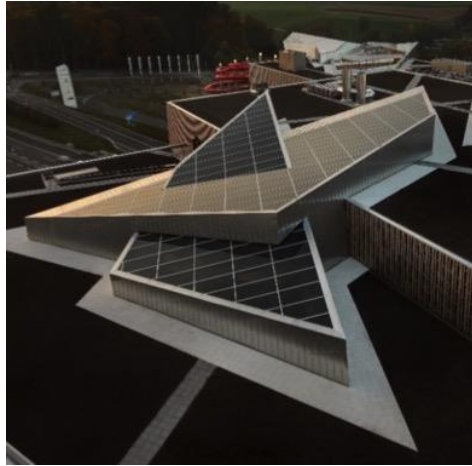


Figure 3.7.7. Roof windows of Westside Shopping and Leisure Centre (libeskind.com)



Figure 3.7.8. Roof windows of Westside Shopping and Leisure Centre (archdaily.com)



Figure 3.7.9. Westside Shopping and Leisure Centre (archi.ru)

3.8. Contemporary Jewish Museum (San Francisco, USA, 2008)



Figure 3.8.1. Contemporary Jewish Museum (archweb.it)

Studio Libeskind designed this new museum in 2008 as a dialogue with the main building. Its angled, glowing blue steel-clad structure is inserted within the historic red brick building from the 19th century.

Libeskind based the design of the building on the two Hebrew letters “L’Chaim,” which means “To Life.” Following the Jewish tradition, letters are not only signs but significant participants in the story they create.

The forms of the addition are clad in bright blue steel panels that help to diffuse and soften the reflection of light. The panels change color in different times of day, the weather, and the viewer’s position (Libeskind, 2008).

Before analyzing the volumes and plans, taking a brief look at the mentioned letters of Hebrew will be helpful to understand the building.

Letter Yod י

Based on “the Glorious Hebrew Letters” book, “Yod י” is the tenth and the smallest letter of Hebrew alphabet; thus for starting to write any Hebrew letter we have to start with writing Yod. The symbol for Yod is “hand.” This letter first appears in Genesis 3:22. “And the LORD God said: “... he ‘the man’ must not be allowed to reach out his hand and also take from the tree of life and eat, and live forever” (Kelley, 2010, p: 42). Accordingly, the letter Yod is not only a start for every Hebrew letter, but also it is the reason for the beginning of life on earth.

Letter Cheth ח

“Cheth/Heth” is the eighth letter of Hebrew alphabet; 8 means humanity and reformation. Also, this is a feminine letter in Hebrew and symbolizes cultivation and life (Kelley, 2010, p: 37).

Volumetric Composition

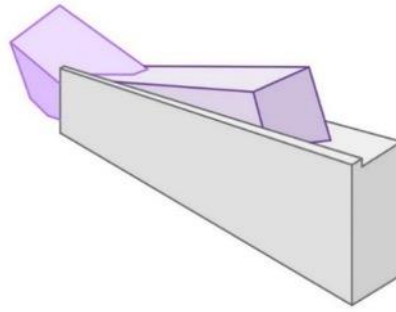


Figure 3.8.2. Contemporary Jewish Museum's Volumes (by author)

In the picture above purple volumes are Libeskind's design. In this extension, he does not interrupt the facades, and they mostly affect the top of the existing building. The color of both buildings is blue, which according to "Color Studies" book, in Judaism blue symbolizes holiness (Anderson Feisner and Reed, 2014, p: 187).



Figure 3.8.3. A view of Cheth and Yod Buildings (themuseumwow.wordpress.com)



Figure 3.8.4. South elevation of the museum (divisare.com)

Planimetric Composition

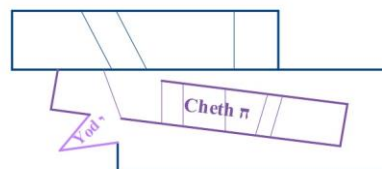


Figure 3.8.5. Ground Floor Plan (by author)

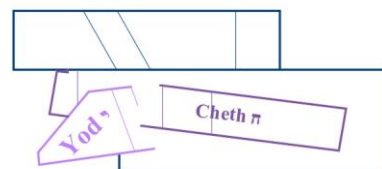


Figure 3.8.6. First Floor Plan (by author)

The vertical planes of Libeskind's design continue inside the building. At the entrance of the building, visitors can see parts of both new and old building. The Yod volume is the entrance and the starting point of the museum. The Cheth volume continues almost in accordance with the main building's volume, without making any disruption on its façade.

A significant element in the building is the "PaRDeS Wall." According to the website of the museum (thecjm.org, 2008) it is designed by Libeskind and is placed in the span of the lobby. This wall is an abstract representation of the Hebrew acronym PRDS referring to four distinct levels for interpreting traditional Jewish texts: literal, hinted, allegorical, and mystical. Each of the four letters of the acronym is embedded into the wall and illuminated, to show the museum's philosophy of embracing multiple interpretations and layers of meaning.



Figure 3.8.7. Entrance of the Museum (libeskind.com)



Figure 3.8.8. The "PaRDeS" wall (archello.com)



Figure 3.8.9. The Gallery on the Ground Floor
(artbusiness.com)

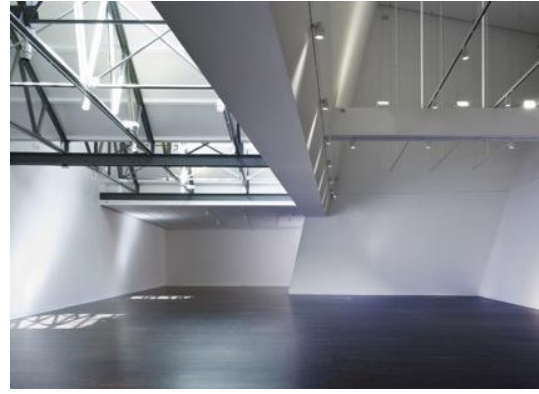


Figure 3.8.10. The Gallery on the Ground Floor
(smwllc.com)

Openings

In this building, the volume that is inspired by letter Yod has thirty-six windows. 36 is a significant number in Judaism. The letter Cheth volume has a single opening, which is also the entrance to the building.

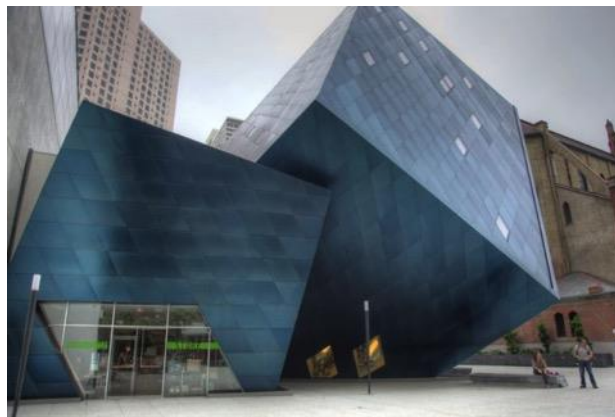


Figure 3.8.11. Contemporary Jewish Museum (inexhibit.com)

3.9. The Villa (Datteln, Germany, 2009)



Figure 3.9.1. The Villa (www.ec-a.ru)

This home completed in Germany can be constructed and shipped to almost any location in the world. The prefabricated structure is built of three interlocking ribbons with striking angles, creating an asymmetrical, double height, and a dynamic interior (Libeskind, 2009).

Volumetric Composition

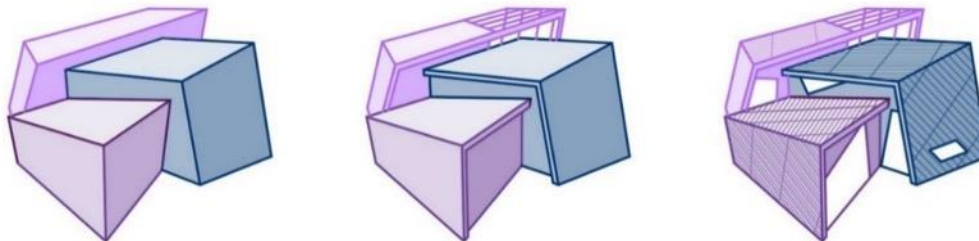


Figure 3.9.2. The Villa's Volumes (by author)

This building is formed by the connection of three volumes. It becomes more complicated by extension of some planes, adding irregular windows, diagonal patterns on walls and characteristic railings of the balcony.

Planimetric Composition

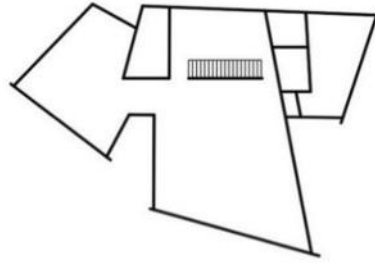


Figure 3.9.3. Outline of Ground Floor
Plan of the Villa (by author)

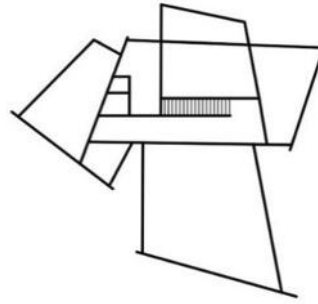


Figure 3.9.4. Outline of First Floor
Plan of the Villa (by author)

In plans, especially in the first-floor plan, stairs are like a center for the level. In simplified plans, it seems like four main shapes are connecting each other (picture 1), but in fact, a shape is broken to get closer to center, which is the staircase. (Picture 2). This break is evident in the plan, not in the volumes.

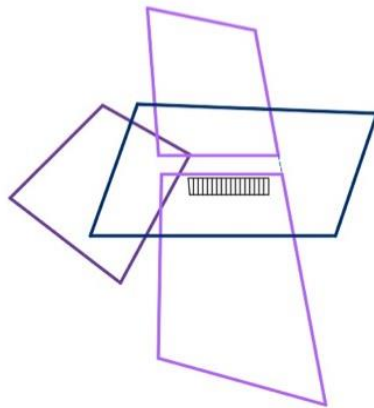


Figure 3.9.5. Picture 1 (by author)

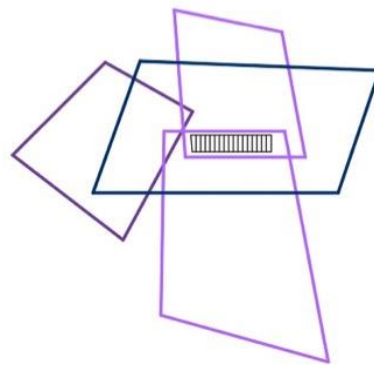


Figure 3.9.6. Picture 2 (by author)

Openings and Subtractions

Openings of this building have irregular shapes. Their slope is opposite of the slope of the volume that they are on and this makes a balance among the pointy angles of this building. A subtraction in this building is part of a volume that is entirely carved out. It is used as a balcony, and the surface of its volume is railing of the balcony.



Figure 3.9.7. The Villa (mgerwingarch.com)



Figure 3.9.8. The Villa (www.ec-a.ru)

3.10. 18.36.54 House (Connecticut, USA, 2010)



Figure 3.10.1. 18.36.54 House (architizer.com)

The name of the building derives from the number of its planes (18), points (36), and lines (54). This structure is designed as one folded plane, and the form of a spinning ribbon inspires its form. Within this scrolling of the ribbon, an enclosure is attained by use of large glass planes that at junctures virtually disappear. Circulation within the house is free-flowing, a theme which carries through in the almost-nonexistent distinction between inside and outside (Libeskind, 2010).



Figure 3.10.2. 18.36.54 House (dobkanize.com)



Figure 3.10.3. 18.36.54 House (nikolaskoenig.com)

Volumetric Composition

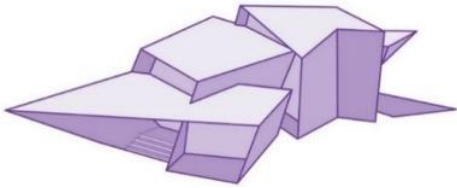


Figure 3.10.4. 18.36.54 House Volume

(by author)

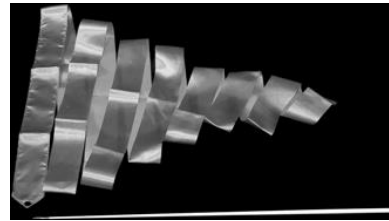


Figure 3.10.5. A Spinning Ribbon (avidcruiser.com)

As it was mentioned, this building looks like a spinning ribbon. According to Marotta the spiral belongs to the genetic patrimony of humankind and has right of entry into the dimension of the myth, like the Tower of Babel. Also, he believes in the spiral movement of history and art, the encounter of external and internal worlds and the labyrinth of discovery (Marotta, 2013, pp: 101- 102). Here seemingly Libeskind encounters external and internal worlds by designing full glass planes as windows so that inside and outside are not completely divided. Also, he designed roof planes that extend to surfaces of volumes, and as a result, some portion of the outside is drawn to inside. Also, some planes are not designed only to define an interior space, they continue further and draw some portion of outside to the inside of the building, like the wall in figure 3.10.8 and planes in Figure 3.10.3.

Planimetric Composition

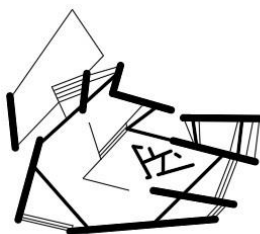


Figure 3.10.5. Outline of Ground Floor Plan of 18.36.54 (by author)

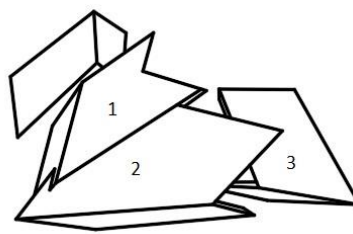


Figure 3.10.6. Outline of Roof Plan of 18.36.54 (by author)

If we look at the plans, roof plan and the volume we can see that this house is divided into four volumes. The volume that contains dining room has the highest roof (1), the volume that contains kitchen and living room have a lower roof (1), and the volumes that contain bedroom and entrance have the lowest roof (3). Libeskind made bedroom and entrance cozier by low roofs, not by dividing them entirely by walls. In the pictures below, we can see how he uses height and level differences, furniture and partial walls for dividing spaces.



Figure 3.10.7. Interior Space of 18.36.54
(revistaestilopropio.com)



Figure 3.10.8. Interior Space of 18.36.54
(architizer.com)

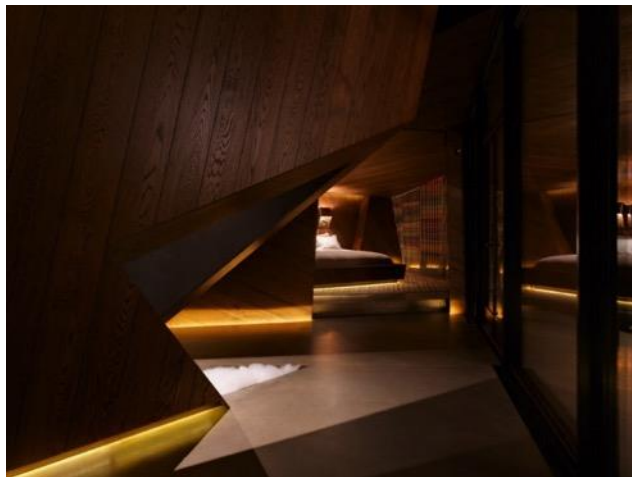


Figure 3.10.9. Interior Space of 18.36.54
(pinterest.com)



Figure 3.10.10. Interior Space of 18.36.54
(architizer.com)

18.36.54 and the “Wall House” of Leonard Hejduk

According to Antonello Marotta 18.36.54 House is Libeskind’s response to his teacher, Leonard Hejduk’s “Wall House,” which was a house provided with a wall like a slab and conceived as a dialectic relation between inside and out. From the origins of architecture to present, a wall defines a private territory. Yet the Modern Movement sought a free interchange between the private interior and the public exterior. Here also, in the house without walls, Libeskind broke the traditional way of using walls, to raise a question of the unsolved aspects of walls (Marotta, 2013, pp: 26-27).



Figure 3.10.11. The Wall House 1970 by HEjduk (podolski.be)

Openings

A spinning ribbon inspires the shape of this building. There are no windows on the surface of the ribbon. They are fully transparent planes that intersect the ribbon surface, so the junctures are virtually disappeared. Also division between inside and out is less distinctive.



Figure 3.110.12. 18.36.54 (knowledgefile.rzb.h5h.ir)



Figure 3.10.13. 18.36.54 (archiemons.com)

3.11. Military History Museum (Dresden, Germany, 2011)



Figure 3.11.1. Military History Museum (libeskind.com)

The design boldly interrupts the main building's classical symmetry. The extension, a massive, wedge of glass, concrete, and steel, cuts into and through the former classical order. Its high viewing platform provides views of modern Dresden while pointing towards the triangulation of the area where the firebombing began in Dresden (Libeskind, 2011).

Volumetric Composition

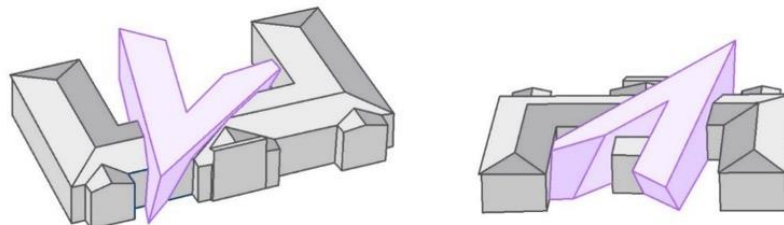


Figure 3.11.2. Military History Museum's Volumes (by author)

Libeskind's extension to Military History Museum is in the shape of an asymmetric triangle and also head of an arrow. It affects all facades and roof of the existing building. However, the facades of the main building can be seen, because of the semi-transparent surfaces of the extension. The first building of the Military History Museum was finished in 1876. It is a symmetric building made of concrete. Its exhibitions have a chronological order, and Libeskind claims that his design interrupts the part of the building that relates to 1914-1945 (TEDxViadellaConciliazione, 2013). The shape of the extension is like a "wedge," and the perforated surface of the

extension provides a look towards the center of rebuilt Dresden, which was entirely ruined by the firebombing of 1945 (Murphy, 2012).

Planimetric Composition

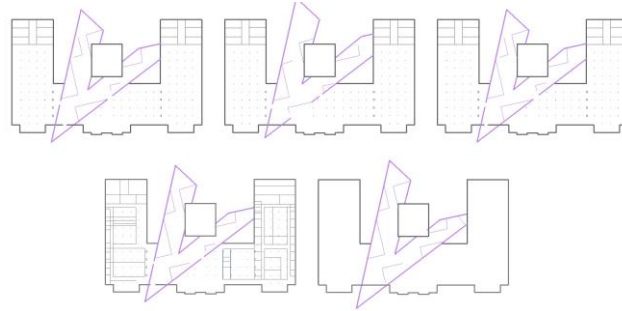


Figure 3.11.3. Outline of Floor Plans of Military History Museum (by author)

Although the surface of the extension's volume provides a view of the main building due to its semi-transparent facades, the extension interrupts the plans' symmetry entirely. The galleries in the main building have high roofs, and display areas are placed in between columns. High roofs and the columns placed in perpendicular axes and, give an impression of continuity and flow throughout the gallery space. In contrast, the extension which is related to the era between 1914 and 1945 has zigzag-shaped walls, lower roofs, and materials with dark colors.

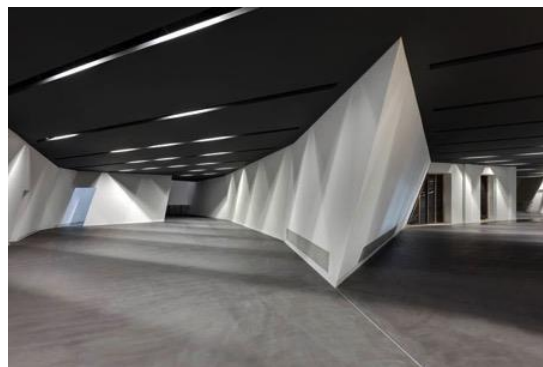


Figure 3.11.4. Interior of Libeskind's Extension to Military History Museum (inhabitat.com)



Figure 3.11.5. Interior of the main building of Military History Museum (designbuild-network.com)



Figure 3.11.6. A view of interior of the main building and the extension (theplan.it)

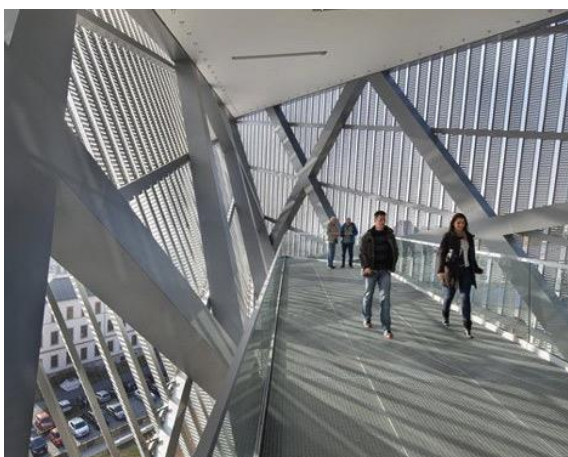


Figure 3.11.7. Head of the Arrow of Libeskind's Extension (blog.naver.com)

Openings

The extension designed by Libeskind is a volume that intersects the main building. Although it is roughly interrupting the main building's façade, it is semitransparent, and the main building is visible through the extension.



Figure 3.11.8. Military History Museum (uk.phaidon.com)

3.12. Magnet (Tirana, Albania, 2014)



Figure 3.12.1. Magnet (pierofanizzi.com)

“The thirteen story tower is crescent-shaped in the plan, rising with stepped terraces. The ridges of the undulating façade and the peaked penthouse silhouettes echo the surrounding mountain range seen beyond the city skyline from the terraces and balconies of each unit (Libeskind, 2014)”.

Volumetric Composition

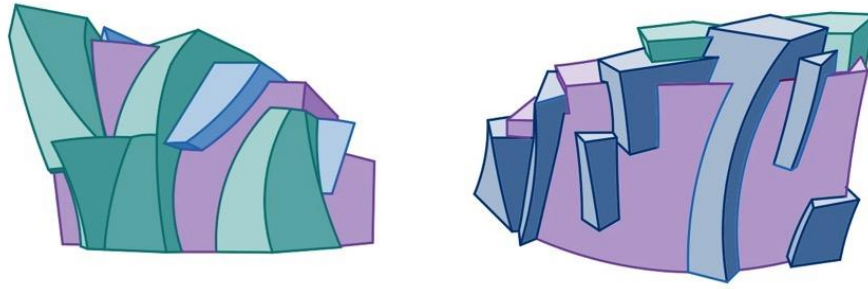


Figure 3.12.2. Magnet's Volumes (by author)

This building is formed from a main crescent shape volume and other volumes that some of them are connected on the top. The shapes other than the main one are mostly balconies, which look like rib bones coming out of a body. These volumes' connection on top and their similarity to the rib bones give an impression that they continue inside the building.

Planimetric Composition

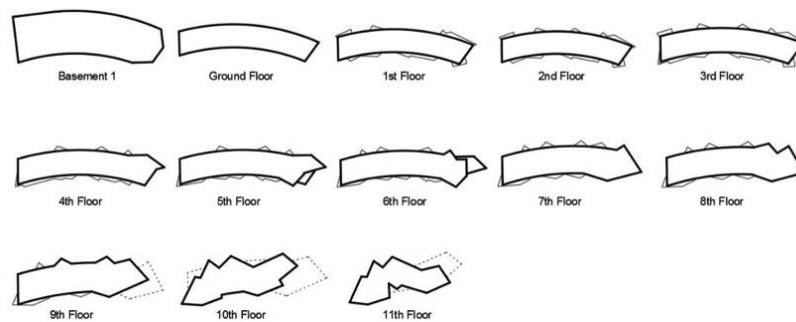


Figure 3.12.3. Outline of Floor Plans of Magnet (by author)

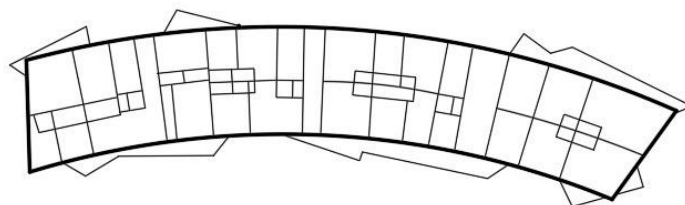


Figure 3.12.4. First Floor Plans of Magnet (by author)

Since the interiors of all floors are nearly the same, only the first-floor plan is shown here. As we see the primary volume is getting smaller on higher floors and in the last two floors, it completely disappears. Another point that we see here is that surfaces of balconies do not continue to the inside of the building. Also, unlike the intricate look of the exterior, the interior has mostly rectangular shapes and parallel lines.

Openings and Subtractions

Unlike all the buildings analyzed before, this building has rectangle windows that are placed on facades with almost regular patterns. The parallel subtractions of other volumes (balconies) make them look like ribs that are coming out of the main shape.



Figure 3.12.5. Magnet (archinect.com)

3.13. Vitra (2015)



Figure 3.13.1. Vitra (archi.ru)

The multi-faceted glass tower includes 14 floor-through apartments. A shaped composition of glass balconies with green gardens (Libeskind, 2015).

Volumetric Composition

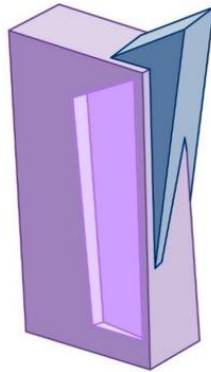


Figure 3.13.2. Vitra's Volumes (by author)

This building is formed of two interlocking shapes and a subtracted shape, which contains balconies. Libeskind claims that this building expresses the vibrant culture of Brazil (Phaidon, 2015). Glass facades may be used as a means for this expression since it is like a mirror reflecting the skyscrapers around it.



Figure 3.13.3. Vitra's Volumes (architizer.com)

Planimetric Composition

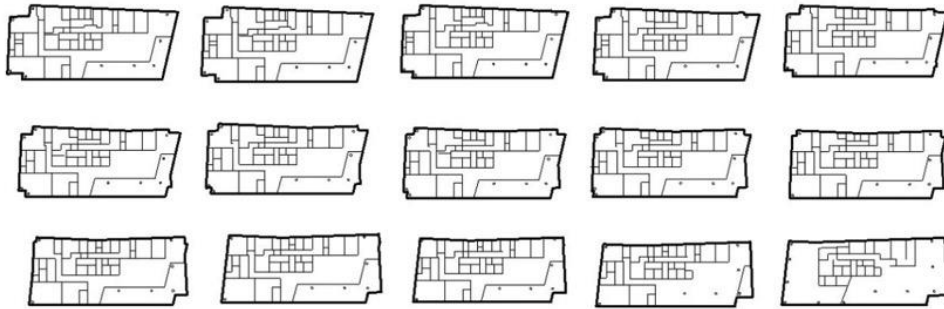


Figure 3.13.4. Floor Plans of Vitra (by author)

Plans are almost the same throughout all floors except the last floor. Figure 3.14.5 shows the reflection of the volumetric composition in the plans.

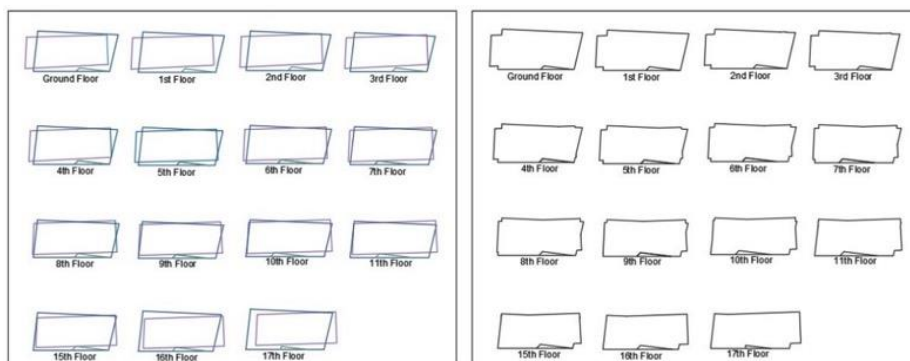


Figure 3.13.5. Outline of the Plans of Vitra (by author)

Openings and Subtractions

In this building, all surfaces are made of glass and act as openings. Besides, Libeskind subtracted a volume from building and added parallel horizontal surfaces which act as balconies.

CHAPTER 4

THE COMPARISON

All the selected case studies are individually analyzed. Considering the analysis, now common points and similarities of cases will be analyzed. The first examined part is the process of formation of the buildings. Next part will be about extensions designed by Libeskind and the method they are added to other buildings. The last part will be about the openings, additions and subtractions in buildings. The section on “Openings” contains both two-dimensional openings (windows, gaps on surfaces) and subtractions.

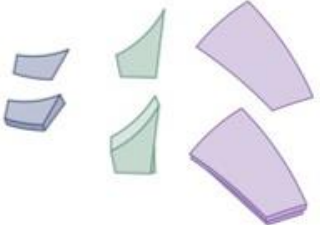

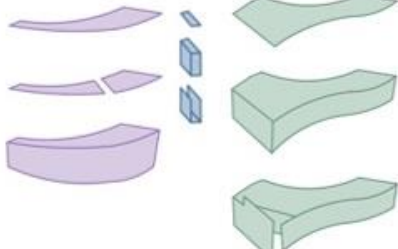
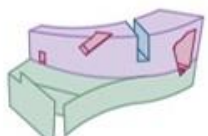
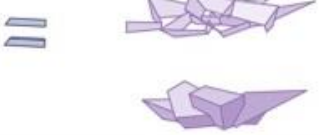



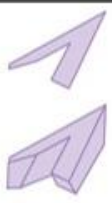
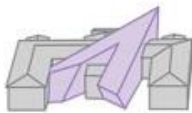
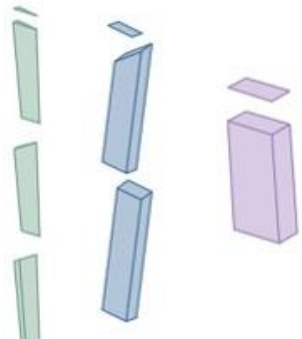

4.1. Formation Process of Volumes

Considering the buildings that were analyzed in this study, the formation of volumes of Libeskind’s buildings can be separated into two categories: 1. from surfaces to volumes, 2. Volumes. 3. Interior volume.

4.1.1. From Surfaces to Volumes

This category includes the buildings displaying a design process that starts from drawing surfaces. Even in the final shape of most cases, the emphasis is on the surfaces rather than volumes. In the table below the buildings that are related to this category are shown. The column on the right, shows the final shapes of buildings. The middle column shows the transition of surfaces into their final forms.


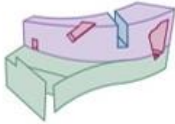


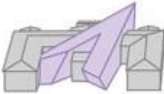

Table 4.1. The buildings transformed from surfaces to Volumes

Imperial War Museum		
Studio Weil		
Extension to DAM		
18.36.54		
Military History Museum		
Vitra		

An Overview of Buildings Transformed from Surfaces to Volumes

In the Extension to the Denver Art Museum, Fredric C. Hamilton Building, 18.36.54 House and Vitra the emphasis is on continuity. The first building is shaped by a surface turning around itself. The second one is also formed of a continuous surface. Vitra is formed by continuity and repetition of three horizontal surfaces in slanted axes on several floors. In the second case, the transparency of other surfaces connects the outside in the inside. In contrast to this continuity, in the Imperial War Museum emphasis is on discontinuity and breakage, since its form is inspired from a shattered globe. In Military History Museum, although there is no discontinuity in Libeskind's design itself, it creates a discontinuity on the facades of the main building that it was added to. Studio Weil is the other building in this category with its unique inspiration, which is Volvelle discs.



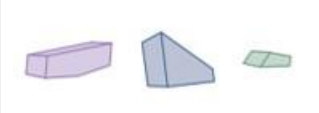

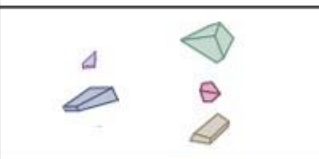
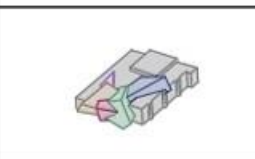

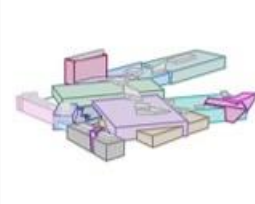


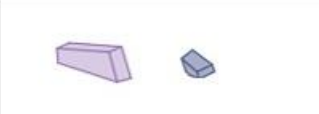
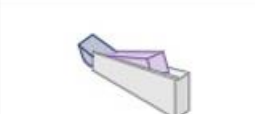
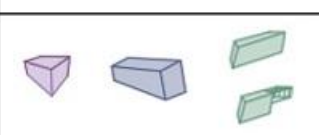
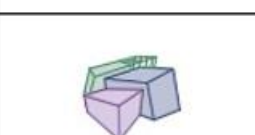
Table 4.2. Main features of buildings transformed from surfaces to Volumes

Imperial War Museum		- A shattered globe
Studio Weil		- Series of concentric rings with an imperfect shape (Lull's Volveles)
Extension to DAM		- A single folded paper
18.36.54		- A spinning ribbon
Military History Museum		- A wedge pointing Dresden
Vitra		- Three horizontal surfaces extruded in oblique axes

4.1.2. Volumetric Compositions

In the buildings, related to this category the focus is mainly on the volumes rather than surfaces. Unlike the previous buildings that their forms were originally inspired from shapes of surfaces, these buildings were designed as a combination of volumes in the first place. In the chart below the component volumes of the buildings are shown separately.

Table 4.3. The buildings designed as volumetric compositions (by author)






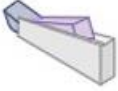

Felix Nussbaum Haus		
London MET		
Royal Ontario Museum		
Westside Shopping and Leisure Centre		
Magnet		
Contemporary Jewish Museum		
The Villa		

An Overview of Buildings designed as volumetric compositions

The concepts of the buildings in this category are more varied than the first category. Here in London Metropolitan University and Westside Shopping and Leisure Centre the focus is on unity. Both buildings unify different functions in a single building. The shapes of these buildings are formed from connecting a number of volumes, as well. The focal points of the other cases are as is mentioned below.

The linear cuboid shapes in Felix Nussbaum Haus present the sense of fear and difficulties in Nussbaum's life. Libeskind's design in Royal Ontario Museum resembles crystals coming out of a desert. It may also be a symbol of extinction. The volumes attached to the main crescent shape volume in Magnet, look like rib bones coming out of the body. In Contemporary Jewish Museum, Jewish symbols inspired Libeskind's design. The Villa is formed of three simple volumes which became more complicated by adding texture and irregular openings on the surfaces.

Table 4.4. Main features of buildings designed as volumetric compositions (by author)

Felix Nussbaum Haus		- Claustrophobic cuboids symbolize difficulties
London MET		- Unifying dissimilar volumes
Royal Ontario Museum		- Intersecting volumes - Crystals coming out of sand
Westside Shopping and Leisure Centre		- Unifying several volumes - Connection
Magnet		- Main crescent shape with added volumes - Rib bones
Contemporary Jewish Museum		- Cheth and Yod letters
The Villa		- Interlocking volumes with striking angles


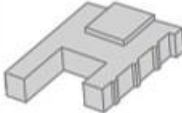

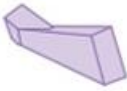

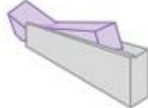
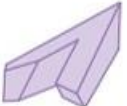

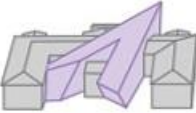
4.2. Extensions

A common point among some of Libeskind's buildings is that they are extensions to existing buildings. In this part, the main concern is to analyze different ways of adjoining new and old buildings. In general, Libeskind has two ways of adding a new building to an existing one; he intertwines buildings or attaches them by a corridor.

4.2.1. Intertwined Buildings

In the table below intertwined extensions are shown in purple, and main buildings are in gray. The common point among these museums is that the extension is added on or inside the building rather than attaching to it by a corridor.

Table 4.5. Intertwined Extensions (by author)

Royal Ontario Museum			
Contemporary Jewish Museum			
Military History Museum			

One of the main features of the Royal Ontario Museum is that the building is a combination of different parts made in different periods of time and each part represents the architecture of its era. While all parts of ROM are more reminiscent of Classical architecture, Libeskind's part represents the modern era of architecture, such as shiny materials and distorted shapes. Hard crystals come out from soft sand in deserts inspired the form of this museum, which is a nature museum. Also collapsed volumes of this design, might be a reference to the galleries inside them since they are about extinct animals.

Extension to Contemporary Jewish Museum is placed on top of the building and does not penetrate the main building's facades. The Yod (symbol of the start of everything)










is like a start point of the building. The volume of letter Cheth (symbol of life) continues along with the main building.

The extension to Military History Museum boldly interrupts the original building's symmetry in the part that relates to years 1915-1945. This interruption is a symbol of difficulties of those years. The volume is also in shape of an arrow that is toward the rebuilt Dresden.

4.2.2. Extensions attached with Corridors

Corridors connect these extensions to the main building. In the chart below the main buildings are shown in gray, extensions in purple and corridors in blue.

Table 4.6. Extensions attached by corridors (by author)

Felix Nussbaum Haus			
London MET			
Extension to DAM			

The extension to Felix Nussbaum Haus is formed out of linear cuboids that all look like corridors. Here Libeskind implies difficulties of the artist's life by making visitors walk among thin corridors. Also since Nussbaum has lived in different cities and each city had its difficulty, passing through corridors may be a symbol of the artist's life passing through hard stages.

In London Metropolitan University the corridor is much less noticeable than both the extension and the main building.

In Extension to Denver Art Museum, the extension is connected to the main building by a long glass corridor.

4.2.3. Similarities and Differences among the Extensions

Connections

In general, to emphasize a specific era, Libeskind's extensions penetrated both facades and roof. Though, in other cases, extensions are attached by a corridor to the main building. In the extension to the Denver Art Museum, there is an emphasis on the corridor, and as it was mentioned in the previous chapter in this building, the focus is on the continuity and flow. The extension to the Felix Nussbaum Haus is formed of corridors, due to the emphasis on the idea behind this design which is fear and difficulty.

Shapes

Regarding shapes of extensions, most of the cases have pointy edges and slanted walls. According to Jonathan Glancey, in the extension to London Metropolitan University, with his "explosive building" Libeskind creates a landmark for the whole street (Glancey, 2004). In the extension to Denver Art Museum, the form of the extension may look like collapsed and broken volumes, but it is, in fact, a plane line that wraps around itself. It is also in contrast with the stability and firmness of the main building. In Royal Ontario Museum and Military History Museum, these harsh extensions are symbols of difficulties in a specific era. In the Contemporary Jewish Museum, although the volumes look as if collapsed and unstable, they do not penetrate the main building roughly; the Yod volume is like a start point, and the Cheth volume continues along the main building. The only case with cuboid shapes is the extension to the Felix Nussbaum Haus, which the claustrophobic corridors are symbols of fear and difficulty in different stages of Nussbaum's life.

Materials

Another common point among the extensions is the use of shiny materials in most of their facades. In Felix Nussbaum Haus one of the volumes has a shiny façade; different facades in this extension is a symbol of disharmony. In the extension to London Metropolitan University, in addition to the explosive form of the building, the material has an important role to make it a more noticeable landmark. In Denver Art Museum not only the form of the extension is in contrast with the main building, but also its material is also in contrast with it. Since the Royal Ontario Museum is about nature, in designing its extension, Libeskind is inspired from shiny crystals coming out of

sands in deserts. Facades of extension to Contemporary Jewish Museum are shiny blue, is a symbol of holiness in Judaism.

4.3. Openings

Although there are formal similarities among the openings and subtractions in the studied cases, they have the most various impressions among the common points that are analyzed in this thesis. Formally similar openings are divided into four categories.

1. Linear windows
2. Irregular windows
3. Full glass surfaces
4. Semi-transparent surfaces

The tables below contains descriptions of the openings of these categories and their main features. Openings with similarities other than their forms are shown in rows with the same colors.

Table 5.7 shows the linear windows. Although these buildings cannot be categorized precisely, the focal point of three of them is continuity (blue rows), and two of them is breakage (purple rows). Other two cases have individual concepts (green and yellow rows).

Table 4.7. Buildings with linear openings (by author)










Imperial War Museum (the Water Shard)		- A window continues on two facades symbolizes continuity of horizon
London MET		- Windows give a sense of continuity since they continue in between floors
Westside Shopping and Leisure Centre		- A single linear window on each facade - Bold Linear windows lessen the emphasis on cubic volumes
Imperial War Museum (the Water Shard)		- Broken rectangles are reminiscent of the tectonic formation of continents
Extension to DAM		- The L-shaped window separates the main surfaces of the volumetric composition from the roof surface
Felix Nussbaum Haus		- A linear light in contrast to the black covering
Royal Ontario Museum		- Windows are inspired from "Chamberworks". (Rethinking geometry through the idea of line)

Table 4.8. Buildings with irregular openings (by author)

Felix Nussbaum Haus		- Shape of windows resemble auto portraits of Nussbaum.
The Villa		- Contrasting shapes of windows and walls create balance.

By designing full glass surfaces Libeskind brings parts of nature into the buildings (table 4.9).

Table 4.9. Buildings with full glass surfaces (by author)

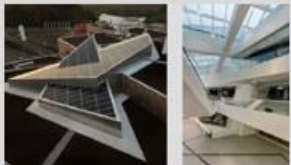




Westside Shopping and Leisure Centre		- Bringing the natural light inside the building
18.36.54 House		- Bringing nature inside the building

Table 4.10. Buildings with semi-transparent surfaces (by author)

Imperial War Museum North (the Air Shard)		- Semi-closed interior space help visitors to be able to feel the weather conditions
The Villa		- Balcony railings
Military History Museum		- The façade of the main building is visible through the extension

4.4. Additive and Subtractive Forms

The buildings with additive forms are shown in table 4.11. In some cases they are designed as extensions for other buildings. In the other cases they are originally made from additive forms. The subtractive forms mainly have functional impacts on buildings, rather than conceptual impacts (table 4.12.).

Table 4.11. Additive Forms (by author)



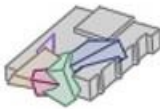
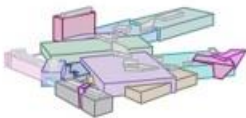

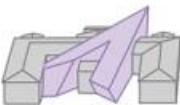
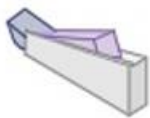


Felix Nussbaum Haus		- Volumes are added to the main building
London MET		- Interlocking volumes are added to the main building.
Royal Ontario Museum		- Collapsing volumes are added to the main building
Westside Shopping and Leisure Centre		- Several volumes are connected to create a building
The Villa		- Three volumes are interlocked
Military History Museum		- The extension is added to and disrupts the main building's façade.
Contemporary Jewish Museum		- The extensions are added in front and on top of the main building.
Magnet		- The volumes are added to the main volume with a crescent shape. Then some parts of added volumes are subtracted.
Vitra		- Two volumes are added and a volume is subtracted.

Table 4.12. Subtractions (by author)

Studuio Weil		- A connection point between Libeskind and Weil
		- Carving out volumes to place hidden windows
The Villa		- Carving out volumes to place balconies
Magnet		- Carving out volumes to place balconies
Vitra		- Carving out volumes to place balconies

CHAPTER 5

CONCLUSION

As it was mentioned in the first chapter, Libeskind is criticized because of the similar forms he uses in his architecture. So this thesis aims to understand if the similar forms also have similar meanings or not, since Libeskind claims he is against habitual forms in architecture. To reach this aim, first, Libeskind's description about his architecture and a number of his buildings, the outlines of planimetric and volumetric compositions, openings and subtractions of selected buildings are studied in the fourth chapter. This chapter also studied how the inspirational points of designs have transformed into buildings. The fourth chapter analyzed similar forms in the buildings and whether similar forms convey similar meanings. In the following paragraphs, the conveyed information in each chapter is reviewed concisely.

Libeskind claims in his designs, he takes the inspirations from the roots of the cultures and manifests them in his own way. He defines seventeen pairs of words which are the main inspirations for his designs. These pairs contain two opposite words, where the first word in each pair is the inspirational word for Libeskind. A number of these are directly related to the formal aspect of design. These pairs include:

Inspirational Words	Opposing Words
Hand	Computer
Complex	Simple
Real	Stimulated
Raw	Refined
Risky	Safe

A number of these pairs is related to the form and the meaning it conveys, which are:

Inspirational Words	Opposing Words
Expressive	Neutral
Radical	Conservative
Emotional	Cool
Inexplicable	Understood
Unexpected	Habitual
Communicative	Mute
Pointed	Blunt





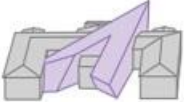

The mentioned words are general and are implied to all of his designs. Nevertheless, after studying each building at a more specific level, it can be concluded that each building has its sources of inspiration. In the third chapter, the sources of inspirations of each building are studied. The fourth chapter analyzes the formal similarities regarding different aspects and the meaning they convey, or concepts they symbolize. The first analyzed aspect is the formation process of the buildings. Regarding this aspect buildings are divided into two categories:

1. The buildings converted from surfaces to Volumes
2. The buildings designed as volumetric compositions.

In table 5.1 the sources of inspirations of buildings in the first category and in table 5.2 are written briefly.

Table 5.1 and 5.2 refer the inspiration sources of buildings in the first and second category respectively.

Table 5.1. Inspiration sources of the buildings converted from surfaces to Volumes (by author)

Imperial War Museum North		- A shattered globe
Studio Weil		- Llull's Volvelles
Extension to DAM		- A single folded paper - Continuity and movement
18.36.54 House		- A spinning Ribbon
Military History Museum		- An arrow pointing Dresden - Disrupting the main building's façade
Vitra		- Expressing the vibrant culture of Brazil - Three surfaces extruded in oblique axes

As we can see in the table above, in addition to similar forms, some buildings have similar inspirational sources, too. The emphasis in Imperial War Museum North and Military History Museum is on breakage and discontinuity; since the first building is inspired from the shape of a shattered globe and the second building disrupts the façade of the main building.

The emphasis in the Extension to Denver Art Museum, 18.36.54 House and Vitra is on continuity. The first two buildings are shaped from folding a single plane and Vitra is shaped from extruding surfaces in oblique axes.

Table 5.2. Inspiration sources of the buildings designed as volumetric compositions (by author)



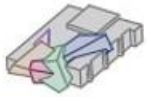


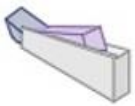

Felix Nussbaum Haus		<ul style="list-style-type: none"> - Claustrophobic corridors show the difficulties of Nussbaum's life - Unfinished volumes symbolize unfinished works of Nussbaum
London MET		<ul style="list-style-type: none"> - Creating a landmark for the street
Royal Ontario Museum		<ul style="list-style-type: none"> - Crystals coming out of sand
Westside Shopping and Leisure Centre		<ul style="list-style-type: none"> - Connecting two sides of highway by unifying several volumes
Magnet		<ul style="list-style-type: none"> - A crescent shape and connected volumes - Rib bones
Contemporary Jewish Museum		<ul style="list-style-type: none"> - Hebrew letters
The Villa		<ul style="list-style-type: none"> - Interlocking volumes

Table 5.2 shows that the emphasis in London Metropolitan University and Westside Shopping and Leisure Centre is on unifying volumes and connection. The other buildings have different inspirational sources.

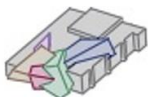

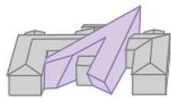

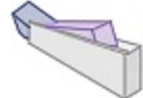
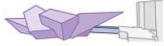
In chapter 4.2 the extensions designed by Libeskind are overviewed. Regarding this aspect, buildings are divided into two categories:

1. Intertwined Buildings

2. Extensions attached with Corridors

Table 5.5 shows the buildings in each category, and the reason for the way of their attachment to the main building.

Table 5.3. Connection of the extensions (by author)

Intertwined Extensions			Extensions attached by corridors		
Royal Ontario Museum		- Emphasis on a specific era	Felix Nussbaum Haus		- Corridors are symbols of difficulties
Military History Museum			London MET		- The Emphasis is on the extension rather than the corridor
Contemporary Jewish Museum		- Extension placed on top and continues along the building	Extension to DAM		- The focus is on movement and continuity

Chapter 4.2 also studies the other similarities among the extensions, which are the material of their facades and their shapes. Table 5.6 shows the similarities of shapes. Table 5.7 shows similarities of materials.

Table 5.4. Similarities of the extensions' shapes (by author)













Buildings		Shapes
Felix Nussbaum Haus		- Linear and claustrophobic cuboids show the difficulties in Nussbaum's life.
MET London		- The building creates a landmark for the whole street
Extension to DAM		- The extension contrasts with the main building's stable shape.
Royal Ontario Museum		- Contrasts with the main building's symmetry and represents modern architecture.
Contemporary Jewish Museum		- Inspired from Hebrew letters
Military History Museum		- Inspired from the shape of an arrow, placed toward Dresden

Table 5.5. Similarities of the extensions' materials (by author)

Buildings		Material
Felix Nussbaum Haus		- Different materials symbolize the disharmony in Nussbaum's life
MET London		- The shiny building creates a landmark for the whole street
Extension to DAM		- The extension contrasts with the main building in terms of material.
Royal Ontario Museum		- It is inspired from crystals coming out of sand.
Contemporary Jewish Museum		- Blue symbolizes holiness in Judaism
Military History Museum		- The shiny facades are reminiscent of material of an arrow

Chapter 4 lastly analyzes the similarities in the openings of the buildings. Considering this aspect, openings are divided into four categories, which are:

1. Linear windows
2. Irregular windows
3. Full glass surfaces
4. Semi-transparent surfaces

Tables 4.7, 4.8, 4.9 and 4.10 represents the openings with similar forms. As it was mentioned in those tables among buildings with linear openings, the emphasis of

openings of Imperial War Museum North (the Water Shard), London Metropolitan University and Westside Shopping and Leisure Centre is on continuity. In contrast the emphasis on linear windows of Imperial War Museum North (the Earth Shard) and the Extension to Denver Art Museum is on breakage. Other openings in this category and the remaining categories have different inspirational sources.

The last aspect analyzed in chapter 4 was the additive and subtracted forms. As it is shown in table 4.11 and 4.12 additive forms are mostly designed as extensions to other buildings. Subtractive forms are mostly used to create spaces for balconies.

After reviewing the analysis of buildings, it can be deduced that Libeskind's seventeen words of architectural inspirations are all applied to the buildings in different ways. The first sketches of the buildings are not *computer* made designs, but rather his drawings or forms of simple tools such as a broken globe, folded papers, ribbons or Volve discs. The forms are *complex* and *risky*; these points are more evident in the extensions. Because they are added to classical symmetric buildings that contrast notably with Libeskind's designs. All the studied buildings are *raw* and without *refined* surfaces.

Since all of his buildings have different inspirational points and are symbolizing different concepts, they are *expressive*, *emotional* and *communicative*. For designing radical spaces, he takes the roots of a culture, but does not represent them in a habitual way, and this makes buildings *inexplicable* and *unexpected*.

Although Libeskind's designs are unexpected comparing to the buildings they are added to, he is criticized because of the formal similarities among his own buildings. Regarding this issue, the main question of this thesis was to understand if the formal similarities in Libeskind's buildings convey similar meanings or not. This thesis studied the designs according to descriptions of Libeskind about them, the outline of their planimetric and volumetric compositions, their openings and subtractions chapter 4. As a result, the findings of chapter 5 are by comparing aspects studied in chapter 4.

Concerning this framework of information, it is concluded that in some cases such as formation processes of some buildings, the way of connecting extensions to main buildings, linear windows, and subtractions similar forms have similar meanings. Yet in general, most of the similar forms are inspired by different tools and concepts.

Concerning this framework of information, it is concluded that the buildings with similar formation processes, especially the buildings transformed from surfaces to volumes have the most common meanings compared to other aspects that are analyzed in this study. Also in a number of cases, linear windows have similar inspirational sources; yet since the common inspirations distinguished among linear windows were two opposite concepts of *continuity* and *breakage*, a clear meaning could not be comprehended. Considering the functional uses, subtractions were forms with the highest amount of similarity. Additive volumes and the openings were similarities with the most various inspirational points.

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Appendix A: Completed Buildings by Daniel Libeskind

- Jewish Museum Berlin (1989)
- Garden of Love and Fire (1992)
- Outside Line (1997)
- The Wohl Centre (2001)
- The Run Run Shaw Creative Media Centre (2002)
- Tangent Façade (2003)
- Glass Courtyard, Jewish Museum Berlin (2004)
- The Ascent at Roebling's Bridge (2004)
- Bord Gáis Energy Theatre and Grand Canal Commercial -Development (2004)
- Citylife Residences (2004)
- Denver Art Museum Residences (2005)
- Haeundae Udong Hyundai I'Park (2005)
- Reflections at Keppel Bay (2005)
- Zlota 44 (2005)
- Memoria E Luce, 9/11 Memorial (2005)
- Crystals at Citycenter (2006)
- Forum at Leuphana University (2007)
- Cabinn Metro Hotel (2008)
- L Tower & Sony Centre (2008)
- Kö-Bogen Düsseldorf (2009)
- Academy of the Jewish Museum Berlin in the Eric F. Ross Building (2010)
- Centre De Congrès à Mons (2011)
- Corals at Keppel Bay (2011)
- Museum of Zhang Zhidong (2011)
- Sapphire (2012)
- Ogden Center for Fundamental Physics at Durham University (2013)
- Ohio Statehouse Holocaust Memorial (2014)
- Vanke Pavilion (2015)
- The Wings (2015)
- National Holocaust Monument (2015)

Appendix B: Published Books about Daniel Libeskind

- The Space of Encounter (2001)
- Perfect Acts of Architecture (2001)
- Daniel Libeskind (2001)
- A Passage through Silence and Light: Daniel Libeskind's Extension to the Berlin Museum (2001)
- Die Deutschen Sind Immer Die Anderen (2001)
- The New Paradigm in Architecture (2002)
- The Danish Jewish Museum & Daniel Libeskind (2004)
- Breaking Ground (2004)
- Architectures Experimentales (2005)
- Museums in the 21st Century: Concepts, Projects, Buildings (2006)
- The Architectural Reader: Essential Writings from Vitruvius to the Present (2007)
- Counterpoint: Daniel Libeskind in Conversation with Paul Goldberger (2008)
- Bold Visions: The Architecture of the Royal Ontario Museum (2008)
- Daniel Libeskind (2008)
- London 2000+ (2008)
- Daniel Libeskind and the Contemporary Jewish Museum San Francisco (2008)
- Great Modern Architecture (2009)
- The Daniel Libeskind Research Studio (2010)
- Sonnets in Babylon (2011)
- Eminent Architects: Seen by Ingrid Von Kruse (2012)
- La Linea Del Fouco (2014)
- Daniel Libeskind (2014)
- Moving Focus (2015)
- Inspiration and Process in Architecture (2015)
- The Buildings that Revolutionized Architecture (2015)
- Sonnets in Babylon (2016)