Contemporary Surface Architecture: The correspondence between surface and space

Lu FENG

July 2008

Thesis submitted for the fulfillment of

the degree of Doctor of Philosophy in Architecture

School of Architecture

The University of Sheffield

CONTAINS PULLOUT

Acknowledgements

For my parents,
and,
for my dream and love.

Thanks to my supervisor Prof. Jeremy Till. This thesis would not have been possible without the support and help of him.

Many thanks to Prof. Sarah Wigglesworth and other members in the group of PhD by design course, and those invited critics in design reviews. The thesis benefited greatly from the discussions with them, and from their comments and criticism.

Many thanks also to the support, help and encouragement of the staff of the school and the university, especially Prof. Jian Kang, and to that of all my friends within or outside the school.

Summary

This thesis aims to investigate aspects of contemporary architecture that concentrate on the role of surface, in sense of *demateriality*. The word 'demateriality' denotes the spatiality rather than a physical substance; it does not refer to the actual absence of matter or the abolishment of the solid materials of construction. Rather it describes the phenomenal perception of a particular spatialisation that the surface creates through either the way it is formed or through the optical quality of its materials. The terms *surface* and *surface architecture* discussed in this thesis thus have specific meanings beyond the generally received understanding of 'architectural surface', 'material surface' and so on. What is focused on is the particular role of surface architecture as a spatial boundary, especially between inside and outside spaces. In this context, the research aims to explore the correspondence between the surface and space, between the forms of the surface and the experience that they induce.

As a programme of PhD with design, this research includes both theoretical and practical approaches, including a design research project supported by an extensive literature review and theoretical argument. The thesis mainly consists of five parts. It begins from an *Introduction* including subject and questions, context, definition and methodology of the research. *Chapter One* is about a critical review of history of surface-space architecture, both in theory and design will be considered first. This will mainly focus on the architecture of 20th century modernism. *Chapter Two* focus on contemporary theories and practices of surface architecture, as well as the conception of surface in other intellectual areas such as philosophy and cultural theory. Based on a rigorous theoretical framework built by the historical and contemporary research, a series of design works will be developed in *Chapter Three*, and attempt to offer a further understanding and rethinking of the knowledge gained from the first phase. Finally, at the end of the thesis, there is a brief *Conclusion*.

Contents

Acknowledgements ---------- i

Summary ---------- ii

Contents ---------- iii

Introduction ---------- 1

0.1 Aims and Objectives ---------- 2

0.2 Research Context ---------- 3

0.3 Definition and Background Theories ---------- 8

0.4 Methodology ---------- 12

Chapter One: The Horizon of Surface Architecture in Modernism ---------- 17

1.1 The End of Façade, the Beginning of Surface-Space ---------- 18

1.1.1 Façade and Surface ---------- 18

1.1.2 Surface-Space Discussion ---------- 31

1.2 Simplification and Composition ---------- 36

1.2.1 Enclosure ---------- 36

1.2.2 Dressing and Cladding ---------- 43

1.2.3 Partition and Unbroken Plane ---------- 46

1.2.4 Envelope and Free Façade ---------- 55

1.3 Transparency and Reflection ---------- 62

1.3.1 Skin ---------- 62

1.3.2 Picture and Display Window ---------- 65

1.3.3 Reflective Surface ---------- 71

1.4 Key Terms of Surface in Modern Architecture ---------- 76

Chapter Two: Phenomenal Demateriality and Spatiality of Contemporary Surface Architecture ---- 82

2.1 Scope ---- 83

2.2 Smoothness and Folding Surface ---- 93

2.2.1 Blob ---- 100

2.2.2 Folded Surface ---- 126

2.2.3 Topographical Surface ---- 143

2.3 Translucency of Surfaces ---- 160

2.3.1 Translucent Skin ---- 167

2.3.2 Veiling Surface ----182

2.3.3 Imaging Surface ---- 192

2.4 Key Terms of Contemporary Surface Architecture ---- 207

Chapter Three: Diagram of Surfacescape, Dialogue between Theory and Design -------- 213

The Illustration of the Diagram of Surfacescape ----214

3.1 The Diagram of Surfacescape ---- 215

3.2 Breeding A: The Transformation between Partition and Blob ---- 219

3.3 Breeding B: The Transformation between Picture Window, Partition and Translucent Skin- ---- 235

3.4 Breeding C: The Transformation between Unbroken Plane and Topographical Surface -- 248

3.5 The Potential of the Diagram ---- 261

Conclusion ---- 263

Bibliography ---- 274

Figure Sources ---- 284

Introduction

0.1. Aims and Objectives

This thesis will examine aspects of contemporary architecture that concentrate on the role of surface. The philosopher, Avrum Stroll, in his 1988 book *Surfaces* defined surfaces as the "thin spreads that form the upper or outer boundaries of embodiments."[1] My research focus is the way that architectural space is affected specifically by the surface, rather than the materials, of architecture. The objective of my research will therefore concern the aspects of the spatiality of architectural surface, such as enclosure, folding or transparency, translucency etc, rather than the actual materials of the surface e.g. colour, texture, coating and so on. The thesis thus concentrates on what is termed the *demateriality* of surface. The word 'demateriality' denotes the spatiality rather than a physical substance; it does not refer to the actual absence of matter or the abolishment of the solid materials of construction. Rather it describes the phenomenal perception of a particular spatialisation that the surface creates through either the way it is formed or through the optical quality of its materials. This will be discussed in some detail in section 0.3 below, and also at the beginning of the Chapter Two, as the prelude to the main discussion of contemporary surface architecture.

The discussion of the relationship between 'surface' and space in architecture has a historical background in the theories of, among others, Semper in the 19th century and Giedion in the 20th. Nowadays, the term 'surface' occupies a significant position in contemporary architecture. On one hand, there are an increasing number of discussions of surface in various theoretical contexts; on the other hand, there is an increasing interest in and application of an ever broader range of surface formations in architectural practice. The research aims to observe the relations between these two spheres and thus to make a critical analysis of both the theory and practice of surface. In this it is hoped to offer a contribution to a key area of architectural thinking and practice.

The aim of this research is twofold: 1). to find a specific approach to understand contemporary surface architecture, and in particular the forms of the surface and the experience that they

---

[1] Avrum Stroll (1988), *Surfaces*, (Minneapolis: University of Minnesota Press), 208.

induce. 2). to develop design propositions and prototypes within a rigorous theoretical framework, and through such design works further understand, and explore the knowledge gained from the first phase. The research will combine both theoretical and practical approaches, including a design research project supported by an extensive literature review and theoretical argument.

The research question has three parts, all of which relate to the significant position that surface plays in contemporary architecture, especially in the context of 'folding' and 'translucency'. Firstly, what is the relationship between 'surface' theories and 'surface' practice, both in the contemporary world and the historical context, and then what are the differences between them? Secondly, how can the outcome of such historical and theoretical study be transferred as a useful reference for the exploration of design? Lastly, based on the understanding of the preceding knowledge, how might one develop design proposals as critiques and developments of some of the current positions?

In order to address these questions, the research will trace 'surface' through three main lines of inquiry:

A critical review of the history of surface-space architecture, both in theory and design will be considered first. This will mainly focus on the architecture of 20th century modernism.

- Secondly, the research will focus on contemporary theories and practices of surface architecture, as well as the conception of surface in other intellectual areas such as philosophy and cultural theory. The correspondence between the demateriality of surface architecture and its phenomenal spatiality, and competing notions of surface in contemporary architecture will be investigated.

  Thirdly, based on the historical and contemporary research, a series of design works will be used to develop propositions and prototypes and attempt to offer a rethinking of current positions.

0.2. Research Context

The term *surface* has become increasingly used in recent architectural theory and practice. Since

the 1990s, one can identify a large number of texts and discourses which refer to 'surface', as well as a number of monographs which used 'surface' as their titles; these are discussed briefly below. Most of these present differing interpretations of the word 'surface', meaning that the contemporary discussions of surface present a complex landscape of different, and often competing, positions. Moreover, it is not as if surface is just a contemporary term; it has a clear historical legacy in both the theory and practice of the 20th century and earlier. These references serve to further increase the complexity of the discussion of surface.

The state of current research into architectural surface will be introduced through a study of key texts. It is not the intent to describe the whole state of contemporary surface discussions but only those that contribute to the particular research questions and context. Some of these texts, mainly monographs, will be briefly introduced here as representative of the current research context.

1). There are a number historical and theoretical monographs about the surface in modernism: for example, *Surface & Symbol – Giuseppe Terragni and the Architecture of Italian Rationalism*, by Thomas L. Schumacher published in 1991; *White Walls, Designer Dresses: The Fashioning of Modern Architecture*, by Mark Wigley in 1995; *Weimar Surfaces: Urban Visual Culture in 1920s Germany*, by Janet Ward in 2001; and *Surface Architecture*, by David Leatherbarrow and Mohsen Mostafavi in 2002. Schumacher's book focuses on the 'façade' of buildings designed by Terragni and others in Italian modern movement, and describes how their architecture contributed to the Modern movement. In particular, Schumacher draws on Peter Eisenman's analysis to explain how Terragni, in the Casa del Fascio in Como, transferred interest from the building as 'object' to the relationship between different surface elements.[2] In *White Walls, Designer Dresses*, Wigley is mainly concerned with the relationship between fashion and the surfaces of modern architecture, especially the particulars of the white wall and its cultural meanings.[3] Ward's book focuses on the cultural situation and interpretation of urban visual

---

[2] Thomas L. Schumacher (1991), *Surface & Symbol – Giuseppe Terragni and the Architecture of Italian Rationalism*, (London: Architecture Design and Technology Press), 164.
[3] Mark Wigley (1995), *White Walls, Designer Dresses: The Fashioning of Modern Architecture*, (Cambridge Mass. and London: The MIT Press), xiv.

surfaces in the 1920's Weimar Republic, including architecture, advertisement, movies and fashion. Ward's main argument concerns the creation of postmodern simulation and its cultural system, especially the figure of popular consumption, which occurred following the formation of Modernity and was obtained through the visual expressions of modern surfaces.[4] Leatherbarrow and Mostafavi's book focuses on the representation of surfaces in relation to their instrumental production and use of technology, mainly drawing on examples from modernist architecture in the 20th century. Architectural surface is considered as a site of the contest between structure and skin, a site made possible once the skin of the building became independent of its structure in the late 19th century.[5] Finally, there is a volume of *The Cornell Journal of Architecture* titled *The Vertical Surface*, published in 1988. This is a collection of essays concerning the modern architecture of surface, including an article by Thomas L. Schumacher who defines two types of surface in Modernism and the late of the 20th century as the "skull" and the "mask" respectively.[6] He suggests that surface architecture in Modernism was mainly the direct outcome of the creation of 'space' and the application of technology, but more recently, especially in so-called post-modernism, there is a return to the precedence of ornament and representational meanings. All these historical reviews show that, in modern architecture, surface is already a significant matter which relates to space, technology and culture.

2). New tendencies of surface architecture have been arisen since the 1990s. In 1993, two architectural journals introduced two major aspects of contemporary surface. First is an issue of *Architectural Design*, with the title *Folding in Architecture*. The many theories and design projects in this issue show the interest in a new morphology of surface architecture. In Greg Lynn's essay *The Folded, the Pliant and the Supple*, this new tendency is referred to folding, smooth and topological surface.[7] Second is the monograph on Herzog and de Meuron in *EL*

---

[4] Janet Ward (2001), *Weimar Surfaces: Urban Visual Culture in 1920s Germany*, (Berkeley, Los Angeles and London: University of California Press), 1.
[5] David Leatherbarrow and Mohsen Mostafavi (2002), *Surface architecture*, (London, Cambridge Mass.: The MIT Press), 8.
[6] Thomas L. Schumacher (1987), "The Skull and the Mask: The Modern Movement and the Dilemma of the Façade", *The Vertical Surface, The Cornell Journal of Architecture* (Volume 3), (New York: Rizzoli International Publications. Inc), 5.
[7] Greg Lynn (1993), "The Folded, the Pliant and the Supple", *Architectural Design*, Vol. 63, No. 3/4 1993.

Croquis Vol. 60. With this major survey of these Swiss architects, this issue introduced a tendency of surface architecture which focuses on the treatment and the effect of materials. More recently, issues of architectural journals have taken 'surface' as the theme. For example, *Journal of Architectural Education* published a special issue on surface in 2003. This issue collected a series of essays which explored different approaches to architectural design, installation, furniture etc, in relation to a number of theoretical interpretations of surface. As the editor, Lily H. Chi, said: "The surfaces investigated in each vary in scale and concept, but all aim at spatial, temporal, and conceptual effects that extend well beyond their physical limits."[8] In the same year, *Architectural Design* published an issue titled *Surface Consciousness*. This issue introduced a wide range of surface projects including digital rendering, material treatment, technical and structural matters, electronic media and landscape etc, and the theoretical concerns of ornament and the interface between virtual and material. In his essay, *Surface-Talk*, Mark Taylor introduced Avrum Stroll's notions of surface. According to Stroll's definition and Semper's theories, Taylor suggested that an investigation of surface could lead to a way out of the conventional paradigm of structure/ornament, and instead focus on the perception and effect of surface rather than its material constitution.[9] These journals demonstrate that surface is an important theme in contemporary architectural practice. Since the 1990s, surface has been highlighted through the development of new geometrical form, particular material treatments, and new media.

3). There are also a number of monographs that deal with specific aspects of surface. Two volumes of *The Built Surface* published in 2002 are concerned with an art history of architectural surface as the pictorial art. The first volume focused on the subject in the period from antiquity to the Enlightenment,[10] and the second mainly on the classical period.[11] In relation to contemporary surface architecture, Alicia Imperiale published a book, *New flatness: surface tension in digital architecture,* in 2000. As suggested in the title, the major interest of

---

[8] Lily H. Chi (2003), "Introduction", *Journal of Architectural Education*, Vol. 57 Issue 2 2003, 5.
[9] Mark Taylor (2003), "Surface-Talk", *Surface Consciousness, Architectural Design*, Volume 73 No.2 2003, 31-32.
[10] Christy Anderson (ed.) (2002), *The Built Surface Vol.1: Architecture and the pictorial arts from antiquity to the Enlightenment*, (Aldershot: Ashgate Publishing Limited).
[11] Karen Koehler (ed.), *The Built Surface Vol. 2: Architecture and the pictorial arts from Romanticism to the twenty-first century*, (Aldershot: Ashgate Publishing Limited).

the book is the development of contemporary digital architecture, with an emphasis on the formation and presentation of surface on the computer screens. The term of "new flatness" referred to the idea of 'slippery' surface form in comparison to the flat surface of modern architecture.[12] The author lists a series of design projects and labelled them with different tags such as media surface, folded surface, mapped surface, topological surface etc, and also compiled a taxonomy of contemporary surface, with themes such as body surface, media interface and so on. This short book thus acts as a selected index of contemporary surface. Ellen Lupton's 2002 book *Skin: surface, substance, and design* is another index of contemporary surface design. This collection, including works in industrial design, biomedical production, furniture and architecture etc documented the tendency towards a 'new organicism' – the living but manufactured products resemble natural organisms – made possible with technological advances of our era.[13] Besides these collections, there are also publications which concentrate on particular aspects of surface, for example, *ijp: the book of surface*, published in 2003, by George Liaropoulos-Legendre. The book focuses on the correspondence between conceptual space, termed by the author as "superficial space", and surface forms of mathematical and informational complexity.[14] It mainly consists of an assemblage of a large number of geometric notations.

These references unfold a very broad landscape of the themes of surface architecture. However, as we shall see, the emphasis in many of the more recent approaches is on the formal and material aspects of surface. This thesis attempts to go beyond these morphological and physical themes by investigating the relation between surface and space; the way that surface inflects on the 'production' and perception of space. The debate about this relation is complex not only because of its complex historical context, but also due to the multiple statuses of the surface. This research work will be helpful for the understanding and further exploration of surface architecture.

---

[12] Alicia Imperiale (2000), *New flatness: surface tension in digital architecture*, (Basel; Boston; Berlin: Birkhäuser), 5.
[13] Ellen Lupton (2002), *Skin: surface, substance, and design*, (New York: Princeton Architectural Press), 29.
[14] George Liaropoulos-Legendre (2003), *ijp: the book of surface*, (London: AA Publications), 9.

0.3. Definition and Background Theories

The terms *surface* and *surface architecture* discussed in this thesis have specific meanings beyond the generally received understanding of 'architectural surface', 'material surface' and so on. The definition here focuses on the particular role of surface architecture as a spatial boundary, especially between inside and outside spaces. This specific understanding of the terms is founded on four main sources:

The first comes from psychologist James J. Gibson. In his *The Ecological Approach To Visual Perception*, Gibson indicated that visual perception depends on the direct information from surfaces and their relationship to the human visual system. For him, there is a "ground theory of space perception" that the perception of space and depth is no more than "the perception of a continuous background surface." Based on this, Gibson regarded the "ground theory" as a theory of the "layout" of surfaces, which includes both places and objects, meaning "the relations of surfaces to the ground and to one another, their arrangement."[15] In this context, it is argued that, in the area of perception, the definition of spaces depends precisely on the definition of surfaces. For Gibson, a simple building, for example a hut, could be seen as a hollow object that is an object as viewed from the outside but also an enclosure from the inside.[16] The relationship between inside and outside spaces is therefore decided by the surface of such a 'hollow object'. If a complex building is understood as an abstract hollow object, surface architecture could thus be regarded as a complex system of spatial boundaries. For an opaque surface, the role of the spatial boundary is mainly decided by its shape, in the case of an integrated surface, or the relationship of surface pieces; here morphology is thus the main factor in the perception of the spatiality of surface architecture. For transparent or translucent surfaces, the spatiality is produced by the visual superimposition of the surface boundary and the spatial images behind it. Even though Gibson's notion of 'space' is based on an empirical understanding of three-dimensional perception (an empiricism that is beyond the terms of this thesis), his connection of surface to space is still a useful reference.

---

[15] James J. Gibson (1979), *The Ecological Approach to Visual Perception*, (Boston: Houghton Mifflin Company), 148.
[16] Ibid., 34.

The second source is philosopher Avrum Stroll, Professor of Philosophy at the University of California, who published his philosophical book, *Surfaces*, in 1988. He argues that discussion of surface comes to play an important role in the understanding of the perception of the external world in the twentieth century. Stroll introduced four conceptions of surface in history, some of which deal with the surface as a physical entity, some of which see it as an abstract entity. LS, which he identifies with Leonardo da Vinci, is the form of surface as an abstract entity acting as an interface that marks the distinction between two things, or between "a thing and nothingness;" DS, as an abstraction, describes the surface that belongs to its corresponding entity, which is no longer a physical part but is a conceptual limit, a boundary acting as the outer limit; OS, which accords with the observation of surface by an ordinary person, is the surface of the entity and is a part of the object (usually the upper or outer part) deep enough to be become marked, scratched or scuffed, so it has thickness and is also a boundary; SS, which is conceived physically as the last layer of atoms, the outermost aspect of an object.[17] In the end, Stroll defines surfaces as "the thin spreads that form the upper or outer boundaries of embodiments."[18] Based on Stroll's definition, there are two specific points that can be emphasized here in terms of 'spreads' and 'embodiment'. For Stroll, 'spreads' means a formation extending simultaneously in at least two dimensions towards a state of "disseminated" and "complete coverage."[19] So, the first specific character of surface formation could be considered as the condition of continuous, spatial extension, i.e. continuity. The state of continuity refers not only the formation of surface, but also the form of its embodiment. The definition of surface in architecture can be found in the relationship between surface and its embodiment. If the materials e.g. concrete, brick, wood etc were seen as the embodiment, the term 'surface' is seen to refer to the status of the 'material surface' i.e. the materiality. However, if the spatial formation of the building is seen as a kind of conceptual embodiment, the term 'surface' refers to the condition of the spatial boundary. This idea is precisely the definition of surface that will be adopted in this thesis. It concerns the effect of spatialisation, in terms of the perception and

---

[17] Avrum Stroll (1988), *Surfaces*, (Minneapolis: University of Minnesota Press), 40-59.
[18] Ibid., 208.
[19] Ibid., 204-206.

experience of architectural space, especially the relationship between inside and outside spaces. It is a spatialisation that is dependent on formal factors over and above material factors, and as such leads to the term 'demateriality' of surface.

The third reference is from the theories of Gottfried Semper. There are two key terms for surface architecture that can be taken from Semper: *dressing* and *enclosure*. The term *dressing* indicates a separation between surface and structure, and introduces the role of ornament and representation of surface. The idea of dressing leads to discussions of tectonics and materials. The tectonic line is more concerned with the relationship between the skin or cladding and the structure in terms of its appearance and tectonic resolution. The material line is concerned with the treatment and expression of materials within the surface skin. The combination of the tectonic and the material leads to discussions of the relationship between appearance/construction, and between representation/technology. This can be found in Loos's discourse on cladding principles and ornament,[20] Frampton in his *Tectonic Culture*[21] and Leatherbarrow and Mostafavi in their *Surface Architecture*.[22] The main feature of these tectonic and material interpretations is the question of representation, over and above the issues of technical invention. Whether symbolic or metaphorical, the emphasis is on the semantic meaning or representational contents of surface as an outcome of *appearance*. This tends to limit the discussion of surface architecture to its visual or pictorial representation. Though the sensibilities of touch and the other senses are also clearly the consideration of tectonics and the treatment of materials, the issue of *appearance* tends to dominate because of the privileging of vision in both the human senses and the cultural realm.

The term *enclosure*, on the other hand, suggests an alternative approach towards surface, one which is dependent on its negotiation with the concept of *space*. According to James J. Gibson, enclosure is a *layout* of surfaces, which implies a formation of a simple shape, or an arrangement of relations between surfaces. In the case of architecture, the layout of surfaces can

---

[20] Adolf Loos (1898), "The Principle of Cladding", in Adolf Loos (2002), trans. by Michael Mitchell, *On architecture*, (Riverside, Carlifornia: Ariadne Press).
[21] Kenneth Frampton (1995), *Studies in Tectonic Culture*, (Cambridge, Mass.: The MIT Press).
[22] David Leatherbarrow and Mohsen Mostafavi (2002), *Surface architecture*, (London, Cambridge Mass.: The MIT Press).

be understood as the basis of surface architecture. Using the idea of *enclosure*, surface architecture in this thesis focuses more on the relationships between surface formation, spatial effect and the perception or experience of body. In contrast to the representational status of *dressing*, the effect of *enclosure* is more based on the configuration and transaction of spatial relations rather than on a reading of appearance.

Lastly, the arguments of the contemporary architectural theorist and philosopher Andrew Benjamin are used to develop the theoretical background of the thesis. In his paper *Surface effects: Borromini, Semper, Loos*, published in *Journal of Architecture* in 2006, Benjamin argued that surface could be considered "both as an existing architectural reality and as a theoretical concept," engaging with theories and practice at the same time.[23] For Benjamin, it is this dual role of surface that gives it equivalent status to the conception of space. He explains how the relationship between surface and space can be regarded as a significant agenda within architectural theory and practice, using the examples of Borromini, Semper and Loos. As Benjamin notes:

The argument in this paper is that surface should be understood neither as a merely structural, nor as a merely decorative aspect of building. Rather, the creation of surfaces (interior walls or facades and so on) organises a programme which allows for a reading of the space of architecture. The latter formulation—the space of architecture—has a double register. On the one hand, it refers to the specific architectural works, to particular buildings, and how they effect and affect the subject. On the other hand, it makes a broader, theoretical point about the way that architecture is conceived as an effect of the possibilities inherent in the materials used in the making of surfaces.[24]

Based on these four sources, there are a number of points that can be summarised here as the definition of surface architecture in this thesis: 1). It does not concentrate on appearance and material treatment but rather a production of spatial formation; 2). It will be considered

---

[23] Andrew Benjamin (2006), "Surface effects: Borromini, Semper, Loos", *The Journal of Architecture*, Volume 11 Number 1 2006, 3.
[24] Ibid., 1.

primarily in terms of spatial boundary; 3). The relationship of surface to space is established on its spatial effects, and the perception and experience of audiences, which is not pictorial but phenomenal (the clarification of the conception of phenomenal space will be introduced at the beginning of Chapter Two); 4). It will be treated as something that has both theoretical content and practical application, with each half informing the other in an oscillating relationship.

0.4. Methodology

As a programme of PhD with design, this research develops a particular methodology which is based not only conventional research methods but also includes the specific approach of research by design. In this thesis, what will be concentrated on is the significant relationship between history, theory and design. It will try to explore that how history and theory can engage in the idea of design, and equally how design might give its contribution back to the knowledge of theory and history. In this reflexive mode, the production of form per se will not be the main interest of this research by design. What will be at stake here is how to find an approach to the understanding, thinking and rethinking of the knowledge of surface architecture, through the intertwining of history, theory and design.

Christopher Frayling in his oft-cited 1993 paper *Research in Art and Design* divided research-design/art relationship into three categories: research "into", "for" and "through" design or art.[25] In the case of architecture, research "into" design regards architecture as an object to be interpreted on the basis of historical and theoretical perspectives; research "for" design refers to research to inform future applications, including into materials, instruments and technologies; research "through" design is a kind of action research in using design itself as part of the research methodology. In this context, the particular relationship between history/theory and design may be divided into two models. Conventional architectural historical and theoretical research can be understood as a model of "into" and "for". The former investigates existing design works, i.e. it is after design. The latter anticipates application in the future, i.e. it is before design. For such research, design mainly occurs as the existing or expected design

[25] Christopher Frayling (1993), "Research in Art and Design", *Royal College of Art Research Papers*, Vol.1 No.1.

production. In contrast, the research by design in this thesis will try to employ the idea of research "through" design as an effective research method in cooperation with others. In this mode, theory and design develop through a critical dialogue. Design will be considered as a specific approach of the understanding of theories, and theory will become an inseparable part of the process of design.

Using design as a research approach could be supported by recent rethinking and resetting of 'design' itself in academic debates. On one side, there is a general feeling that design cannot be regarded as research because it is "no more than a local problem-solving activity."[26] In his famous book *The Sciences of the Artificial*, first published in 1969, Herbert Simon defined designing as aimed at changing existing situations into more desirable ones and thus conceiving artefacts to enable such changes.[27] This is summarised by Nigan Bayazit: "Facing social and economic problems after World War II, and for the purpose of solving complex design problems and meeting user requirements, the fact of design was considered as a problem-solving and decision-making activity."[28] In eyes of Richard Foqué, based on such a scientific paradigm, design is necessarily a seeking for the "best solution".[29] However, as Bryan Lawson shows, this problem-solving paradigm of design has been challenged by the paradigm of "reflective practice" developed by Donald Schön since 1980s; as a result he argues the focus on design has been transferred from design method to design thinking.[30] In his paper, *Design as research*, Lawson further argues that designers gain an understanding of architectural knowledge through the act of designing itself, and use the design project to explore and develop their own intellectual programme and principles. "In this sense," he says, "the design process can itself be seen as a form of research."[31] Following Lawson's argument, design thus can be seen to have an alternative role of thinking and understanding in comparison with the paradigm of

---

[26] Bryan Lawson (2002), "Design as research", *arq*, Vol.6 No.2, 2002, 110.
[27] Herbert Simon (1969), *The Sciences of the Artificial*, (London and Cambridge, Mass.: The MIT Press).
[28] Nigan Bayazit (2004), "Investigating Design: A Review of Forty Years of Design Research", *Design Issues*, Vol.20 No.1 Winter 2004, 22.
[29] Richard Foqué (2001), "On the True meaning of Research by Design", in Anja Langenhuizen, Marieke van Ouwerkert, Jürgen Rosemann (eds.) (2001), *Research by Design International Conference proceedings B (November 2000)*, (Delft: Delft University Press), 1.
[30] B. Lawson, M. Bassanino, M. Phirl and J. Worthington (2003), "Intentions, practices and aspirations: Understanding learning in design", *Design Studies*, Vol.24 No.4 July2003, 328.
[31] Bryan Lawson (2002), "Design as research", *arq*, Vol.6 No.2, 2002.

problem-solving.

In the introduction to the special issue of *The Journal of Architecture* called *Research by Design*, Jonathan Hill argued that, in contrast to the role of problem-solving, design could be regarded as an intellectual action that moves between thinking to drawing. As revealed by its original word in the Italian, *disegno*, design means drawing and implies a direct link between an idea and a thing, confirmed as an intellectual activity since the Renaissance.[32] Hill further indicates that design could work effectively as an intellectual action precisely because the drawing is not merely a means of representation, but rather a dialogue between what is designed and how it is designed, between design intention and working medium, between thought, action and object.[33] Using Hill's cue, the act of drawing in this thesis will be considered as a dialogue between history, theory and design. As a process from thinking to drawing, design helps organize the action of understanding, thinking and rethinking of history and theory. Correspondingly, history and theory becomes the conceptual site and context of design works. If design, as Lawson maintains, is a specific and essential approach for architects to gain architectural knowledge, it could thus bring opportunities to explore new approaches to the renegotiation of particular theories, in comparison with conventional theoretical investigations.

If research is necessarily a regular and systematic action,[34] it will be also a question how to allow design to meet with these criteria. As argued by Jeremy Till in his paper *Too Many Ideas*, the act of architectural design is at heart contingent, and this contingency is a character of both the architectural domain and design action.[35] Till argues that through the combination of "intent" and "doubt", the property of contingency could be adopted as a "strength" of design because it allows a scope for reflection and possibilities.[36] The "intent" informs the start and

---

[32] Jonathan Hill (2003), "Introduction: opposites that overlap", *The Journal of Architecture*, Vol.8 Summer 2003, 163.
[33] Jonathan Hill (2003), "Hunting the shadow – immaterial architecture", *The Journal of Architecture*, Vol.8 Summer 2003, 174.
[34] Juhani Katainen and Seppo Aura (2001), "Dissertation in Architecture: Academic-based research and design-based research as alternatives", in Anja Langenhuizen, Marieke van Ouwerkert, Jürgen Rosemann (eds.) (2001), *Research by Design International Conference proceedings B (November 2000)*, (Delft: Delft University Press), 171.
[35] Jeremy Till (2001), "Too many ideas", in Anja Langenhuizen, Marieke van Ouwerkert, Jürgen Rosemann (eds.) (2001), *Research by Design International Conference proceedings B (November 2000)*, (Delft: Delft University Press), 317-318.
[36] Ibid., 320.

direction of design. The attitude of "doubt" allows for diversity in process and the end result, in that it does not assume a fixed solution. For design as research, these two can be supplemented with the notion of *coordinate*, which could be seen as a kind of spatial coordinates or geographical coordinates for tracing and orienting the action. A regular and systematic mapping of coordinates will guarantee a clarification of "intent" on one hand, and on the other hand, will define a specific scope of research and reveal the traces of diverse design proposals. With such coordinates, design can work more effectively as an organized exploration rather than a random seeking. In this instance, design is both contingent and precise. These coordinates will not be a specification of design, but rather an active platform. In this thesis, such coordinates will be created by a diagram of theoretical conceptions and key terms obtained through the investigation of history and theories of surface architecture. Within these theoretical coordinates, design work can find its precise position corresponding to the thinking, understanding and rethinking of history and theory.

The methodology of this research will include three main sections:
Firstly, standard historiographic methods such as literature review and case studies will be used to investigate and understand historical and current works.

Secondly, critical methods of historical and philosophical research will be used to establish a theoretical landscape including discussions of surface in the writings of architectural history and theory, and using approaches from philosophy and cultural studies. At the same time, critical studies of architectural projects will be used for the analysis of different approaches to architectural surface, especially contemporary cases. Each of these case studies will be related to the theoretical background. The conclusion to this stage will be summarized and visualized as a diagram of the dialogue between the theoretical contents and approaches of design practice. The diagram will set a number of theoretical terms against built or theoretical designs. Such a framework should not be seen as a theoretical conclusion for design work, but rather a creative platform including potential possibilities. The first phase of the research is thus intended to give a rigorous historical and theoretical basis to the subsequent design work. This diagram will not only concrete the historical and theoretical site and context for design, but also establish

relevant coordinates.

In the design phase of the research, a method of "experiment" borrowed from biology will be considered as a creative method of design. This methodology is based on the premise of establishing a taxonomy of surface, and uses the analogy of the biological gene as the vehicle for design. The "genes" are related to the key terms in the diagram summarized in the foregoing phase. The design is then executed as an experiment using the process of "breeding". Design will be used to breed various transformations employing different "genes" of surface form through the creative reinterpretation of a seminal project of modernism, and drawing on the diagram that summarized the first phase of the research. In this instance, the breeding of forms will be interwoven with the relevant breeding of theories. As a consequence, the diversity of design proposals will be shown through the development of the initial diagram. It is thus intended to use this process to inform the relationship between history, theory and design, between form and content. Design is thus used as a kind of research, as both a systematic investigation, and a creative exploration. In this way it is not intended to be a quasi-scientific procedure alone. It is hoped that the outcome will be a new framework for thinking surface, proposing new ways in which they might be formed both formally and materially, which in turn might feed back into the development of contemporary theories of surface.

Chapter One:

The Horizon of Surface Architecture in Modernism

1.1. The End of Façade, the Beginning of Surface-Space

Before moving on to the discussion of contemporary surface architecture, this chapter will give a brief historical overview of the architecture of surface in Modernism. There are two main considerations with regard to the period of Modernism as a significant historical context for this discussion: on one hand, with the end of the classical façade, terms such as enclosure, envelope and skin were used with the concept of 'surface'. On the other hand, it is the time when the term 'space' occupied the core of architectural theories and discussions after it became an architectural vocabulary in 1890s,[1] and in this process 'surface' played an indispensable role; in other words, early Modernism marked the start of the discussion of surface-space as an architectural concept. These two agendas – that of surface and space - are inseparable within the strategy of the Modern Movement.

This chapter will briefly introduce the specific difference between *façade* and *surface*, and then attempt to explain why surface architecture is significant for the concept of space and vice versa. The discussion of the correspondence between surface and space will be developed through reference to arguments made by Modernist architects and theorists often in relation to design projects. The investigation will reveal how those theoretical proposals affect practice, and also how the formation of surface architecture intervenes in either the configuration of theories of space or the perception of spatiality. It will not be possible to cover the entire spectrum of ideas about the surface-space relation in the period of Modernism. The examples are selected are not only because of their representative and influential roles in theory and history, but also because they create a distinctive set of criteria for the Modernist surface in relation to the discussion of contemporary surface architecture in next chapter.

1.1.1. Façade and Surface

One of the key manifestations in the rise of Modern Movement out of nineteenth century architecture is the transition from notions of the classical façade to the modern notion of surface. In the Oxford Dictionary of Architecture, façade is defined as "external face or elevation of a

---

[1] Adrian Forty (2000), *Words and Buildings: A Vocabulary of Modern Architecture*, (London: Thames & Hudson), 256.

Figure 1.1
Bailica di Santa Maria del Fiore in Florence, Italy, 1296-1887, by a series of architects.

building, especially the principal front."[2] By this definition, the notion of *façade* is compared to *face*, as an expressive means defined by the characteristics of externality and frontality (Figure 1.1). The metaphor of *face* is given to the *facade* because it generally relates to the expression of emotional, symbolic, semantic or metaphorical meanings. For David Leatherbarrow and Mohsen Mostafavi, this distinct representational role of the façade has existed since the late medieval and early Renaissance periods.[3] As they argue, in the Renaissance period, the façade was given a "partial autonomy" through being separated from the construction of the main building enclosure, and is used as a dominant instrument to bear "significatory attributes."[4] In the eighteenth century, the façade referred directly to the idea of *face* through the theories of architectural physiognomy which were developed by a number of architects including Etienne-Louis Boullée and Claude-Nicolas Ledoux.[5] In this instance, the 'facade' was not only

---

[2] James Stevens Curl (1999), *A Dictionary of Architecture*, (Oxford: Oxford University Press), 237.
[3] David Leatherbarrow and Mohsen Mostafavi (2002), *Surface architecture*, (London, Cambridge Mass.: The MIT Press), 9.
[4] Ibid., 9.
[5] Ibid., 9.

represented through decorated wall and columns on frontal side of the building, but also by the expression of elevations of volumetric mass. For example, in the projects of Boullée and Ledoux, the expressive intent is delivered by the facade of simplified volumetric form (Figure 1.2). As Hitchcock notes, even the forms of their design are highlighted by a quality of geometrical simplicity, the intent of Boullée and Ledoux aims to a kind of symbolism in regarding the expression and meaning as its main concerns.[6] In Frampton's view, this expressive manner is inherited by Karl Friedrich Schinkel in the middle of the nineteenth century, whose work "tended to stress the physiognomic character of the form itself."[7] In contrast, modern architecture is generally regarded as a place where the expressive role of the *façade* was abolished. As Leatherbarrow and Mostafavi said:

A commonplace of architectural history and criticism holds that the embrace of industrialization and its products in twentieth-century architecture led to the abandonment of the project of representation in architecture and of the primary instrument of representation – the façade. Were this indeed the case, it would mean the end of a very long-standing tradition, for the idea of the façade as a distinct representational face of the building has existed since the late medieval and early Renaissance periods.[8]

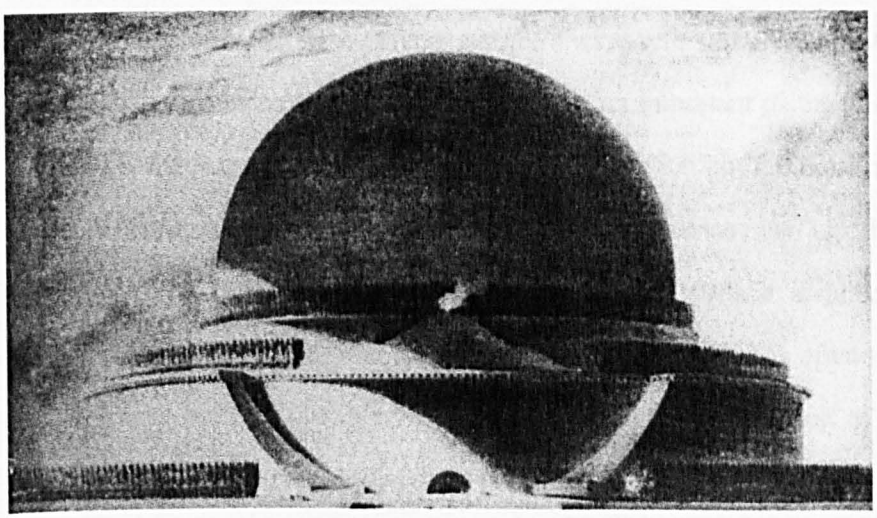


Figure 1.2
Cenotaph for Newton, 1784, by Etienne-Louis Boullée.

---

[6] Henry-Russell Hitchcock (1977), *Architecture: Nineteenth and Twentieth Centuries* (Fourth edition), (Harmondsworth: Penguin Books), 19.
[7] Kenneth Frampton (1992), *Modern architecture: a critical history* (third edition), (London: Thames & Hudson), 19.
[8] David Leatherbarrow and Mohsen Mostafavi (2002), *Surface architecture*, (London, Cambridge Mass.: The MIT Press), 9.

In opposition to this general view, Leatherbarrow and Mostafavi argued that in fact the representational role of facade has never really been cancelled but has been used continually until today. For them, the emphasis of expression moved from the facade to the volume and the flatness in appearance on one hand, and the cancellation of frontality on the other hand; the expressive role of *face* is inherited by *elevation*.[9] Meantime, *surface* becomes the context where the distinction between skin and structure is most apparent; "the site of this contest is the architectural surface."[10] In their interpretation, the real questions of architectural surface since Modernism not only lie in issues in representation, but also in the relationship, or conflict, between representation and production, resulting in a tension between expression and technology. However, in noting that the question of representation is precisely a matter of appearance;[11] their interpretation of surface sometimes does not go beyond its externality, and in this way *surface* can barely differ from the idea of *face*.

If the metaphorical meaning of *face* was the essential character of *facade*, the difference between *façade* and *surface* might be found through an analysis of the difference between *face* and *surface*. This difference is analysed by Avrum Stroll in four ways.[12] Firstly, the term face is generally used to talk about human beings and animals, whereas surface relates to inanimate objects. Secondly, in contrast to surface, face is always set with a specific direction of 'front' or 'forward'. The third difference is that surface always refers to the concept of boundary, but *face* is not primarily concerned with this idea. Lastly, an important distinction between surface and face is that the former often has the quality of abstraction but the latter can almost never have. These differences defined by Stroll between face and surface can also be used to explore the differences between the classical façade and modern surface architecture. In this context, *surface* differs from *facade* and *face* in three aspects: Firstly, it is often treated with an attitude of 'objective' presentation in contrast to the 'subjective' expression of symbolic or semantic meanings. This conceptual 'objective presentation' is not only a theoretical argument, but also supported by design proposals in which the formation of surface architecture tends towards a

---

[9] Ibid., 14.
[10] Ibid., 8.
[11] Ibid., 1.
[12] Avrum Stroll (1988), *Surfaces*, (Minneapolis: University of Minnesota Press), 188-192.

quality of simplified abstraction. Secondly, the frontality of the façade is displaced by a nondirectionality based either on homogeneous continuity or fragmentation. Thirdly, the role of the spatial boundary is stressed over and above aspects of external appearance. These three issues are now explored in more depth.

Objectivity and Simplification

The term 'objective' here is not equal to the special idea of 'objectivity' which concerns a social political proposition, though the later also favors the form of elementary, abstract, geometrical design. As Frampton notes, the German term *Sachlichkeit* (objectivity) is first used in an architectural context in a series of articles written by Hermann Muthesius for the journal *Dekorative Kunst* between 1897 and 1903. It means "an 'objective', functionalist and eminently yeoman attitude to the design of objects, tending towards the reform of industrial society itself."[13] When this term was adopted again as 'new objectivity' *(Neue Sachlichkeit)* in the 1920s and 1930s, it concerned a political attitude towards 'social reality' in the realms of both art and architecture, defined through functionalism.[14] As what is focused here, the 'objective' presentation of surface of modern architecture refers to the principles of simplification, with qualities of flatness, thinness and homogeneousness and, in Reyner Banham's terms, 'elementary composition'[15] in relation to its formal character. Such characters of the treatment of surface may be seen to arise in a number of specific but interactive contexts, besides of the rationalist thought against redundant decorations in general.[16]

The first is the academic context of design. The combination of 'elementary composition', as a way of form making, and the intent of 'objective' presentation is developed at the very beginning of the 20th century by Julien Guadet in the school of the École des Beaux-Arts in Paris. In Banham's opinion, Guadet's book *Éléments et Théorie de l'Architectures* of 1902, can

---

[13] Kenneth Frampton (1992), *Modern architecture: a critical history* (third edition), (London: Thames & Hudson), 130.
[14] Ibid., 130-141.
[15] This notion is defined in Reyner Banham (1960), *Theory and Design in the First machine Age*, (London: The Architectural Press).
[16] From the 18th century, the French rationalists already proposed that architecture should be "a science, controlled by need and necessity", and "a reasonable affair" conditioned by social demands, convenience, and economy. See Robin Middleton and David Watkin (1980), *Neoclassical and 19th century architecture*, (New York: Harry N. Abrams, Inc.), 30-31.

be seen as a manifesto typical of a certain kind of 'scientific' attitude. It presents a type of 'objective' aesthetics through a focus on the composition of architectural elements. Following the approach of 'elementary composition', small structural and functional elements, e.g. walls, openings, roofs etc, are assembled to make functional volumes, and then these volumes go on to compose a whole building.[17] Guadet's compositional approach is successfully carried forward by his students Auguste Perret and Tony Garnier, who later become staff at the Beaux-Arts. The influence of Perret can be seen in his buildings, for example the famous apartment building at 25bis Rue Franklin in Paris, completed in 1903 (Figure 1.3). Commended by Banham, the importance of this building lies in its clear display of the concrete framing as an exterior effect (even though the concrete frame is not bare but covered in tiles.)[18] In this case, the design could be seen as a presentation of the logic of structure and the geometrical form of elementary composition.

Figure 1.3
The apartment at 25bis Rue Franklin in Paris, France, 1903, by Auguste Perret.

[17] Reyner Banham (1960), *Theory and Design in the First Machine Age*, (London: The Architectural Press), 20.
[18] Ibid., 39-40.

The design model of simplified surface and elementary composition is fully developed in the Bauhaus School, and then becomes a significant issue in modern architecture because of the important influence of this school. The Bauhaus has a complicated, even conflicting, history, including the various arguments and approaches of different staff members. Even so, due to the concern about industrial production and construction, the aesthetic of machine age, and abstract art, the Bauhaus focused on issues such as industrial design methods, abstract geometrical form, and simple materials. All these issues are easily leading to the production of simplified surface. The direction for this comes from a number of people associated with the Bauhaus including Gropius, Moholy-Nagy, El Lissitsky and others. Moreover, the idea of 'Elementarism' – i.e. the composition of simple, abstract elements following the mechanical or Constructivist line – was brought to the Bauhaus by Lissitsky with the source of Russian Constructivism, and by peoples like Moholy-Nagy with the idea of De Stijl and so on.[19] In the academic environment of the Bauhaus, the artistic idea of 'Elementarism' was adopted as a kind of design method of architecture. As Moholy-Nagy recorded later, "Composition and construction are aspects of the same problem."[20] In this logic, the architectural surface is transferred from the zone of representation and appearance, and instead seen as part of a set of simplified compositional elements.

The second context in which surface in modern architecture can be read in Modernist architecture is that of industrial development and techniques. The role of the evolution of industrial technology and production in relation to modern architecture has been commented on by almost all of the main historians of the movement, such as Giedion, Banham, Hitchcock, Frampton, Tafuri, and Leatherbarrow. In the shift from classical façade to the surface of modern architecture, besides of the inducement of machine aesthetic, industrial development and applications bring at least three major influences. The first is that that external wall no longer needs, technically, to be load-bearing. The use of steel and ferroconcrete frames allows the surface to be liberated from its structural function. Separated from the structural frame, the

---

[19] Kenneth Frampton (1992), *Modern architecture: a critical history* (third edition), (London: Thames & Hudson), 189.
[20] László Moholy-Nagy (1947), *The new vision 1928 and abstract of an artist* (fourth edition), (New York: George Wittenborn, Inc.), 31.

external wall can take on a quality of "thinness", which is an important formal character of *surface* defined by Avrum Stroll.[21] The second significant impact of industrial development on modern architecture is that, with the introduction of mass production and standardisation for building materials, there was tendency towards simple, flat, and repetitive surfaces. In particular the use of glass becomes much more significant; no longer confined to the window frame, glass brings a new opportunity to surface architecture because of its transparent effect and visualisation of spaces. Glass in its new guide is regarded in the early modern movement as an instrument for the creation of new world, even a utopia. For example, in 1914, Paul Scheerbart in his *Glass Architecture* announced the glass wall could bring a new spirit for a new culture: "the surface of Earth would change greatly if brick architecture were everywhere displaced by glass architecture."[22] Lastly, following the logic of industrialized construction, modern architecture showed a character of "regularity" in terms of Hitchcock and Johnson.[23] Such regularity was not only displayed by regular forms of volume and structure, but also by the regularity of different sides of the building. Thus surfaces of different sides are more easily unified into a visual effect of homogeneous continuity.

The third context consists of avant-garde art movements in the beginning of 20th century, especially those artist groups who contributed to both art and architecture. These art groups often share same interest on simplified, abstract geometrical form. For example, the Purism in France of the 1920s insists on a kind of 'simplicity' under the dominance of simple geometry.[24] One of the founders, Corbusier, played a significant role in theory and practice of surface architecture. He will be discussed in detail later. The most significant one may be the De Stijl which is founded in Holland but has a wide influence in international sphere. The relation between De Stijl and the Bauhaus is very close. Lissitsky, as a member of De Stijl, is a an important staff of the Bauhaus; van Doesburg had lecture there; Moholy-Nagy, also an important staff of the Bauhaus, with some De Stijl members together signed the foundation

---

[21] Avrum Stroll (1988), *Surfaces*, (Minneapolis: University of Minnesota Press), 207.
[22] Ulrich Conrads (ed.) (1971), trans. by Michael Bullock, *Programs and manifestoes on 20th-century architecture*, (London and Cambridge Mass.: The MIT Press), 32.
[23] Henry-Russell Hitchcock and Philip Johnson (1966), *The International Style*, (New York and London: W. W. Norton & Company), 56.
[24] Reyner Banham (1960), *Theory and Design in the First Machine Age*, (London: The Architectural Press), 207-210.

Manifesto of the Constructivist International, which contains the themes of "Machine Aesthetic" and "Elementarism."[25] The contribution of this group also will be given more details in coming sections.

Though the focus on 'objective' presentation in modern architecture begins to move the architectural surface into the realm of undecorated simplicity, abstract geometry and elementary composition, it does not necessarily mean that *façade* has become fully *surface*. For Leatherbarrow and Mostafavi, Robert Venturi and many critics, it may be seen as no more than a changing of the style of representation. In other words, it could never be truly 'objective'. For Robin Evans, Euclidean geometry and the composition of elements are exactly the properties of architecture that have pertained since the Renaissance; what is changed is the classical geometry of "centrality" has shifted to the modern composition of "fragmentation".[26] Only with the cancellation of the frontality of facade, can a new agenda of surface architecture - constituted by simplified, abstract, fragmental or continuous surfaces - be seen to be established in architectural Modernism. This transition could not have happened without the reconsideration of the concept of space. As Henri Lefebvre noted, following the adoption of "new consciousness of space", "the *façade* – as face directed towards the observer and as privileged side or aspect of a work of art or a monument - disappeared."[27] In Thomas Schumacher's analysis, this transition from *façade* and *face* to modern surface architecture is defined by three conditions, all of which need to be present: the liberation of surface from the load-bearing structure; functionalism;[28] and the highlighting of the idea of space "as the generators of architectural form and surface," especially the unfolding of interior space.[29]

---

[25] Ibid., 187.
[26] Robin Evans (1995), *The projective cast: architecture and its three geometries*, (Cambridge, Mass. and London: The MIT Press), xxvi-xxxvii.
[27] Henri Lefebvre (1991), trans. by Donald Nicholson-Smith, *Production of Space*, (Oxford: Blackwell Publishers Ltd), 125.
[28] For Schumacher, it is because that the anthropological model of architecture was transferred from the expression of facade to the emphasis on function and program of building, and thus spatial arrangement and abstract surface got their chance to become the matter of external presentation.
[29] Thomas L. Schumacher (1987), "The Skull and the Mask: The Modern Movement and the Dilemma of the Façade", in *The Cornell Journal of Architecture*, issue 1987, (New York: Rizzoli), 5-9.

Continuity and Fragmentation

The cancellation of frontality allows the possibility for surface architecture to be read, in contrast to the façade, as a *spatial boundary*. As Alan Colquhoun pointed out:

The notion of frontality is at the root of the concept of the façade. The non-frontalized building was for other exponents of the Modern Movement a logical extension of the fact that modern buildings should not have facades – the surface being merely the edge condition of an internally generated organization.[30]

As "the edge condition of an internally generated organization", surface architecture not only reflects the situation of internal spatial relations but also establishes the relationship between the interior and the exterior. Following this shift from the façade to the spatial boundary, the focus of surface is transformed from the expression of external features to the formation of volumes or spaces; it thus contributes to the effect of phenomenal spatiality. Following the abolishment of frontality, the relation between surface elements is redefined by the new principles of continuity and fragmentation.

Geoffrey Scott, in his 1914 *Architecture of Humanism*, had already proposed volume as one of major elements for the composition of architecture. Scott argued architecture as a pure objective form consisting of the combination of spaces, masses and lines.[31] As Banham notes, the term "spaces" that Scott used in his book, which comes from the German term *Raum*, actually means conjoined volumes.[32] In Banham's view, the focus on such volumetric space, and later on the concept of space as the continuum, leads to a three-dimensional emphasis in 'elementary composition' as the basis of architectural design, in contrast to the two-dimensional production of either the plan or the pictorial surface as Blanc and Guadet had earlier focused on.[33]

The term 'volume' became significant in the language and theories of the modern movement according to the definition of Henry-Russell Hitchcock and Philip Johnson in their seminal book

---

[30] Alan Colquhoun (1972), "Displacement of concepts in Corbusier", in Alan Colquhoun (1981), *Essays in Architectural Criticism: Modern Architecture and Historical Change*, (London, Cambridge Mss.: The MIT Press), 57.
[31] Reyner Banham (1960), *Theory and Design in the First Machine Age*, (London: The Architectural Press), 66.
[32] Ibid., 66-67.
[33] Ibid., 67.

The International Style. For them, "Volume is felt as immaterial and weightless, a geometrically bounded space."[34] They regarded 'volume' as a first principle in modern architecture in contrast to the massive buildings of Classicism. It is generally formed by simplified enveloping surfaces and skeleton construction. As they note:

The effect of mass, of static solidity, hitherto the prime quality of architecture, has all but disappeared; in its place there is an effect of volume, or more accurately, of plane surfaces bounding a volume. The prime architectural symbol is no longer the dense brick but the open box. Indeed, the great majority of buildings are in reality, as well as in effect, mere planes surrounding a volume. With skeleton construction enveloped only by a protective screen, the architect can hardly avoid achieving this effect of surface of volume unless, in deference to traditional design in terms of mass, he goes out of his way to obtain the contrary effect.[35]

Hitchcock and Johnson's argument concerning volume introduces a very important notion for surface formation: continuity. They note: "Thus as a corollary of the principle of surface of volume there is the further requirement that the surface shall be unbroken in effect, like a skin tightly stretched over the supporting skeleton."[36] For them, there are two ways to show the continuity of surface. One is the continual enveloping made of integral wall plane. The other is an unbroken horizontal surface of the ceiling, which defines a spatial boundary and implies a virtual envelope formed by "imaginary" bounding vertical planes e.g. Mies's Barcelona pavilion.[37] With an emphasis on continuity, surfaces on different sides of the volume treated as equivalent with a homogenous quality, and so the frontality of façade is abolished.

Frontality is also displaced by the principle of fragmentation, as formed as either through surface collage or fragmental planes, taking the lead from the modern art movements at the beginning of the 20th century, especially Cubism and De Stijl. As Alan Bowness comments in *Modern European Art*, the synthetic cubism in the early 20th century, notably that of Pablo Picasso and Georges Braque, "led immediately to the conception of the painting as primarily an

---

[34] Henry-Russell Hitchcock and Philip Johnson (1966), *The International Style*, (New York and London: W. W. Norton & Company), 44.
[35] Ibid., 41.
[36] Ibid., 45.
[37] Ibid., 48.

object, which in turn made possible both a totally abstract art and an extension of painting, first into collage and relief and then into sculpture."[38] The fragmental, abstract forms of the Cubists introduced a new conception of space. As Bowness indicates, the significance of such fragmentation is highlights a concern for the representation of spatial objects; as Braque said: "Through fragmentation I was able to establish space and movement in space, and I was unable to introduce objects until I had created space."[39]

In his book, *Space, Time and Architecture*, Giedion considered the classical façade as corresponding to the invention of the perspective in the Renaissance. Its main character is that "in linear 'perspective' – etymologically 'clear-seeing' – objects are depicted upon a plane surface in conformity with the way they are seen, without reference to their absolute shapes or relations", and "every element in a perspective representation is related to the unique point of view of the individual spectator."[40] In contrast, Cubist paintings cancelled the dominance of Renaissance perspective through a kind of fragmental composition of spatial elements and therefore cancelled the priority of subjective 'front'. The projects of Corbusier are often used as the examples to indicate the influence of Cubism on architectural design. This is not only because the relationship between Cubism and his artistic development of Purism.[41] It also comes from an analysis of his buildings. Using the Villa Stein of 1927 as an example, Colquhoun notes "it establishes the 'free' and diagonal organization of the internal spaces on the façade", and "just as a Cubist painting is a description of the structure of the pictorial space, so Le Corbusier's houses are descriptions of the structure of the architectural space."[42]

The principle of fragmentation is developed as the primary method of composition of fragmented surfaces, in correspondence with a pursuit of spatial continuum, by the De Stijl movement and Russian constructivism in 1920s. Gerrit Rietveld put De Stijl theory into practice through the completion of Schröder House at Utrecht in 1924-25 (Figure 1.4). In this building,

---

[38] Alan Bowness (1972), *Modern European Art*, (London: Thames & Hudson Ltd), 105.
[39] Ibid., 112.
[40] Sigfried Giedion (1949), *Space, Time and Architecture: the growth of a new tradition (Second edition)*, (London: Oxford University Press), 30-31.
[41] Reyner Banham (1960), *Theory and Design in the First Machine Age*, (London: The Architectural Press), 206-207.
[42] Alan Colquhoun (1981), *Essays in Architectural Criticism: Modern Architecture and Historical Change*, (London, Cambridge Mass.: The MIT Press), 55-62.

the walls, roofs and balconies are all reduced to simple geometrical slabs. The composition of these fragmental slabs formalizes the spatial structure of this building, and allows a 'continuum' between inside and outside. Another form of fragmentation can also be observed in other examples of the period, such as Mies's brick house and the Barcelona Pavilion, which will be discussed later. As Frampton argues, these projects of Mies had been developed precisely under the influence of De Stijl and Russian constructivism.[43]

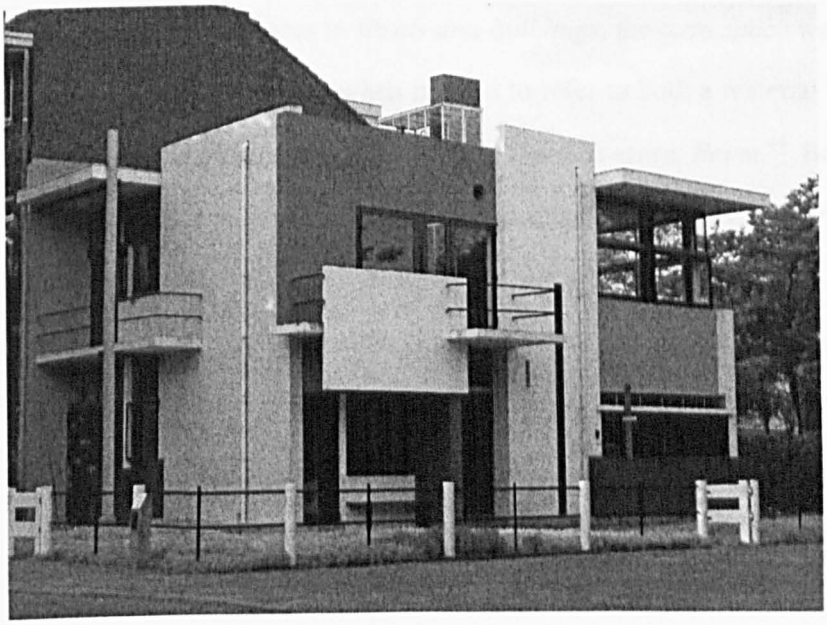


Figure 1.4
Schröder House at Utrecht, Netherlands, 1924-25, by Gerrit Rietveld.

Summary

Rationalist thought, various academic experiments, industrial technology and production, and various modernist art movements give rise to a specific social and cultural background that led to the abolishment of classical façade in both architectural conception and practice. Out of this, modern surface architecture developed according the principles of 'objectivity' and the cancellation of frontality. Modern surface is often presented as a simplification in manner of terms of abstract, flat, thin and homogeneous form. In contrast to frontality, the focus on either continuity or fragmentation means that modern surface is more concerned with surface as spatial boundary than it is the frontal façade, leading to the creation of a spatial volume or continuum. Surface is liberated from the previous concerns with decoration and expressive

[43] Kenneth Frampton (1992), *Modern architecture: a critical history* (third edition), (London: Thames & Hudson), 163.

meaning, and in this goes beyond issues of representation within the external appearance. With all these conditions, the emphasis on the formation of architectural surface moves from two-dimensional representation to three-dimensional composition, and consequently addresses the spatial relationship between inside and outside, and the presentation of the organization of interior volumes.

1.1.2. Surface-Space Discussion

As Adrian Forty discusses in *Words and Buildings*, the term *space* was not used in architectural vocabulary until the 1890s, when it came to refer to both a material enclosure as a 'room' and the philosophical concept as in its original German sense, *Raum*.[44] Before this, it had been used equally as the term for volume or void since the 18th century. The motives for the adoption of the conception of space in Modern architecture are threefold:

To describe the original motive of architecture: for Hegel, and particularly for Semper, the significance of spatial enclosure was as the purpose from which architecture, as an art, had developed.

To describe the cause of aesthetic perception in architecture: as developed by Schmarsow and Lipps particularly, 'space' provided an answer to the question of what in works of architecture stimulated aesthetic perception.

To satisfy the expectation, fundamental to all nineteenth-century art theory, that works of art should reveal movement. How works of architecture, inherently static, might express motion was a longstanding concern.[45]

Forty then argues that the idea of *space* is adopted by modernist architects to fulfil particular historical, philosophical and aesthetic tendencies that identified and legitimised the idea of modernism.

In the first place the concept of 'spatiality', in its definition of the distinctive and historically specific features of modern perception, offered as good as a case as there could be for a new

---

[44] Adrian Forty (2000), *Words and Buildings: A Vocabulary of Modern Architecture*, (London: Thames & Hudson), 256.
[45] Ibid., 262.

sort of architecture. Secondly, 'space' offered a non-metaphorical, non-referential category for talking about architecture, and one which at the same time allowed architects to rub shoulders with the socially superior discourses of physics and philosophy. In so far as architecture had always suffered the slur of being no more than a trade, or a business, the claim to deal with the most immaterial of properties – 'space' – allowed architects decisively to present their labour as mental rather than manual. Ultimately the motives for the architectural interest in space differ from the philosophical and scientific motives for interest in it: that they shared the same terminology should not mislead us into thinking that they were talking about the same thing.[46]

After becoming a mature category within the vocabulary of modern architecture, *space* is used by architects and critics during the 1920s in three main ways, as described again by Forty: firstly, space as enclosure – as established by Semper, and developed by Berlage and Behrens - this was the commonly understood sense of space for most architects in the early 1920s; secondly, space as continuum – as highlighted by De Stijl and the Bauhaus group around El Lissitsky and Moholy-Nagy, it focused on continuous and infinite relationships between inside and outside spaces; thirdly, space as the extension of the body – space was considered as the body's imagined extension within a volume, an idea developed by Schmarsow, or as a body's membrane between man and the outer world as argued by Bauhaus teacher Siegfried Ebeling. Overall, the first two conceptions of space, as enclosure or continuum, are more accepted and influential than the last in the modernist era.[47]

Once the concept *space* is addressed by architecture, it engages *surface* in the conversation. The two main conceptions of *space* summarized by Forty could be considered as dealing with the relationships between *space* and *surface*. In the first place, enclosure, as the original model of surface architecture, through Semperian theories creates a correspondence of surface-to-space according to the presentation of enclosure wall and the phenomenal perception of space. Secondly, as argued by Moholy-Nagy, the continuum of inside and outside spaces depends on

---

[46] Ibid., 265.
[47] Ibid., 266.

the relationship of scattered partitions in-between spaces.[48] The correspondences between enclosure and enclosing surfaces, between continuum and fragmental surfaces can be found not only in the theoretical domain but also on design projects. Moreover, there is a correspondence between volume and envelope as mentioned in last section. Through these factors, the role of surface architecture is affirmed as the setting of spatial boundaries. Avrum Stroll's definition of surface, as "thin spreads that form the upper or outer boundaries of embodiments,"[49] could be redefined for modern surface architecture as *the composition of surfaces that form the (outer) boundaries of spaces.* In the instance of enclosure or volume, there is an outer boundary. For a space of continuum, there are boundaries between different spatial locations. In the case of architecture, there is always more than a pure enclosed space or simple continuum, but a more complex set of relationships. In its role of setting spatial boundaries, the formation of surface architecture is thus concerned with degrees of separation and connection. This formation is not merely decided by physical continuity or fragmentation, but is supplemented by the transparency and reflection of glass walls.

The specific relationship between surface and space was also emphasized by Sigfried Giedion in his seminal book *Space, Time and Architecture*, often seen as the first book in English that describes modern architecture as an art of space. As Forty notes, through Giedion's interpretation architectural space is given a sense of actually *existing* in the built works of modern architecture, and thus as far more than just a concept.[50] This new sense may be understood as the actual perception allowed by concrete embodiment of *space*. For Giedion, such embodiment could be seen as *surface*. The observations on *surface* run through the whole discussion in *Space, Time and Architecture*. For example, when the discussion arrives at the beginning of modern architecture in Holland, Giedion states: "The wall as a flat surface was soon to become the starting point for new principles in architecture, not merely in Holland but everywhere."[51] The most obvious evidence is that when Giedion discusses the shift from the

---

[48] László Moholy-Nagy (1947), *The new vision 1928 and abstract of an artist* (fourth edition), (New York: George Wittenborn, Inc.), 63.
[49] Avrum Stroll (1988), *Surfaces*, (Minneapolis: University of Minnesota Press), 208.
[50] Adrian Forty (2000), *Words and Buildings: A Vocabulary of Modern Architecture*, (London: Thames & Hudson), 268.
[51] Sigfried Giedion (1949), *Space, Time and Architecture: the growth of a new tradition (Second edition)*, (London:

perspective to the presentation of space in Modernism; here surface is regarded by him as the first significant instrument for this procedure:

Surface, which was formerly held to possess no intrinsic capacity for expression, and so at best could only find decorative utilization, has now become the basis of composition, thereby supplanting perspective, which had triumphed over each successive change of style ever since the Renaissance. .....With the cubist's conquest of space, and the abandonment of one predetermined angle of vision which went hand in hand with it, surface acquired a significance it had never known before. Our powers of perception became widened and sharpened in consequence. .....The human eye awoke to the spectacle of form, line, and color – that is, the whole grammar of composition – reacting to one another within an orbit of hovering planes, or, as J. J. Sweeney calls it, "the plastic organization of forms suggested by line and colour on a flat surface."[52]

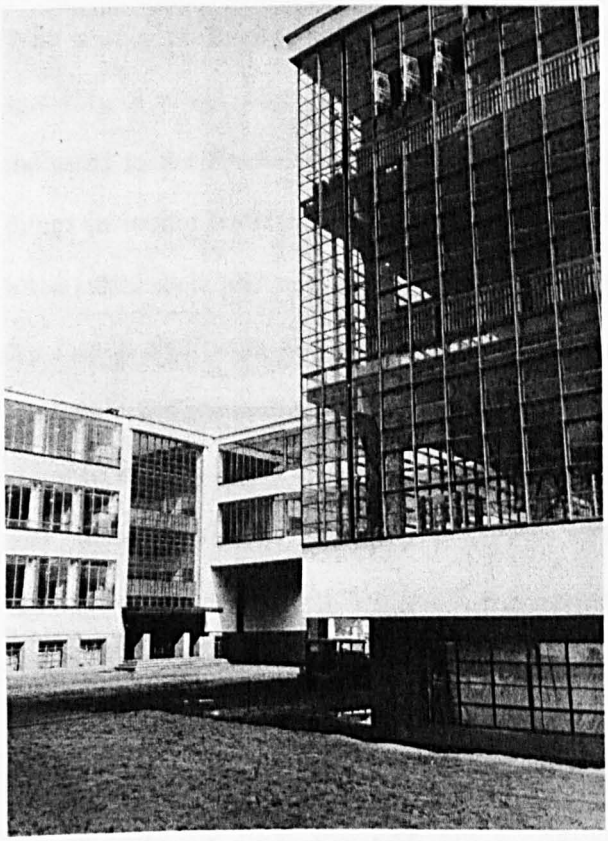


Figure 1.5
Bauhaus Building, Germany, 1926,
by Walter Gropius.

In another example, the role of the spatial boundary in modern surface architecture was further clarified by Giedion when he stressed the importance of the Bauhaus Building (Figure 1.5):

Oxford University Press), 247.
[52] Ibid., 393-394.

"The walls are developed as planes, and conceived as sheer curtains between inner and outer space."[53] In the eyes of Mark Wigley, Giedion's narrative about three historical situations of space is nothing more than a history of the status of surface:

It follows Riegl in beginning with the Egyptian and Greek conception in which the prehistoric play of "endless changing surfaces" is reassembled to create a "smooth unbroken plane," a sensuous surface without any sense of space. This in turn gives way in the middle of the Roman period to a conscious search for space, understood as the depth of an interior. When modern art begins to produce the third conception, this is framed as a return to the first conception, if not its prehistoric origins, inasmuch as there is no longer a clear-cut distinction between inside and outside; rather, there is a collage of suspended and mobile surfaces in which, in its definitive form, "solid and void, inside and outside, flow continuously into one another."[54]

With a role of forming spatial boundaries, surface architecture does not simply induce a spatiality of visual effect, but may also have a social and political content. As Henri Lefebvre indicated in the *Production of Space* of 1974, social space is a set of relationships between things including bodies, and such relationships as the configuration of social organization are often established, and certainly inflected, by physical or virtual boundaries.[55] It is obvious that the façade also plays a role in social space, but if according to Lefebvre, it is more like a production of "representational spaces:"

space as directly lived through its associated images and symbols ..... This is the dominated – and hence passively experienced – space which the imagination seeks to change and appropriate. It overlays physical space, making symbolic use of its objects.[56]

In contrast, the role of spatial boundaries, especially the concern about the relationship between inside and outside spaces, brings surface architecture into the domain of "spatial practice", "which embraces production and reproduction, and the particular locations and spatial sets

---

[53] Ibid., 414.
[54] Mark Wigley (1995), *White walls, designer dresses: the fashioning of modern architecture*, (Cambridge Mass. and London: The MIT Press), 113-114.
[55] Henri Lefebvre (1991), trans. by Donald Nicholson-Smith, *Production of Space*, (Oxford: Blackwell Publishers Ltd), 193.
[56] Ibid., 39.

characteristic of each social formation."[57]

Based on the correspondence of surface-space, the following discussion of modern surface architecture will be unfolded through two sections. The first section includes two points. One is about the simplification of modern surface architecture, especially its flatness and homogeneousness. The other relates to the formation of surface according to its composition of continuity and fragmentation. The second section will focus on the specific effects of glass boundaries in terms of transparency and reflection. Such spatial effects are not primarily produced by way of composition, but rather induced by what will be termed a spatiality of framing. This does not mean that glass surfaces do not contribute to the composition of surface architecture; it just aims to explore and demonstrate the particular spatiality of this type of surface by seeing it as an independent factor. The formation of its spatiality can be seen as a form of frame, through framing a real perspective or reflected images. In addition, there is the particular reading of phenomenal transparency, which was introduced by Colin Rowe and Robert Slutzky in their famous paper of *Transparency: Literal and Phenomenal*, with Part I published in 1964, and Part II in 1971.

As will be seen, the discussion includes both theoretical approaches to surface together with relevant design projects. In this way, the correspondence between theory and practice in both surface and space will be related.

1.2. Simplification and Composition

1.2.1. Enclosure

The term *enclosure* as used in architecture comes from Gottfried Semper. As argued in his 1851 publication *Four Elements of Architecture*, the primordial dwelling is divided into four basic elements: the hearth, the roof, the enclosure and the mound.[58] In *Style in the Technical and Tectonic Arts or Practical Aesthetics*, Semper regarded the ancient pen and interwoven fence as

---

[57] Ibid., 33.
[58] Gottfried Semper (1989), trans. by Harry Francis Mallgrave and Wolfgang Herrmann, *The Four Elements of Architecture and Other Writings*, (New York, Melbourne: Cambridge University Press), 102.

the earliest vertical spatial enclosure that man invented, which brought about the invention of weaving.[59] For Semper, the *enclosure* of architecture is specifically defined by the "wall" which is not only the spatial enclosing but more importantly "the creation of the idea of space."[60] The earliest wall for Semper is the wickerwork of hanging mats and carpets, and the logic of such wickerwork as "the essential of the wall" manifests itself in the later formations of clay tile, brick, or stone walls.[61] The *enclosure* made of primitive wickerwork could thus be seen as the original surface architecture as a form of spatial boundary. Later, as Semper argued, the role of *enclosure*, or the representation of "true wall," is played by the covering of stucco in ancient Greece, as distinct from the solid walling structure behind it. It is not until ancient Rome that the creation of space is realized again by the *enclosure* of the construction of the wall and the character of naked stone, though it was covered soon after by wall paintings, such as those at Pompeii and Herculaneum.[62] Whether ancient wickerwork, hanging carpet, stucco, naked stone or wall painting, all are used as the representation of the externality of surface, and in this sense, they are accepted as the 'true' means of *the enclosure* or 'wall' and 'the creation of the idea of space'. It is important for Semper that all these tectonic instruments create the identity and the representational meaning of *the enclosure*, as opposed to just the physical status of structure. This is why Semper argued:

The wall should never be permitted to lose its original meaning as a spatial enclosure by what is represented on it; it is always advisable when painting walls to remain mindful of the carpet as the earliest spatial enclosure. Exceptions can be made only in such cases where the spatial enclosure exists materially but not in the idea.[63]

It can be understood that Semper's notion of the *enclosure*, as the creation of *the idea of space*, focuses on the immediate perception of surface on the one hand, and the meaning of the tectonic reading, as developed historically, on the other. It is consistent with his notion of *elements of architecture*, as indicated by Mallgrave, which are "not as material elements or forms, but as

---

[59] Ibid., 254.
[60] Ibid., 103-104.
[61] Ibid., 103-104.
[62] Ibid., 109-110.
[63] Ibid., 127.

'motives' or 'ideas', as technical operations based in the applied arts."[64]

The idea of space can thus be seen as mainly a combination between perceived effects and the conceptual reflection of the representation of surfaces rather than as a physical distance or depth. This is developed in Semper's later theory in which he relates the creation of the idea of space to the *dressing*, i.e. the attached external layer of the wall, which enacted "the motive and spatial essence of the wall."[65] In Frampton's interpretation, there is a difference between "the representational face of a building's surface and the phenomenological (ontic) depth of space."[66] Frampton argued that Semper divided 'four elements' into two aspects: the earthwork and the framework / roof were related to ontological elements, whilst the hearth and the infill wall were considered elements of representation.[67]

Semper's theory of the *enclosure* has important implications for the concept of space and the way that surface architecture is designed in early Modernism. On one hand, it legitimises the dominant status of the wall for the presentation of the concept of space. This 'space' is not an enclosed void but rather a half perceived and half conceptual matter derived from the visual representation of surface. On the other hand, the major role of *enclosure* is achieved by the *dressing* rather than the actual physicality of the enclosure. Unfortunately, what was usually noticed as the understanding of enclosure and space is more about the externality of surface architecture rather than its role of spatial boundary. Thus the proposition of enclosure-space in the early period of modern surface architecture mainly tended towards the simplification of the wall, i.e. a simple and clean externality. As has been noticed by Mallgrave:

Konrad Fiedler, in an 1878 essay that took its starting point in Semper's theory, suggested a peeling away of the dressing of antique architecture to exploit in modern works the wall's purely spatial possibility. This suggestion was taken up and greatly developed by August Schmarsow in a 1893 lecture, in which he specifically rejected the decorative attributes of the "art of dressing" in favor of architecture's abstract capacity to "create space". The history of

---

[64] Ibid., 24.
[65] Ibid., 24.
[66] Kenneth Frampton (1995), *Studies in Tectonic Culture*, (Cambridge, Mass.: The MIT Press), 89.
[67] Ibid., 89.

architecture is now to be analyzed as a 'feeling for space". Schmarsow's proposal was effectively canonized by the Dutch architect Hendrik Berlage in his important lecture of 1904, in which he defined architecture as the "art of spatial enclosure". In the addendum he attached to the publication of his lecture Berlage argued that the nature of the wall was surface flatness, and such constructive parts as the pillar and capitals should be assimilated into it without articulation. Semper's figurative masking of reality is transposed in Berlage's conception into a literal mask, in which surface ornamentation, material, and structural components represent, as it were, their own constructive and nonconstructive roles as surface decoration.68

Hendrik Berlage studied in Zurich in the late 1870s, under followers of Semper, returning to Amsterdam in 1881 to form a partnership with P.J.H. Cuijpers, a follower of Viollet-le-Duc.[69] Following Semper and the influence from the rationalist thought, plus his admiration for ancient Roman architecture, Berlage developed a position in opposition to the traditional values of decoration and ornament. In the desire to create a simplified surface, even structural pillars had to be hidden to allow the perfect presentation of a simple, flat and homogeneous wall. His project of the Amsterdam Exchange Building built in 1897-1903 is representative of this approach, though it should be actually seen as a transitional building on the way towards flat and homogeneous brick surface (Figure 1.6). Though the connection between inside and outside spaces was not the prime concern of Berlage, it could not be said that his design concerned only an *enclosure* of the interior; it was also about an *enclosure* of exterior urban space. As Frampton argues:

For Berlage the street was essentially an outdoor room, the necessary consequence of the housing lining its length. This insistence on enclosure, pre-figured in the medieval city, had already been postulated by Berlage in his design for the Exchange.[70]

---

[68] Harry Francis Mallgrave (1989), "Introduction", in Gottfried Semper (1989), trans. by Harry Francis Mallgrave and Wolfgang Herrmann, *The Four Elements of Architecture and Other Writings*, (New York, Melbourne: Cambridge University Press), 42.

[69] Kenneth Frampton (1992), *Modern architecture: a critical history* (third edition), (London: Thames & Hudson), 71.

[70] Ibid., 73.

Figure 1.6
Amsterdam Exchange Building, Netherlands, 1897-1903, by Hendrik Berlage.

As Forty argues, the conception of 'space' refers to both interior and exterior spaces in the 1920s. The latter idea of exterior space in relation to *enclosure* was introduced by the Viennese architect Camillo Sitte, a disciple of Semper, who described urban design as *Raumkunst* (an art of space) in his book *City Planning According to Artistic Principles* published in 1889.[71] Sitte described his favoured city model as the creation of enclosed spaces through buildings surrounding it, as in public squares of the Middle Ages and Renaissance, and this idea was directly adopted by Berlage to consider the street as an outdoor room.[72] After Sitte, Semper's concept of *enclosure* became available to be used to think about exterior urban spaces. Once urban space was considered as another kind of *enclosure*, the creation of urban space therefore became the matter of exterior surfaces of surrounding buildings. Consequently, the

---

[71] Adrian Forty (2000), *Words and Buildings: A Vocabulary of Modern Architecture*, (London: Thames & Hudson), 258.
[72] Kenneth Frampton (1992), *Modern architecture: a critical history* (third edition), (London: Thames & Hudson), 25 and 73.

representation of simplified modern surface was not only appreciated by an individual building, but also by the city. In this context, the communication between interior and exterior spaces was achieved by the unified features of interior and exterior simplified surfaces.

Semper's notion of *enclosure* was mainly adopted by his followers in early Modernism as a representational means through the externality of surface, but its original intent should not be limited only in this way. For Semper, the representational role of enclosure is inseparable from its status as spatial boundary. For example, he argues: "Hanging carpets remained the true walls, the visible boundaries of space."[73] Here, "hanging carpets" gained the meaning of "the true walls" primarily because offered "the visible boundaries of space" rather than its woven technique, or its texture and pattern. As Semper argued, the original motive of *enclosure* is to protect *the hearth*, through "setting apart some space from the surrounding world."[74] In this context, the primitive dwelling type of *Hofbau* (courtyard building), whose essential motif is the wall, is firstly a "firm enclosure of an open place".[75] Thus the *enclosure* was firstly established on the physical and morphological division between inside and outside spaces. As Andrew Benjamin said, for Semper, space as the "result of surface's operation" is not "a given" but "divided."[76] Meanwhile, Semper's definition of the 'wall' could be thus considered as a material effect of division:

When Semper argues that 'wickerwork' was the original wall, it was because it was the 'original space divider'. This realisation of division defined the 'essence' of the wall. Any consideration of the wall therefore has to do with how materials realise their effect. .....The wall effect is spatial division, although only ever as a result.[77]

The effect of spatial division of *enclosure* has a social and cultural meaning of protection. In *The Basic Elements of Architecture* of 1850, Semper argued that the dwelling or private house

---

[73] Gottfried Semper (1989), trans. by Harry Francis Mallgrave and Wolfgang Herrmann, *The Four Elements of Architecture and Other Writings*, (New York, Melbourne: Cambridge University Press), 104.
[74] Wolfgang Herrmann (1984), *Gottfried Semper: In Search of Architecture*, (Cambridge Mass. & London: The MIT Press), 199.
[75] Ibid., 168.
[76] Andrew Benjamin (2006), "Surface effects: Borromini, Semper, Loos", *The Journal of Architecture*, Volume 11 Number 1 2006, 21.
[77] Ibid., 22.

was "the original and simplest type" of the formation of social units in terms of groups, families and classes.[78] This social meaning of the dwelling was based on the "symbolic significance" of *the hearth* which was the original "social institution" that joined people together into groups.[79] The primary motive of *the enclosure*, as well as *the roof* and *the mound*, is the protection of *the hearth*. They separated a space from the surroundings to protect *the hearth* from bad weather, wild animals and hostile men.[80] So, the separation between inside and outside spaces created by *the enclosure* is not merely a physical effect but rather a social and cultural matter. It brings a separation between nature and the artifical, and protects the private ownership from incursion. In this sense, *the enclosure* establishes a primitive territory. It acts as a means of 'social practice', in the words of Lefebvre, in comparison with the 'representational space' induced by the externality of its surface layer.

In addition, *the mound* separates the place of the *hearth* from exterior ground and inundation. In the case of primitive hut, formalized by *the mound* of "a framework of poles as terrace,"[81] a piece of land was therefore transformed from the natural ground to an artifical interior. If *the enclosure* was a spatial boundary in the vertical dimension, *the mound* could be seen as more like a division of horizontal surface. A building is thus constituted by not only spatial enclosure but also division of the horizontal plane. When *the roof* was reduced to a flat slab in Modernism, the composition of the elements of architecture became no more than composition of vertical and horizontal surfaces. Once the idea of 'flowing space' was developed as a theme in modern architecture[82] - in contrast to the space of *enclosure* - the effect of spatial division is replaced by the relationship between separation and connection.

Summary

Enclosure as a term relates to both surface and space. As a precursor of surface architecture, it concerns not only the visual perception of appearance but also the material effect of spatial

---

[78] Wolfgang Herrmann (1984), *Gottfried Semper: In Search of Architecture*, (Cambridge Mass. & London: The MIT Press), 196.
[79] Ibid., 198.
[80] Ibid., 199.
[81] Ibid., 169.
[82] This will be explained in Section 1.2.3.

division or separation. Though this conception was mainly adopted in early Modernism to legitimate the simplified externality of surface, it should be recognized that the origin of enclosure occurred as a spatial boundary, which separates the inside from the outside. This separation is not merely a physical condition, but also a social and cultural means of protection, and the configuration of artificial world, territory and social organization.

1.2.2. Dressing and Cladding

Semper's notion of *dressing* was adopted and developed by Adolf Loos to evaluate the cultural and ethical function of surface architecture. His main idea about *dressing* works in opposition to ornament, through a simplified and undecorated surface architecture. As argued by Banham, Loos, as an architect, "appears as one of the first to build in a manner that really valued simplicity of form as a virtue in itself," but this proposition of simplicity is not based on the wish for autonomous form as in abstract art but rather is a representation of "a symbol of an uncorrupted mind."[83] For Loos, the metaphorical 'dressing' of architecture is equal to the ordinary dressing of people, and both of them need to match the cultural condition of the day. In his 1898 essay, *Men's Fashion*, Loos argued that the means "to be dressed well" were the same as "to be dressed correctly", and "in order to be dressed correctly, one must not stand out in *the centre of culture*" which he defined as London or the industrialised American cities at that time.[84]

In the same year, 1898, Loos published *The Principle of Cladding*, or in Mark Wigley's more apt title *The Principle of Dressing*,[85] in which he argued for a 'correct' treatment of materials and a 'true' presentation of cladding, i.e. the covering surface of the wall. As he said, "Each and every material has its own vocabulary of forms and no material can appropriate the forms of another."[86] In this context, cladding should display the 'honest' form of itself:

The walls are not built of carpets! Of course they aren't. But these carpets do not claim to be

---

[83] Reyner Banham (1960), *Theory and Design in the First Machine Age*, (London: The Architectural Press), 88-97.
[84] Adolf Loos (1982), trans. by Jane O. Newman and John H. Smith, *Spoken into the Void: collected essays 1897-1900*, (Cambridge, Mass. and London: The MIT Press), 11-12.
[85] Mark Wigley (1995), *White walls, designer dresses: the fashioning of modern architecture*, (Cambridge Mass. and London: The MIT Press), 13.
[86] Adolf Loos (2002), trans. by Michael Mitchell, *On architecture*, (Riverside, Carlifornia: Ariadne Press), 42.

anything other than carpets. They do not pretend, either in colour or in pattern, to be masonry but make their function as cladding for the wall surface clear. They fulfil their purpose according to the principle of cladding. .....This law runs as follows: there should be no possibility of confusing the cladding with the material it covers. To give a specific example, wood can be painted any colour apart from wood colour.[87]

Soon after, Loos developed his argument further in his essays *Ornament and Crime* of 1908 and *Architecture* of 1910. In the former, he used the evolution from the tattooed barbarian face to the modern, clean face to validate the legitimization of the removal of ornament in modern age.[88] He also referred ornament to an "erotic" origin, and said "ornament is not only produced by criminals; it itself commits a crime, by damaging men's health, the national economy and cultural development."[89] Later, in his essay *Architecture*, Loos justified the removal of ornament as not only good in relation to the way people dressed, but also as the principle for 'true' architecture.[90] Nikolaus Pevsner argues that the influences on Loos come firstly from Otto Wagner and then from Semper and Ruskin: consistent with Semper's idea of dressing and Ruskin's appreciation of 'truth', Loos accepted Wagner's idea that design should be "as honest and as serviceable," and appropriate to the aesthetics of the age of industrialisation in the manner of simplicity.[91] Loos might benefit from lectures of Wagner, but he is not a follower of Wagner. Actually, as Ralf Bock mentioned, Loos opposed the dependence on 'art', and argued "every useful form" could only be developed with the knowledge and experience of "generations" of craftsmanship passed on through craft guilds, and thus satisfy the requirement of functional criteria.[92] Consistent with his theoretical arguments, Loos's designs usually presented an appearance of simplified surface, often employing a flat and homogeneous white stucco finish, such as the Steiner House in Vienna built in 1910 and the Moller Villa in 1926-27 (Figure 1.7-8). In this instance, surface architecture is mainly focused on the representation of

---

[87] Ibid., 44.
[88] Adolf Loos (1908), "Ornament and Crime", in Ludwig Münz and Gustav Künstler (1966), *Adolf Loos: pioneer of modern architecture*, (London: Thames and Hudson), 226.
[89] Ibid., 228.
[90] Adolf Loos (2002), trans. by Michael Mitchell, *On architecture*, (Riverside, Carlifornia: Ariadne Press), 74-79.
[91] Nikolaus Pevsner (1966), "Introduction", in Ludwig Münz and Gustav Künstler (1966), *Adolf Loos: pioneer of modern architecture*, (London: Thames and Hudson), 14-20.
[92] Ralf Bock (2007), *Adolf Loos Works and Projects*, (Milan: Skira editore), 26-27.

simplified cladding. At the same time Loos develops his concept of *Raumplan* in his house projects, a term that means literally 'plan of volumes'. *Raumplan* relates to the spatial formation of surface architecture, which will be discussed later. In relation to Loos's treatment of cladding, Mark Wigley argues:

Loos does not simply advocate the removal of decoration in order to reveal the material condition of the building as an object. What is revealed is precisely the accessory as such, neither structure nor decoration. The perception of a building becomes the perception of its accessories, its layer of cladding.[93]

In addition:

Loos is not simply arguing for the abolition of ornament but for collapsing the distinction between structure and ornament into the layer of cladding, a layer between structure and ornament within which all distinctions are produced by being inscribed into the surface.[94]

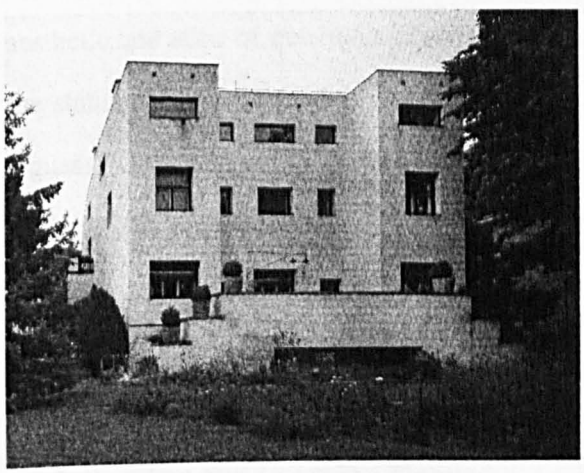


Figure 1.7
Steiner House in Vienna, Austria, 1910,
by Adolf Loos.

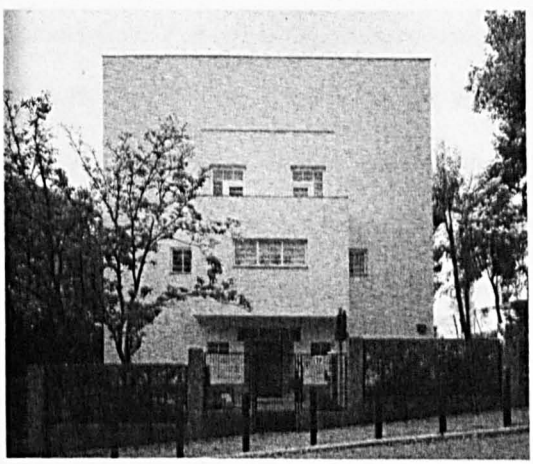


Figure 1.8
Moller Villa in Vienna, Austria, 1926-27,
by Adolf Loos.

The idea that the logic of architecture should be matched to the modern style of dressing is not uncommon in the early period of Modernism. For example, F. R. S. Yorke in his 1934 book, *The Modern House*, argued that if people felt comfortable with modern clothing, they should also

---

[93] Mark Wigley (1995), *White walls, designer dresses: the fashioning of modern architecture*, (Cambridge Mass. & London: The MIT Press), 10.
[94] Ibid., 15.

accept the standard style of modern architecture.[95] In this period, simplified cladding, especially the white stucco of walls, was a common theme in modern surface architecture. In the eyes of Wigley, the white wall was adopted by modern architects as a "style" of "modern" in order to be rid of the old clothing of past fashions, and through this "very particular form of clothing" modern surface architecture used a standardised and mechanised model, consistent with notions of industrial production, to resist the rapid turnover of fashionable styles.[96] Following the transition of the architectural metaphor from *face* to *dressing*, surfaces continued to play a symbolic role in architecture, but they are now seen as a cultural agent through which people think about the relationship between aesthetics and the epoch, and in particular the industrialised aspects of this relation.

Summary

Dressing and cladding is about the externality of surface architecture. In modern architecture, the 'dressing' of architecture tended towards simplification in order to match the modern aesthetic and ethic of standardised and mechanised production. The stress on *dressing* conceals the status of spatial boundary of surface. It suggests a different kind of spatiality. As Wigley argues: "Occupying a space does not involve passing through some kind of opening in the surface, like a door, to find an interior", but rather, "to occupy is to wrap yourself in the sensuous surface." [97] Dressing thus introduces new phenomenal and representational possibilities to surface beyond that of mere spatial division.

1.2.3. Partition and Unbroken Plane

Another significant prototype of surface-space formation emerged in Modernism: its surface architecture is formalized through a composition of vertical fragmental partitions and horizontal unbroken planes. Out of this, the concept of space develops towards spatial continuum or 'flowing space'. As David Leatherbarrow mentioned, the terms of 'flow' and 'flowing space' were commonly used in the middle part of the 20th century, but the idea of 'flowing space', i.e.

---

[95] F. R. S. Yorke (1934), *The Modern House*, (London: Architectural Press), 18.
[96] Mark Wigley (1995), *White walls, designer dresses: the fashioning of modern architecture*, (Cambridge Mass. & London: The MIT Press), xviii-xix.
[97] Ibid., 25.

un-enclosed space allows free movement, could be found its "antecedents" in the writings of both Wright and van Doesburg.[98] Moreover, such notion was also mentioned in the writing of Moholy-Nagy.[99] The most representative case might be the Mies's Barcelona Pavilion built in 1929, but this kind of prototype of the surface-space formation is also found in the earlier project for a brick country house (1923) and his series of courtyard houses in the1930s. The characteristics of this new prototype were summarized by Philip Johnson:

It depends upon a new conception of the function of the wall. The unit of design is no longer the cubic room but the free-standing wall, which breaks the traditional box by sliding out from beneath the roof and extending into the landscape. Instead of forming a closed volume, these independent walls, joined only by planes of glass, create a new ambiguous sensation of space. Indoors and outdoors are no longer easily defined; they flow into each other. This concept of an architecture of flowing space, channelled by free-standing planes, plays an important role in Mies's later development and reaches its supreme expression in the Barcelona Pavilion of 1929.[100]

To allow space to 'flow', it is not enough to have just transparency and openness to the outside, but one must also achieve the continuity of interior spaces. In this way, space could 'flow' from any place of the interior to outside, or vice versa. For this to happen, the enclosure of rooms or of the building has to be broken, hence the introduction of fragmental partitions. These are then complemented by the unbroken horizontal planes of floor and ceiling surfaces. These unbroken planes provide a visual continuity of surface which induces a certain visual and spatial movement through and beyond the fragmental partitions. Moreover, because generally a building is barely opened fully to the outside, thus transparent glass walls are often indispensable elements for the connection of separated partitions but at the same time keep on the visual continuity between inside and outside.

It is often commented by theorists that Mies's development of the composition of free partitions

---

[98] David Leatherbarrow (2002), *Uncommon ground: architecture, technology, and topography* (paperback edition), (Cambridge, Mass. and London: The MIT Press), 176-179.
[99] László Moholy-Nagy (1947), *The new vision 1928 and abstract of an artist* (fourth edition), (New York: George Wittenborn, Inc.), 63.
[100] Philip C. Johnson (1947), *Mies van der Rohe*, (New York: The Museum of Modern Art), 30.

and continuous horizontal planes was influenced by the house projects of Frank Lloyd Wright and the Neoplasticism of De Stijl. For example, Hitchcock argues that besides the "Neoplasticist influence," the spatial openness of Mies's projects "was probably influenced by, the spatial flow in the Prairie Houses of Wright."[101] Wright's Prairie Style of the 1900s, together with his theoretical writings of the same period, develops a building type with an open and asymmetrical ground-plan, reduced pillars and short walls, an overhanging low-pitched roof with white stucco ceiling planes underneath, low bounding garden walls etc.[102] The relation between the extended horizontal planes and fragmental partitions, together with the communication between inside and outside spaces was stressed by Wright in his later writing works as the breaking of "the box":

The corners disappear altogether if you choose to let space come in there, or let it go out. Instead of post and beam construction, the usual box building, you now have a new sense of building construction by way of the cantilever and continuity. .....But, in this simple change of thought lies the essential of the architectural change from box to free plan and the new reality that is space instead of matter. .....What of roof? .....It is a shape of shelter that really gives a sense of the outside coming in or the inside going out. Yes, you have now a wide-spreading overhead that is really a release of this interior space to the outside: a freedom where before imprisonment existed.[103]

As noted by Hitchcock, the form of "flat slabs" as a replacement for "low-pitched hip or gable roofs" began to appear in Wright's designs at the end of the 1900s, such as 1906's Unity Church at Oak Park.[104] Introduced by in two volumes of the Berlin publication by *Wasmuth* in 1910 and 1911 respectively, and by the championing of Berlage in Holland at the beginning of 1910s, Wright's architecture, including his Prairie Houses and Unity Church, made a significant impact in Europe.[105] Moreover, he visited Berlin in 1909 and had an exhibition there the year after, the

---

[101] Henry-Russell Hitchcock (1977), *Architecture: Nineteenth and Twentieth Centuries* (Fourth edition), (Harmondsworth: Penguin Books), 503.
[102] Kenneth Frampton (1992), *Modern architecture: a critical history* (third edition), (London: Thames & Hudson), 59-60.
[103] Edgar Kaufmann (ed.) (1955), *An American Architecture: Frank Lloyd Wright*, (New York: Horizon Press), 77.
[104] Henry-Russell Hitchcock (1977), *Architecture: Nineteenth and Twentieth Centuries* (Fourth edition), (Harmondsworth: Penguin Books), 436.
[105] Reyner Banham (1960), *Theory and Design in the First Machine Age*, (London: The Architectural Press), 145.

latter of which made a deep impression on Mies.[106] While the open plan of Mies's projects may come from Wright, Mies brings a much higher degree of abstraction to the geometrical composition. As Frampton commented:

While this aesthetic (already anticipated in Mies's country house projects of 1922 and 1923) was basically Wrightian, it was Wright as reinterpreted through the sensibility of the G group and the metaphysical space conceptions of De Stijl.[107]

The De Stijl group was another key influence on European architecture at the beginning of 1920s. According to Banham, the impact of De Stijl was initially based on a manifesto of the Constructivist International of 1922, signed by Theo van Doesburg, El Lissitsky and others; this introduced two key ideas of the Machine Aesthetic and Elementarism.[108] For surface architecture, if the idea of Machine Aesthetic mainly implied a simplified surface, the effect of Elementarism could be seen in the development of notions of spatial continuum or flowing space. Elementarism was earlier referred to by the Russian artist Malevich in about 1915 to describe his paintings in which "simple geometric forms...are the basic units of (his) composition," and was brought to Germany by Lissitsky, Moholy-Nagy etc in 1921.[109] The factors of the spatial formation of Elementarism were described by Banham: "Space in Elementarist art is, indeed, continuous and open, and the work of art is a structure that makes its rectangularity manifest by giving body to its grid-lines and the planes and volumes between them."[110] This could be found in words of van Doesburg himself: "By breaking up enclosing elements (walls, etc.) we have eliminated the duality of interior and exterior."[111] Such Elementarist ideas became influential following van Doesburg's visit and lecture to the Bauhaus in 1921, together with the artistic works of Mondrian, van Doesburg, Moholy-Nagy, Kandinsky, Kiesler etc, and the publication of *G* magazine in Berlin. Possibly, it is mainly in this period that Mies, as a member of *G* group at the time, was influenced by the Constructivist or Elementarist

---

[106] Sandra Honey (1986), "Mies in Germany", in Frank Russell (ed.) (1986), *Mies van der Rohe: European works*, (London: Academy Editions), 12.
[107] Kenneth Frampton (1992), *Modern architecture: a critical history* (third edition), (London: Thames & Hudson), 164.
[108] Reyner Banham (1960), *Theory and Design in the First Machine Age*, (London: The Architectural Press), 187.
[109] Ibid., 189.
[110] Ibid., 193.
[111] Ulrich Conrads (ed.) (1970), *Programs and manifestoes on 20th-century architecture*, (London and Cambridge Mass.: The MIT Press), 66.

conceptions.

The relationship between fragmented surfaces, an open ground plan, glass walls, and infinite space was summarised and emphasised by van Doesburg in his 1924 manifesto, *Towards A Plastic Architecture.* Van Doesburg announced a new architecture "as a synthesis of Neo-Plasticism."[112] In this manifesto, he argued for an "elemental", "anti-cubic", "open" architecture based on the correspondence between spatial effect and surface formation:

5.....It follows from this that the surfaces have a direct connexion to infinite space.....

7.....It has overcome the opening (in the wall). With its openness the window plays an active role in opposition to the closeness of the wall surfaces.....

8.....The new architecture has opened the walls and so done away with the separation of inside and outside. .....The result is a new, open ground-plan entirely different from the classical one, since inside and outside now pass over into one another.....[113]

The connection between inside and outside spaces, and the concepts of 'infinite space' and spatial 'continuum', are thus seen as the key points in de Stijl's conception of space enabled by a new attitude to surface. This surface-space correspondence brings an alternative paradigm of spatial formation in contrast to that of enclosure. The most extreme proposal of this paradigm was suggested by Moholy-Nagy, who writes:

The next stage will be space creation in all directions, space creation in a continuum. .....Boundaries become fluid, space is conceived as flowing – a countless succession of relationships. .....A path for future architecture is indicated by another point of departure: the inside and outside, the upper and lower fuse into unity. .....Openings and boundaries, perforations and moving surfaces, carry the periphery to the center, and push the center outward. A constant fluctuation, sideways and upward, radiating, all-sided, announces that man has taken possession, so far as his human capacities and conceptions allow, of imponderable, invisible, and yet omnipresent space.[114]

---

[112] Ibid., 80.
[113] Ibid., 78-79.
[114] László Moholy-Nagy (1947), *The new vision 1928 and abstract of an artist* (fourth edition), (New York: George Wittenborn, Inc.), 63-64.

Under the influences of Wright and De Stijl, Mies developed the composition of fragmental partitions and unbroken horizontal planes into a specific prototype of surface architecture. Though Mies's brick country house of 1923 looks similar in plan to the Barcelona Pavilion of 1929, their surface-space formations are different. In the former case, the idea of extension is the dominant factor. As Hitchcock commented,

This sort of planning allowed a continuous flow of space in and around internal partitioning elements and out through wall-high glass areas to the surrounding terraces, themselves defined by the extension of the solid brick walls of the house.[115]

Three pieces of long brick wall extend from the interior straight out into the surrounding space; they are the defining elements for the flowing space. In the case of the brick country house, the connection between inside and outside spaces is not only emphasised by the openness of boundaries, but also induced strongly by the extension of brick walls, by the continuity of vertical surfaces (Figure 1.9). For the Barcelona Pavilion, it is important that marble walls partly enclose two courts as semi-closed spaces between the interior and exterior (Figure 1.10). In this case, the continuity of surface, and with it the connection between inside and outside, is mainly founded on the unbroken horizontal planes, especially the gridded, homogeneous, marble flooring surface which spreads from the interior into the courts.

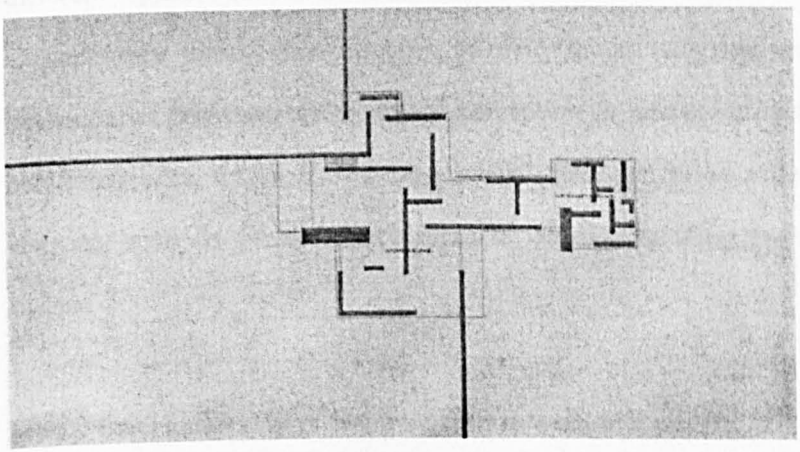


Figure 1.9
Brick country house project, 1923, by Mies van der Rohe.

[115] Henry-Russell Hitchcock (1977), *Architecture: Nineteenth and Twentieth Centuries* (Fourth edition), (Harmondsworth: Penguin Books), 503.

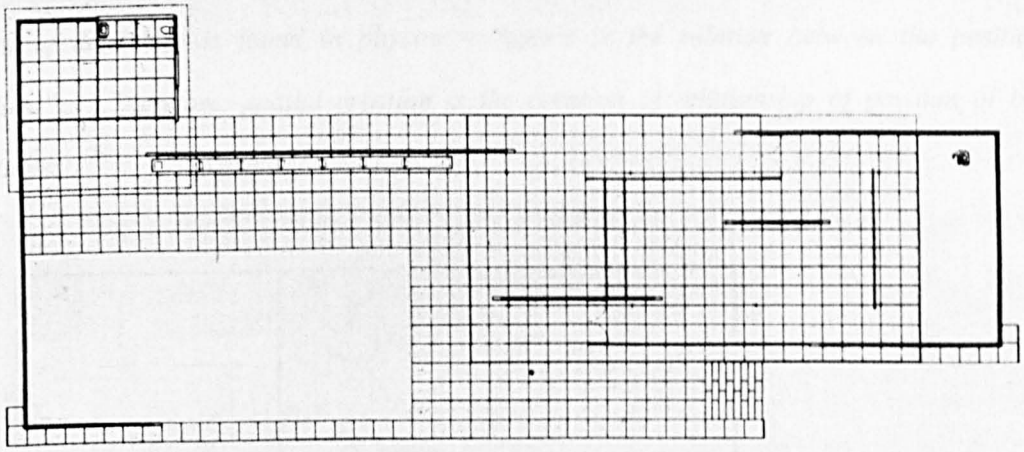


Figure 1.10
Barcelona Pavilion, Spain, 1929, by Mies van der Rohe.

What can be noticed here is that, even though the character of fragmentation occupied a dominant place in the effect of flowing space, the continuity of surface could be still a very important factor. It is not only due to the continuity of horizontal surfaces of ceiling and flooring, but also the continuity of each vertical partition. The continuity of the partitions can be considered as a kind of 'short continuity,' just long enough for them to act as an element of semi-enclosure. The composition of different partitions thus identifies different degrees of enclosure of the spaces. As each partition joins in the formation of different enclosures for different spaces simultaneously, the spatial boundaries are not separated but shared. Consequently, those different spaces, or rather spatial locations, are interconnected through the extension of partitions. Such spatial perception is intensified with the observer's movement between spaces, which allows these spatial moments to be experienced as montage. In this instance, space is perceived according to continually changing relations between body and surface.

Mies's Barcelona Pavilion could be seen as a distinct case reflecting a conceptual transition of space from Semperian *enclosure* to 'flowing space' or spatial continuum. The spatiality of the latter is defined not by enclosing but rather by the "position relation" of fragmental partitions, as argued by Moholy-Nagy's:

Space is the position relation of bodies: a definition of space which may at least be taken as a point of departure is found in physics – "space is the relation between the position of bodies."……Therefore: spatial creation is the creation of relationship of position of bodies (volumes).[116]

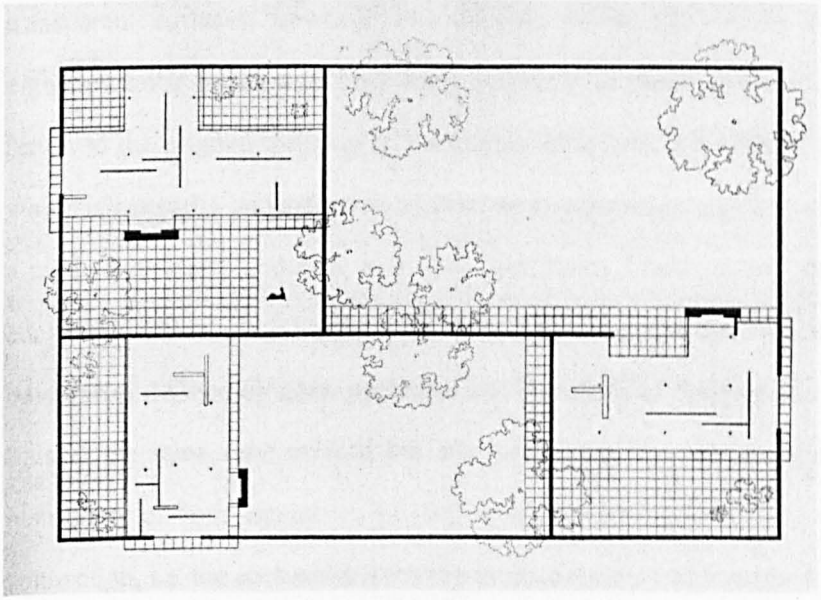


Figure 1.11
Courtyard houses project, 1938,
by Mies van der Rohe.

The tension between continuity and fragmentation is more complicated in Mies's series of courtyard houses of the 1930s (Figure 1.11). On the one hand, free partitions and open horizontal planes are still used; on the other hand, the role of spatial boundary of *enclosure* is evoked through the reversion to *Hofbau* (courtyard building). As we have seen, for Semper the *Hofbau* had occurred as a "firm enclosure of an open place".[117] The difference between *Hofbau* and Mies's courtyard houses is that the enclosure of the former simply aimed to a separation between living space and natural world, but the latter brought a new kind of interrelation between space and landscape.

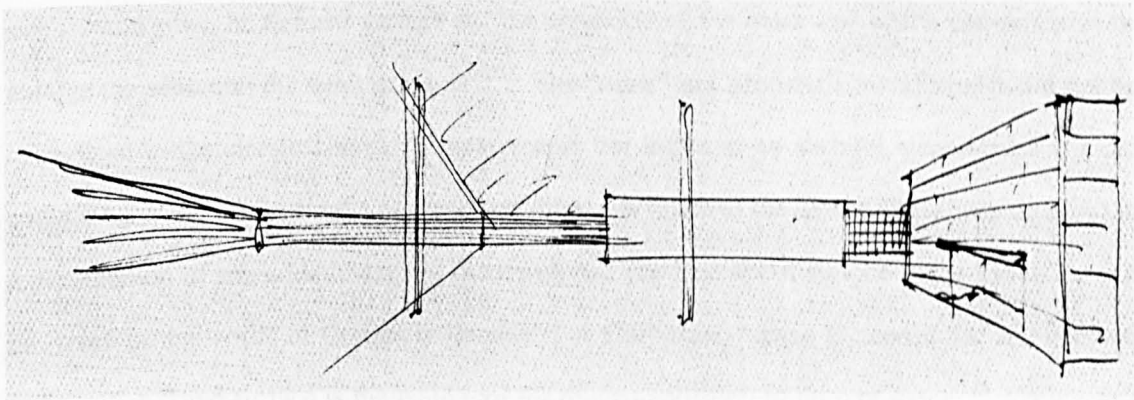
In Mies's courtyard houses projects, flat, homogeneous brick walls extend out to gather the courtyards together with rooms in a series of common enclosure. This can be clearly seen in Mies's perspective sketches of the projects (Figure 1.12). Interior spaces are separated from

---

[116] László Moholy-Nagy (1947), *The new vision 1928 and abstract of an artist* (fourth edition), (New York: George Wittenborn, Inc.), 57.
[117] Wolfgang Herrmann (1984), *Gottfried Semper: In Search of Architecture*, (Cambridge Mass. & London: The MIT Press), 168.

courts by transparent glass walls which made visible the extension of brick walls. The glass walls, as boundaries between interior rooms and courts, acted as a picture frame that transformed the landscape into pictorial images. This particular kind of surface-space formation will be discussed more specifically in a later section which focuses on the framing through transparent surfaces; however, two specific points need to be mentioned here. First, the extended brick walls, with both their simplicity in finish and their enclosing form, suggest a return to the original meaning of Semperian *enclosure*. Secondly, a section of 'natural' ground, which is generally understood as an exterior as opposed to interior condition, is transformed into a kind of enclosed landscape as a semi-open room. Courts and rooms are joined by a common enclosure as 'one space'; at the same time, they were separated into 'different spaces' by various boundaries defined by glass partitions and the edges of flooring and ceiling planes. Spaces are thus at the same time divided but also connected; the continuity of surface here acts as an instrument of both separation, i.e. the separation between dwelling space and the outside, and connection, i.e. the connection between interior spaces and courtyard spaces.

Figure 1.12
Sketch of courtyard houses project, 1931, by Mies van der Rohe.



Summary

The combination of vertical fragmental partitions and horizontal unbroken planes gives rise to the spatiality of 'flowing space' or spatial continuum, in which the composition of continuity and fragmentation within surface architecture brings a spatial effect of both separation and connection. The spatiality arising out of fragmental partitions is based on their positional relationships rather than their enclosure. The horizontal element of unbroken planes endows not only a visual effect of continuity but also an allowance for the continual moving of the body.

Figure 1.13
Villa Savoye at Poissy,
France, 1929,
by Le Corbusier.

1.2.4. Envelope and Free Facade

Envelope and Volume

The notion of *envelope* became widely accepted in modern architecture mainly through the agency of Le Corbusier. In 1923, Corbusier published his seminal book *Towards A New Architecture*. In this book, he proposed three key elements of architecture in terms of *mass*, *surface* and *plan*; he defined surface as "the envelope of the mass and which can diminish or enlarge the sensation the latter gives us".[118] The "mass" in Corbusier's manifesto should not be considered in the classical sense of massiveness but rather as an abstract, geometrical volume containing space. Accordingly, his "surface" does not relate to the externality of cladding but to a presentation of spatial boundary as the *envelope*. The idea about surface-space formation can be found in the words of Corbusier himself. For Corbusier, "space is needed for architectural composition," and surface is the main tool for this composition to present space.[119] Corbusier's design projects illustrate his theoretical proposals, especially the cubic boxes elevated on pillars such as the Villa Savoye (Figure 1.13), which Hitchcock argues "enhance very strongly the look of volumes as opposed to mass."[120]

---

[118] Le Corbusier (1989), trans. by Frederick Etchells, *Towards A New Architecture*, (London: Butterworth Architecture), 17.
[119] Le Corbusier and Amadée Ozenfant (1920), "Purism", in Tim and Charlotte Benton (eds.) (1975), *Form and Function: A source book for the History of Architecture and Design 1890-1939*, (London: Crosby Lockwood Staples), 90.
[120] Henry-Russell Hitchcock (1977), *Architecture: Nineteenth and Twentieth Centuries* (Fourth edition),

For Corbusier, the idea of *envelope* relates to the question of geometry. It is formalized by "a surface", of which the geometry is defined by lines:

A mass is enveloped in its surface, a surface which is divided up according to the directing and generating lines of the mass; and this gives the mass its individuality.

Architects today are afraid of the geometrical constituents of surfaces.

The great problems of modern construction must have a geometrical solution.[121]

The lines of envelope can be understood in two ways. One is the control line of the periphery of the shape - the edges of surface and the joining lines of different sides, such as at the corner of a building. The other is the dividing lines within a single surface – the lines formed by the composition of windows, doors, solid walls, floors etc, which determine the proportional relations of a given surface. The emphasis on these lines suggests a kind of surface architecture constituted by the abstraction of Euclidean geometry and compositional aspects. In this context, although Corbusier's projects sometimes employ the application of colors as the treatment of surfaces, it might be argued that his surface treatments aim to increase the effect of spatial composition of different surfaces rather than the representation of colors themselves. This idea could be found in Purism, the movement founded by Corbusier and Amedée Ozenfant in Paris in the early 1920s, under the influences of Rationalist thought and Cubism.[122] In their manifesto of 1920, they argued that "a work of art should induce a sensation of mathematical order," and this mathematical order could be presented by the composition of surfaces.[123] The emphasis on the simplified geometry of lines is may also be traced to Corbusier's appreciation of the aesthetics of industrial production, in which he notes "the tendency of the engineers of to-day is towards the generating and accusing lines of masses."[124]

(Harmondsworth: Penguin Books), 494.

[121] Le Corbusier (1989), trans. by Frederick Etchells, *Towards A New Architecture*, (London: Butterworth Architecture), 36.

[122] Reyner Banham (1960), *Theory and Design in the First Machine Age*, (London: The Architectural Press), 206-208.

[123] Le Corbusier and Amadée Ozenfant (1920), "Purism", in Tim and Charlotte Benton (eds.) (1975), *Form and Function: A source book for the History of Architecture and Design 1890-1939*, (London: Crosby Lockwood Staples), 89-90.

[124] Le Corbusier (1989), trans. by Frederick Etchells, *Towards A New Architecture*, (London: Butterworth Architecture), 41.

The visual effect of these surface lines is emphasized by the treatment of surfaces as flat and continuous planes, with windows set flush with the solid surface. This point is made by Hitchcock and Johnson:

Thus as a corollary of the principle of surface of volume there is the further requirement that the surfaces shall be unbroken in effect, like a skin tightly stretched over the supporting skeleton. ..... Hence the breaking of the wall surface by placing windows at the inner instead of at the outer edge of the wall is a serious fault of design.[125]

The effect of the flat surface of *envelope* is often achieved by the hiding of structure. This is different from the flatness of *enclosure* in early modern architecture, such as Berlage's. It is not achieved by embedding structural pillars into the wall, but in contrast, is dependent on the separation of load-bearing structure and the surface of the walls: columns are not in the wall, but hidden behind it. With Corbusier's envelope, the normal mode of construction is the framed skeleton structure. As shown in his Dom-Ino model, the flooring and roofing slabs cantilevered a bit out from the concrete columns. The enveloping surface could be thus completely separate from the skeleton, allowing it to take its own form. This characteristic is highlighted by Corbusier's conception of *free facade* which was one of his *Five Points Towards a New Architecture* of 1926. In this declaration, what is mainly intended is the freedom of fenestration, especially with the deployment of horizontal strip windows.[126]

Both Corbusier's 'surface' and 'free facade' are inseparable from the spatial arrangement of *plan*; as Frampton notes, the *free façade* could actually be seen as "the corollary of the free plan in the vertical plane"[127]. In *Towards A New Architecture*, the *plan* is regarded as one of three key architectural elements, and seen as the basis of spatial formation: "Plan which is the generator both of mass and surface and is that by which the whole is irrevocably fixed."[128] The *free plan*

---

[125] Henry-Russell Hitchcock and Philip Johnson (1966), *The International Style*, (New York and London: W. W. Norton & Company), 45.
[126] Le Corbusier and Pierre Jeanneret (1926), "Five points towards a new architecture", in Tim and Charlotte Benton (eds.) (1975), *Form and Function: A source book for the History of Architecture and Design 1890-1939*, (London: Crosby Lockwood Staples), 100.
[127] Kenneth Frampton (1992), *Modern architecture: a critical history (third edition)*, (London: Thames & Hudson), 157.
[128] Le Corbusier (1989), trans. by Frederick Etchells, *Towards A New Architecture*, (London: Butterworth Architecture), 17.

is also one of the *Five Points*; such a plan configures the spatial arrangement of three-dimensional volumes. Its early model could be found in Adolf Loos's *Raumplan*, a kind of free arrangement of interior spaces inside a compact single volume. Loos's *Raumplan* "must now be seen as the first to postulate the problem that Le Corbusier was eventually to resolve with his full development of the free plan", comments Frampton.[129] The correspondence between *envelope* and *volume* brings to surface architecture a prototype of the surface-space formation. It generally is based on a flat, simplified, integrated surface enveloping a pure geometry of volume. However, the correspondence between *free plan* and *free facade* brings an opportunity for surface architecture to display the formation of interior volumes, bringing in the relationship of *free facade* and *shallow space*.

Phenomenal transparency and Shallow space

The formation of surface-space is developed by Colin Rowe and Robert Slutzky in their famous essays on *Transparency: Literal and Phenomenal*. The major concern of these two essays is about how interior spaces or volumes could be perceived from the outside through the composition of the surfaces. In contrast to the perception of space through transparent materials, Rowe and Slutzky developed an alternative idea based on the representational techniques of Cubism, which suggests a kind of pictorial spatiality. In addition to a "real or literal transparency," which is "an inherent quality of substance," they argued for a "phenomenal or seeming transparency" as a perceived effect of spatial organization:

Therefore, at the beginning of any inquiry into transparency, a basic distinction must perhaps be established. Transparency may be an inherent quality of substance – as in a wire mesh or glass curtain wall, or it may be an inherent quality of organization – as both Képes and, to a lesser degree, Moholy-Nagy suggest it to be; and one might, for this reason, distinguish between a real or literal and a phenomenal or seeming transparency.[130]

These two types of "transparency" refer to two different concepts of space:

---

[129] Kenneth Frampton (1992), *Modern architecture: a critical history (third edition)*, (London: Thames & Hudson), 95.

[130] Colin Rowe and Robert Slutzky (1964), "Transparency: Literal and Phenomenal I", in Todd Gannon (ed.) (2002), *The Light Construction Reader*, (New York: The Monacelli Press), 94.

Literal transparency, we might notice, tends to be associated with the trompe l'oeil effect of a translucent object in a deep, naturalistic space; while phenomenal transparency seems to be found when a painter seeks the articulated presentation of frontally aligned objects in a shallow, abstracted space.[131]

The concept of 'phenomenal transparency' is based on the ideas of Gyǒrgy Képes and Moholy-Nagy. In his *Language of Vision* of 1944, Képes argued that transparency could imply "a border spatial order" as "a simultaneous perception of different spatial locations", in contrast to be seeing as "an optical characteristic".[132] Moholy-Nagy in *Vision in Motion* of 1947 argues: "The transparent qualities of the superimpositions often suggest transparency of context as well, revealing unnoticed structural qualities in the object."[133] In this logic, the perception of transparency could be induced by spatial composition, as an alternative to transparent materials. What Rowe and Slutzky emphasized is a visual effect in which the three-dimensional composition of elements and volumes is compressed and reduced into an abstract two-dimensional surface-space similar to the framing of pictorial space in painting. Detlef Mertins commented:

This phenomenal space was considered to be purely optical, in the sense suggested in the late nineteenth century by the aesthetician Konrad Fiedler when he speculated on the possibility of extracting "pure visibility" as an autonomous element in respect to the object, leaving its tactility behind. The planar model of spatial perception on which Rowe and Slutzky's interpretation rested sought an objective congruence between the physiological optics considered inherent to sight and the self-referentially inscribed form of the building. On this basis, they assumed a new kind of cognition and a new kind of pleasure as the building attempted to present itself in ideal visual terms, faced nevertheless with the limitations of material appearances.[134]

---

[131] Ibid., 95.
[132] Ibid., 94.
[133] Ibid., 94.
[134] Detlef Mertins (1996), "Transparency: Autonomy and Relationality", in Todd Gannon (ed.) (2002), *The Light Construction Reader*, (New York: The Monacelli Press), 136.

Figure 1.14
Villa Stein at Garches, France, 1927,
by Le Corbusier.

In their paper, Rowe and Slutzky used Corbusier's 1927 Villa Stein at Garches as a clear example of the idea of phenomenal transparency, contrasting it to the contemporary case of the Bauhaus building, the latter being representative of literal transparency. For Rowe and Slutzky, the presentation of the surface architecture of Villa Stein could be considered as an abstract painting showing "a disposition of frontally aligned objects which are arranged within a lightly compressed space".[135] The main instrument of this presentation could be understood as the formation of "overlapping" surfaces and the "stratification" of spaces. As Rowe argues, "these stratifications, devices by means of which space becomes constructed, substantial, and articulate, are the essence of that phenomenal transparency which has been noticed as characteristic of the central post-Cubist tradition."[136] The result of the formation of overlapping surfaces and the stratification of spaces is a kind of "shallow space":

Consequently, it was further implied that among the causes of phenomenal transparency there might be found a preference for shallow space, or where such space was not possible, for a stratification of deep space, so that the phenomenal as opposed to the real space could be experienced as shallow.[137]

---

[135] Colin Rowe and Robert Slutzky (1971), "Transparency: Literal and Phenomenal II", in Todd Gannon (ed.) (2002), *The Light Construction Reader*, (New York: The Monacelli Press), 109.
[136] Colin Rowe and Robert Slutzky (1964), "Transparency: Literal and Phenomenal I", in Todd Gannon (ed.) (2002), *The Light Construction Reader*, (New York: The Monacelli Press), 100.
[137] Colin Rowe and Robert Slutzky (1971), "Transparency: Literal and Phenomenal II", in Todd Gannon (ed.) (2002), *The Light Construction Reader*, (New York: The Monacelli Press), 103.

The stratification of shallow space can be best understood through their analysis of the composition of surface elements in the Villa Stein (Figure 1.14). It comes from the correspondence between surface and interior spatial arrangement. As Colquhoun indicates, inherent in the Villa Stein was "the idea of the free plan," which implies "the principle that every kind of space has a right to architectural expression."[138] Such "expression" can be observed on the side facing the garden. A two-storey high opening on the left hand side of surface corresponds to the volume of a loggia which is scooped out from the cube of the building. On the right hand side, three horizontal slot windows show the spatial organization of three floors inside. The asymmetrical spatial arrangement is projected onto the layout of the surface, especially because of the loggia. As Colquhoun comments, "by being placed asymmetrically, it establishes the 'free' and diagonal organization of the internal spaces on the façade."[139] The precise effect of stratification is concentrated on the surface-space formation of the loggia. The loggia consists of two parts: a large one on the first floor, of which half is covered by roof and half extends outside as a projecting balcony; there is also a small one on the second floor behind the larger. The top and exterior side of this small loggia have openings which illuminate it with sunlight. The space of these loggias is stratified by four parallel layers of surfaces: 1). the outside parapet of the big loggia; 2). the main surface layer of the building which divides the big loggia into two parts; 3). the parapet of the small loggia and the glass wall below; and 4). the inside wall of the small loggia. Viewed from the outside, these four layers of surface overlap, but at the same time their physical spatial relations are displayed by the relationship of brightness and darkness. The spaces stratified by these surfaces can be looked as a kind of shallow space defined by the projection of the bright-dark and light-shadow effects, just like the pictorial space of Cubist painting.

Summary

The idea of envelope corresponds to the presentation of volume. For modern architecture, it is generally formalized by its geometrical characteristics including controlling lines of shapes and

---

[138] Alan Colquhoun (1972), "Displacement of Concepts in Le Corbusier", in Alan Colquhoun (1981), *Essays in Architectural Criticism: Modern Architecture and Historical Change*, (London, Cambridge Mss.: The MIT Press), 62.
[139] Ibid., 55.

the elemental composition of each elevation. It often consists of continuous, flat, pure enveloping surfaces, which are usually made possible by the separation of surface and load-bearing skeleton hidden behind. In the more developed versions, the combination of 'free façade' and 'free plan' brings a presentation of shallow space. Through the surface formation of overlapping spaces and the stratification of spaces, this prototype of surface architecture induces a visual perception of 'phenomenal transparency'.

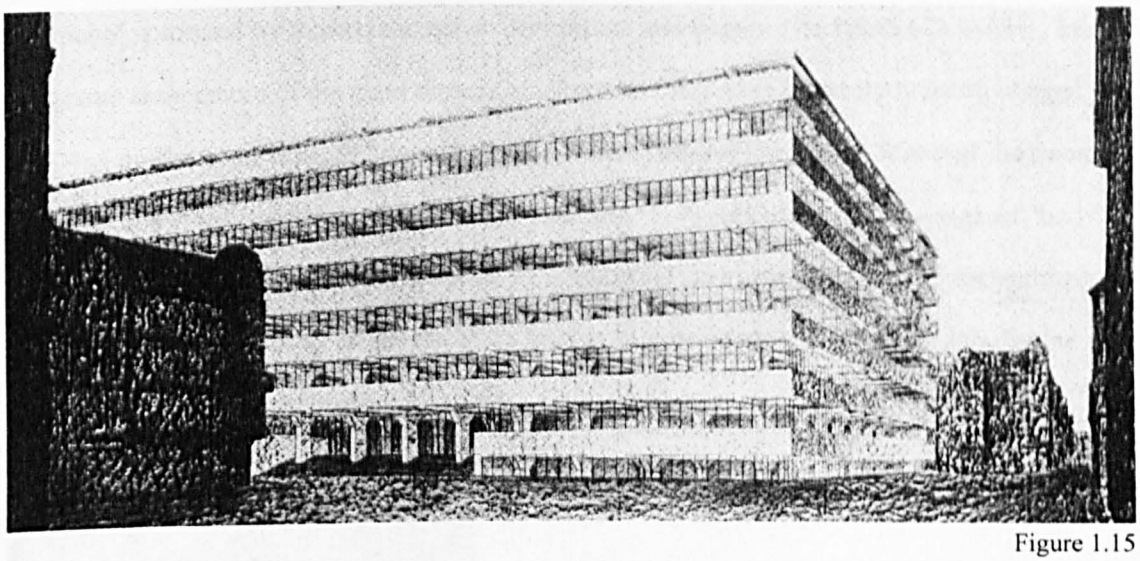


Figure 1.15
Concrete office building project, 1922, by Mies van der Rohe.

1.3. Transparency and Reflection

1.3.1. Skin

The term *skin* is introduced by Mies van der Rohe in the first issue of *G* magazine of 1923:

The materials: concrete, steel, glass. Reinforced concrete structures are skeletons by nature. No gingerbread. No fortress. Columns and girders eliminate bearing walls. This is skin and bone construction.[140]

This statement was used as an interpretation of a design project for a reinforced concrete office building. The proposed multi-floor building of 1922 is formed by a concrete skeleton covered in a skin of ribbon windows, which is totally separate from the column structure. The principle of

[140] Mies van der Rohe (1923), "The Office Building", in *G*, No.1, in Philip C. Johnson (1947), *Mies van der Rohe*, (New York: The Museum of Modern Art), 183.

skin-bone here is not only technical, but also visual. Mies's drawing shows the interior concrete skeleton clearly visible through a transparent glass skin (Figure 1.15). The idea of 'skin and bone' also implies a metaphor regarding the building as a body. It is not a mimetic representation of an organism but rather refers to a kind of mechanical 'body'. As Philip Johnson comments, it is a representation of a rigid structural system based on the conception of a living machine.[141] In Mies's 1919 design proposal for the Friedrichstrasse office building in Berlin, flooring slabs are clearly shown against the transparent glass skin (Figure 1.16). Here, the 'bone' is formed by those slabs rather than pillars and beams. For Beatriz Colomina, Mies's skin-bone architecture of the glass skyscraper suggests "an image of the body being imaged" by an X-ray machine, an early 20th century device, which differed from the "dissected, fragmented, analyzed body" discovered by Renaissance anatomy.[142] In this context, the image of 'body' is no more than a visual projection obtained by a technical instrument; the skin-bone architecture thus does not only refer to an industrial technique of construction, but also to the display of a kind of mechanical body, or objective body.

Figure 1.16
The project of Friedrichstrasse office building of Berlin, 1919, by Mies van der Rohe.

Although employed in the mid 19th century architecture such as market and exhibition halls, the use of the transparent glass curtain wall was not widely accepted until the early 20th century,

---

[141] Philip C. Johnson (1947), *Mies van der Rohe*, (New York: The Museum of Modern Art), 22-30.
[142] Beatriz Colomina (2003), "Skinless Architecture", in Bernard Tschumi and Irene Cheng (Eds.) (2003), *The State of Architecture at the Beginning of the 21st Century*, (New York: The Monacelli Press, Inc.), 69.

rising out of the industrialisation of architectural production and the separation between surface and structure. What can be identified in the curtain wall is the move from glass window to glass wall, in which the division between window and wall is cancelled; a flat, thin, integrated, and transparent skin thus becomes a new agent of surface architecture. As indicated by German architect Artur Korn in *Glass in Modern Architecture* of 1929:

The contribution of the present age is that it is now possible to have an independent wall of glass, a skin of glass around a building; no longer a solid wall with windows. Even though the window might be the dominant part – this window is the wall itself, this wall is itself the window.[143]

This new agent was also referred to by Frank Lloyd Wright. He regarded the glass wall as one of five key resources of modern architecture: "you may see that walls are vanishing. .....Walls themselves because of glass will become windows and windows as we used to know them as holes in walls will be seen no more. Ceilings will often become as window-walls, too."[144] As Jóse Luis Sert argues in his *Windows and Walls*: "with the introduction of steel and concrete skeletons ..... the nature of walls (was transformed) from bearing walls to nonbearing partitions, curtain or screen walls."[145]

Furthermore, the glass skin is adopted to represent Modernism as a new epoch in contrast to the Classical period. Forty notes that the "insubstantial architecture" of 'skin and bones' was used by Mies against the previous historical idea of building as a solid physical mass that contained and constrained the life of the subject.[146] In the eyes of Forty, through the rejection of the historical building's massiveness and materiality, Mies used the transparent glass curtain wall as a kind of new expression for modern architecture. The transparent glass skin could conceal the materiality of the wall through its visual insubstantiality; it also dissolves the massiveness of the

---

[143] Arthur Korn (1929), "Glass in Modern Architecture", in Tim and Charlotte Benton (eds.) (1975), *Form and Function: A source book for the History of Architecture and Design 1890-1939*, (London: Crosby Lockwood Staples), 170.

[144] Frank Lloyd Wright (1943), "In the Nature of Materials: A Philosophy", in Joan Ockman (ed.) (1993), *Architecture Culture 1943-1968: A Documentary Anthology*, (New York: Rizzoli International Publications, Inc.).

[145] David Leatherbarrow and Mohsen Mostafavi (2002), *Surface architecture*, (London, Cambridge Mass.: The MIT Press), 78.

[146] Adrian Forty (2000), *Words and Buildings: A Vocabulary of Modern Architecture*, (London: Thames & Hudson), 268.

building by revealing the interior voids. Using such a skin, the Friedrichstrasse office building has been described as presenting a kind of "materialized dematerialized or a dematerialized materiality" of glass skin.[147] As Arthur Korn said in 1929:

...it is the disappearance of the outside wall – the wall, which for thousands of years had to be made of solid materials such as stone or timber or clay products. But in the situation now, the outside wall is no longer the first impression one gets of a building. It is the interior, the spaces in depth and the structural frame which delineates them, that one begins to notice through the glass wall.[148]

Summary

Skin is a conception of surface architecture in conjunction with 'bone'. Technically, it focuses on the separation between surface and load-bearing structure, and shows an industrialization of construction. Seen as a spatial boundary, skin can imply the spatial formation of a mechanical or objective body. As a glass curtain wall, the transparent skin has the effect of 'disappearing', and correspondingly, brings a visualization of the spatial depth of the interior volume. In this context, the massiveness and materiality of conventional architecture gives place to a kind of dematerialized formation of surface-space.

1.3.2. Picture and Display Window

Two distinct kinds of spatiality are produced by transparent surface architecture through the twin notions of *picture window* and *display window*. Both of these relate to the visual effect of framing. When viewed from inside out, the motif of framing is often described as a pictorial landscape; in this instance, surface architecture can be considered as a *picture window*. When viewed from outside in, the object of framing is an interior scene or display. Here, surface architecture can be regarded as a *display window*. Through these two kinds of surface-space, the objects in view are transferred into a world of images that overrides their physical status.

---

[147] John Zukowsky (1986), *Mies Reconsidered* (exhibition catalogue), (Chicago: Random House Inc), 37.
[148] Arthur Korn (1929), "Glass in Modern Architecture", in Tim and Charlotte Benton (eds.) (1975), *Form and Function: A source book for the History of Architecture and Design 1890-1939*, (London: Crosby Lockwood Staples), 170.

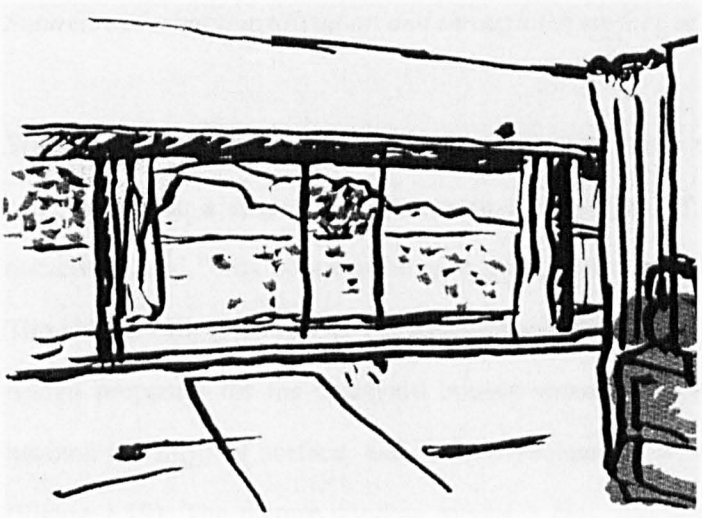


Figure 1.17
Une petite maison, 1954,
by Le Corbusier.

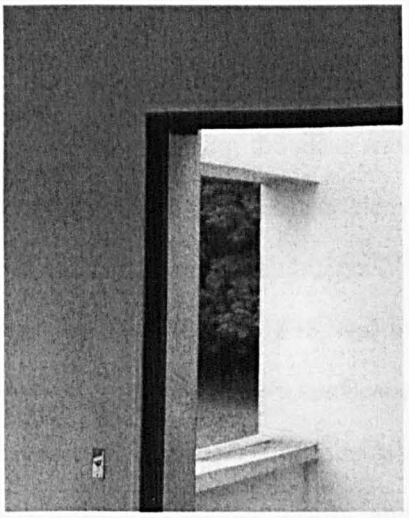


Figure 1.18
Villa Savoye at Poissy, France, 1929,
by Le Corbusier.

Picture window and landscape

Seeing from inside out is an original function of window. But it is not until the Modernism that the specific correspondence between the vision of pictorial landscape and the setting of the window is highlighted, mainly due to the enlargement of the window. Natural scenery becomes a kind of pictorial landscape framed as a painting in a transparent surface. Such an effect can be found in Le Corbusier's architecture, specially his long, horizontal, strip windows. Corbusier's intent can be seen not only in his buildings such as Villa Savoye, but also through design drawings such as *Une petite maison* of 1954 (Figure 1.17). In the case of the Villa Savoye, the building is encircled by ribbon windows and horizontal openings on the first floor. The surrounding scenery is framed by these windows and openings as the images of landscape (Figure 1.18). The spatial experience is produced through the combination of flowing space and the continuous framing of landscape. More obviously, the intent of the picture window is represented in Corbusier's design drawings. As in the sketch for *Une petite maison*, the outside nature is framed as a long landscape painting on the wall, as if it had been dragged into the surface plane. The physical status of the nature is concealed, and replaced by an image of 'pictorial nature' i.e. landscape. As Leatherbarrow and Mostafavi argue:

The horizontal window...instituted a virtual connection and a physical separation between landscape and interior; it thin glass plane served as a mechanism for framing the panorama of

nature, rendering it artificial on and through the surface of the ribbon window.[149]

With Mies, the picture window is enlarged from window to glass wall. For him, the glass wall can "permit us a degree of freedom in the creation of space that we will no longer deny ourselves", and "only now can we give shape to space, open it, and link it to the landscape."[150] The idea is clearly shown in his Resor House Project in Wyoming, proposed in 1938, and in design proposals for the courtyard houses series. In these projects, the images of landscape become the infill of surface, and surface becomes a visual device for the capture of scenery (Figure 1.19). The picture window creates a dialogue between inside and outside spaces, and thus between the artificial and nature.

Figure 1.19
Resor House Project in Wyoming (view from interior), 1938, by Mies van der Rohe.

With such a visual device, what could be pictured is not only the vision of natural landscape but also the scene of urban activities. Through the capture of changing and moving images outside the window, the picture window creates a framing of the urban landscape. In comparison with the silent and static natural landscape, the urban landscape is often full of chaotic, temporal and mobile images. It is thus more like a cinematic show. As Leatherbarrow and Mostafavi argue, the characteristic motion of the urban landscape is caught through the extension of the

---

[149] David Leatherbarrow and Mohsen Mostafavi (2002), *Surface architecture*, (London, Cambridge Mass.: The MIT Press), 44.
[150] Mies van der Rohe, "Address to the Union of German Plate Glass Manufacturers, March 13, 1933", quoted by Frampton in *Modern architecture: a critical History* (third edition), (London: Thames & Hudson), 175.

horizontal window, especially when extending around the corner of building.[151] The picture window which frames the urban landscape introduces a new relation between the street and the room, and thus between public and private spaces. As a spatial boundary it is not defensive, but rather opens up communication with, and absorption of, social information outside of the window. In this new spatiality of the modern, one's social position and identity is defined not through the representational space of symbolic signs or identifiers in the form of architectural 'dressing'; rather, it is obtained through the immediate experience within the chaotic, temporal and mobile images of the urbanism.

Display window and Phantasmagoria

In her book *Weimar Surfaces*, Janet Ward discusses how the display windows of department stores acted as an important factor of culture, capitalist consumption, urban spectacle, and Modernity in 1920s Weimar Germany. Derived from the 19th century French culture of consumption, the transparent glass surface formalizes a visual mechanism for the fetish of commodities. In modern society, the images of commodities become a dominant theme in urban space and everyday life. The display window acted as an instrument that severed the connection to the actual production of this consumption culture, and joins in the creation of the phenomena of "phantasmagoria". The term phantasmagoria, derived from Marx, does not simply mean a dreamlike visual effect, but rather relates to a specific mechanism by which the representation of images conceals the process of production through the creation of a virtual world of images. As Janet Ward explains:

In the hope of deconstructing the aestheticized field of vision, Marx applied the metaphor of phantasmagoria – a term invoking both feverish, fantastic, associative dreams as well as the magic-lantern sequences of the beginning of the nineteenth century, which hid the technique of their art using back projection – to represent consumerism's hold over us in our cavelike "mist-enveloped regions of the religious world."[152]

---

[151] David Leatherbarrow and Mohsen Mostafavi (2002), *Surface architecture*, (London, Cambridge Mass.: The MIT Press), 54-56.

[152] Janet Ward (2001), *Weimar surfaces: urban visual culture in 1920s Germany*, (Berkeley, Los Angeles and London: University of California Press), 191.

Ward argues that the phantasmagoria of consumption images introduced a significant type of urban space at the beginning of the 20th century.[153] It is precisely through the framing of display windows that commodities were transferred from being the materials of usage to being the framed images of exhibition and exchange. The visual experience of everyday urban life falls into a half-real and half-imaginary phantasmagoria, as a world of "specular spectacle."[154] Ward argues that: "In the Weimar display window, the distinction that Lefebvre draws between the spatial metaphors of the 'space of representation' (that of department stores) and 'representational space' (that of advertising) merges into one."[155]

Henri Lefebvre, in his 1974 book, *Production of Space*, argued that space could not be separated from social relation and production. For the production of space, Lefebvre proposed a conceptual triad: spatial practice, representations of space, and representational spaces. Spatial practice "embraces production and reproduction, and the particular locations and spatial sets characteristic of each social formation."[156] In contrast to the spaces of architecture which accommodate the activities of social production and reproduction, 'representational space' is formalized by symbolic representation, "directly lived through its associated images and symbols, and hence the space of 'inhabitants' and 'users'".[157] It is a kind of spatiality induced by the correspondence between symbols or signs and the interpretation and imagination of their audiences. In the context of Ward's argument, the department store could be seen as an actual space which locates the representation of commercial exhibition and exchange, but the display window of the store evokes a kind of representational space which enacts the transformation from displayed commodities to symbolic images of consumption. In this instance, the department store consists of both the actual serving space and the virtual space of imagination and signs, and thus acts as a part of the formation of phantasmagoria. It thus an example of how Lefebvre argued that space, in all its manifestations, is produced. If, as Lefebvre says, the architectural boundary could act a significant role in the creation of social relationships within

---

[153] Ibid., 191.
[154] Ibid., 194.
[155] Ibid., 195.
[156] Henri Lefebvre (1991), trans. by Donald Nicholson-Smith, *The Production of Space*, (Oxford and Cambridge Mass.: Blackwell Publishers), 33.
[157] Ibid., 39.

social space,[158] then the display window can be seen as such boundary which forms a space for spatial practice, and induces an interconnection between actual space and the imaginary space of phantasmagoria.

An early exemplar for the display window can be found in Walter Benjamin's description of the 19th century Paris arcades. As argued by Benjamin, the Parisian arcades introduced a kind of urban experience of phantasmagoria based on the relationship between new economic activities, technological creations and forms of people's behaviour.[159] The glass windows and doors of shops were the main element of the spatial formation within the Paris arcades. Through those display windows, the shops and goods become images of consumption which became the attraction of urban space. In this instance, the difference between interior and exterior spaces vanished. For Benjamin, the Paris arcades were the original model for later department stores.[160] The department stores built in Europe and America in the 19th century are regarded by Giedion as a key type of modern building.[161] Technically, the glass constructions of the department stores are the consequence of industrial production, but economically they are the result of new forms of trading and consumption, and the new urban population with its crowds of pedestrians.[162] The display window acts as a direct response to these new economic conditions, being seen first as instrument of commercial business – but this brings with it in turn a mechanism for the formation of phantasmagoria and the production of social space.

Summary

Due to the framing of the transparent glass window or window-wall, modern surface architecture induces a particular spatiality through the medium of the *picture window* and *display window*, which frame images from outside or inside respectively. The picture window captures either the external natural scenery or urban scene into framed pictures of landscape. It formalizes a physical separation but at the same time a visual and virtual connection between

---

[158] Ibid., 193.
[159] Walter Benjamin (1999), trans. by Howard Eiland and Kevin McLaughlin, *The Arcades Projects*, (Cambridge Mass. and London: The Belknap Press of Harvard University Press), 14.
[160] Ibid., 15.
[161] Sigfried Giedion (1967), *Space, Time and Architecture* (Fifth edition), (Cambridge Mass.: Harvard University Press), 235.
[162] Ibid., 234.

nature and the interior, or between external public space and the private space of the interior through an immediate experience. The display window turns objects into a world of images and signs, and then creates a half-real and half-imaginary phantasmagoria. Both of them offer a visual mechanism for the production of space.

1.3.3. Reflective Surface

Besides transparency, the glass surfaces of modern architecture introduced reflection as another significant visual effect. At the beginning of the 20th century, the reflective effect of glass architecture was appreciated by Paul Scheerbart as a fresh instrument which could transform the Earth's surface into a brilliant world, as if full of jewellery.[163] In this, the effect of reflection was mainly considered as the reflection of light. When it was adopted by Mies as a theme of his design proposals for the glass skyscrapers already discussed above, the reflective surface was not only about light but also about the shadows and images of the surrounding urban environment. As he notes in his design for these skyscrapers: "I discovered by working with actual glass models that the important thing is the play of reflections and not the effect of light and shadow as in ordinary buildings."[164] The visual effect of reflective surfaces proposed by Mies is fully realized in his 1951 Lake Shore apartments in Chicago and 1958 Seagram Building in New York. Both are regular tower blocks covered with a glass curtain wall. The reflected images of the surrounding environment, including natural and urban landscapes, give the buildings a dramatic effect. Since then, the model of the glass curtain wall has become the stereotype for skyscrapers all over the world. Due to the technical innovation of the frameless glass curtain wall, the reflective surface can now achieve perfect flatness and seamlessness, and thus the perfect optical quality of reflection, as can be seen in examples such as the Hancock Tower of 1973 in Boston, designed by I. M. Pei Associates. The glass curtain wall here reflects images of both natural phenomena (of sky and clouds etc) and also the urban context around it, and furthermore overlaps them into a multiple, dynamic, visual composition. Once the presentation of a surface became no more than images borrowed from outside, the building

---

[163] Paul Scheerbart (1914), "Glass architecture", in Ulrich Conrads (ed.), *Programs and manifestoes on 20th-century architecture*, (Cambridge Mass.: The MIT Press), 32-33.
[164] Mies van der Rohe (1922), "Two Glass Skyscrapers", in *Frühlicht*, recorded in Philip C. Johnson (1947), *Mies van der Rohe*, (New York: The Museum of Modern Art), 182.

itself attains the visual quality of 'disappearing'. The reflective surface might thus be used as a means of establishing a visual relationship between a new building and its context. Such opinion is referred to by some theorists. For example, when Brent C. Brolin addressed the question of 'architecture in context' in terms of 'fitting new buildings with old', he focused on a kind of visual continuity in a neighbourhood achieved through the matching of the form of surfaces.[165] Using the Hancock Tower as an example, Brolin argued the reflective surface of this sixty story building helped reduce the conflict between this new building and its existing context, especially the Richardson's Trinity Church (Figure 1.20). He said: "Its mirror-glass curtain wall almost makes the building disappear when you look up at the tower, and, of course, it reflects Richardson's magnificent church below."[166] In a similar argument made by Frampton in the case of the Willis Faber Dumas building of 1974 (Figure 1.21), designed by Foster Associates, the surface of mirror-glass is seen to "answer the contextual imperative of relating to the scale and texture of the existing urban environment – in this instance, by simply reflecting it."[167]

Figure 1.20
Hancock Tower at Boston, 1973,
by I. M. Pei Associates.

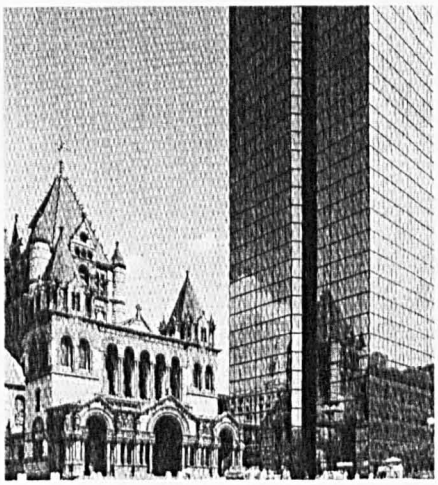
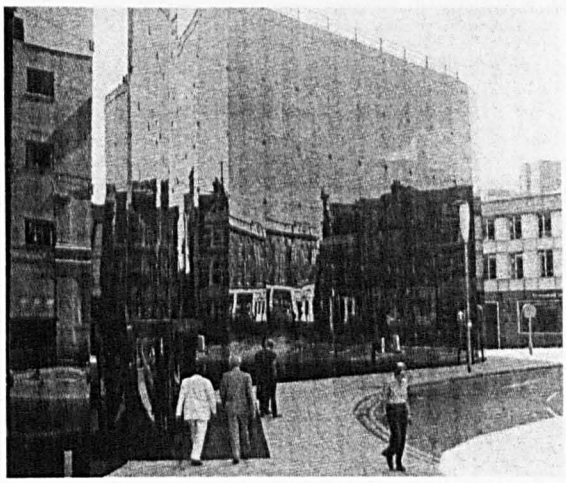


Figure 1.21
Willis-Faber and Dumas building at Ipswich, 1974,
by Foster Associates.



In the eyes of Leatherbarrow and Mostafvi, the reflective surface brings the effect of a building's 'disappearing' due to the unlimited "spectral effects" of reflection, and thus induces "the experience of 'distraction' – a special form of looking, focused not on permanent figures

---

[165] Brent C. Brolin (1980), *Architecture in Context: fitting new buildings with old*, (New York: Van Nostrand Reinhold Company).
[166] Ibid., 135.
[167] Kenneth Frampton (1992), *Modern architecture: a critical history*, (London: Thames & Hudson), 302.

nor on entire objects but on local or minor occurrences, and thus attentive to the ephemerality of urban phenomena."[168] As argued by K. Michael Hays, the problem for the western intellectual in the first half of the twentieth century was the acute anxiety of how, when facing the chaotic metropolitan experience, to provide a "cognitive mechanism" with which to register the intense changes being continually experienced in the modern city.[169] According to Hays, Mies's skyscraper projects already gave a critical response to this anxiety: with the changeable reflections and refractions of the glass curtain wall on one hand, and a complex but unitary volume covered by glass surface on the other hand, the Friedrichstrasse project presented a kind of inscrutable and uncertain spatiality in correspondence with the changing, chaotic urban environment. This kind of indeterminacy matched the conditions of the newly mobile society. It did not display classical values of certainty and permanence, but rather a reflection of dynamic and also particular scenes of time and place, and of the uncertain life in the metropolis. This effect could then be transferred into the perception and experience of citizens in their everyday life. In this context, Mies's design projects acted as a "critical interpretation of its worldly situation."[170] As Hays comments:

Mies insists that an order is immanent in the surface itself and that the order is continuous with and dependent upon the world in which the viewer actually moves. This sense of surface and volume, severed from the knowledge of an internal order or a unifying logic, is enough to wrench the building from the atemporal, idealized realm of autonomous form and install it in a specific situation in the real world of experience time, open to chance and uncertainty of life in the metropolis. Mies here shared with Dada an antagonism against a priori and reasoned order; he plunges into the chaos of the new city and seeks another order within it through a systematic use of the unexpected, the aleatory, the inexplicable.[171]

The reflective surface creates a rich visual experience in which various images kept interweaving and changing endlessly. The materiality of surface is overcome by fantastical

---

[168] David Leatherbarrow and Mohsen Mostafavi (2002), *Surface architecture*, (London, Cambridge Mass.: The MIT Press), 202.
[169] K. Michael Hays (1984), "Critical Architecture: Between Culture and Form", in Todd Gannon (ed.) (2002), *The Light Construction Reader*, (New York: The Monacelli Press), 391.
[170] Ibid., 392.
[171] Ibid., 392.

images, and so the surface is dematerialized and becomes similar to a projection screen. It is an effect similar to the surface in transparency but with a different end result. With transparency, the framed images come from real objects in front of our eyes; but on the reflective surface, the framed images are simulacrums – copies of reflected objects. The framing of transparency is more like that of a 'window', which depends on the dissolution of surface and the visualization of the connection between inside and outside spaces. In contrast, the framing of reflection conceals the interior through an effacing of the building itself, and transforms the building into a simulacrum of the context.

When a reflective surface contributes to the spatial creation of a building, the surface-space is multiplied by the production of virtual images. In some cases, reflective surfaces act as a connection between fragmented parts. An example of this is Robin Evans' interpretation of Mies's Barcelona Pavilion. Although perhaps not Mies's initial intention, the reflection of the partition walls, as shiny marble walls and glass partitions, often produce symmetrical images in the pavilion, even though the building is generally regarded as a representative example of the anti-symmetrical form of modern architecture. As argued by Evans:

It must be admitted that the usual effects of reflection are disruptive and confusing. However, when a construction reflects itself more than it reflects its surroundings and where, moreover, these reflections are always into plane surfaces parallel or perpendicular to one another, the result is quite different. In such circumstances an asymmetrical arrangement becomes virtually symmetrical, like Siamese twins, whenever a reflective plane cuts through it.[172]

In this manner, reflective surfaces and symmetrical images intervene in and disarrange the existing spatial order. The spatial experience consists of changing, temporary moments perceived in the movement of viewer. Reflective surfaces thus induce an overlapping of the stable composition of the fragmental spatial structure and the dynamic temporary composition of combined real and virtual images.

---

[172] Robin Evans (1990), "Mies van der Rohe's Paradoxical Symmetries", in Robin Evans (1997), *Translations from Drawing to Building and Other Essays*, (London: Architectural Association Publications), 263.

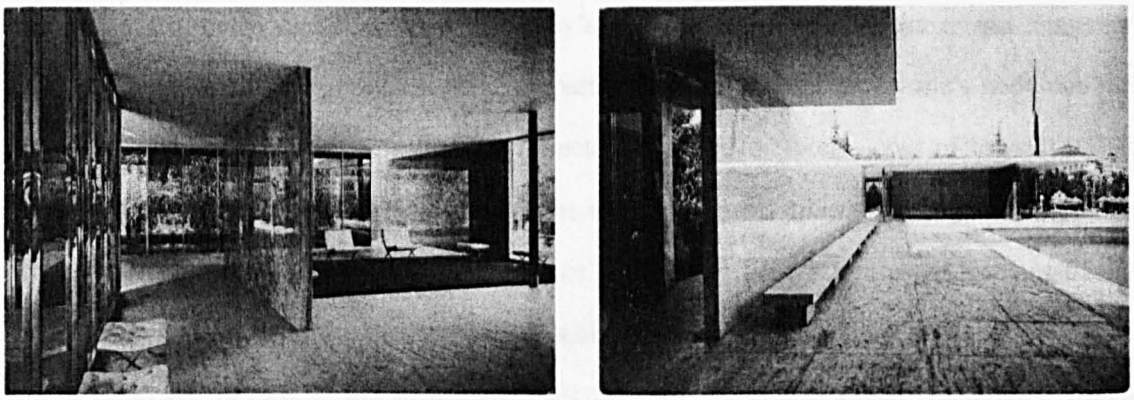


Figure 1.22-23
Barcelona Pavilion, Spain, 1929, by Mies van der Rohe.

With a symmetrical image, there are a number of spatial formations induced by reflection. Sometimes a spatial symmetry is created between the object and its reflected image. Sometimes it makes a connection with an object which does not appear in the main field of vision, and thus could imply the existence of a hidden object (Figure 1.22). Finally, the reflection could evoke a kind of virtual transparency. This often happens in the situation when the reflected object and the reflectional surface are perpendicular to each other. The reflected image thus looks like an extension of its original object; meanwhile the reflectional surface placed between the object and its virtual extension becomes 'transparent' (Figure 1.23).

The reflective surface brings a contradictory spatiality which lies somewhere between the real and unreal, especially when it also serves as a mirror of the body. As Lefebvre mentioned:
The mirror is a surface at once pure and impure, almost material yet virtually unreal; it presents the Ego with its own material presence, calling up its counterpart, its absence from – and at the same time its inherence in – this 'other' space. .....The mirror discloses the relationship between me and myself, my body and the consciousness of my body.....because it transforms what I am into the sign of what I am.[173]

In the eyes of Lefebvre, a subject is constituted by the body and his or her awareness of this body. This awareness is based on the inseparable relation between the body and space. Space "is

[173] Henri Lefebvre (1991), trans. by Donald Nicholson-Smith, *Production of Space*, (London: Thames & Hudson), 184-185.

first of all my body, and then it is my body's counterpart or 'other', its mirror-image or shadow."[174] However, mirror space evokes a particular separation between one's body and the awareness of seeing a 'body' – actually a reflected image of the body – out of 'myself.' This spatial experience brings a confusion between real and unreal spaces; there is a difference between seeing a mirror space with and without the image of 'myself'. In the instance of the former, it is easy to be aware that the mirror space is not a real but only a virtual copy of real world. However, in case of the latter, the viewer is involved in a world of simulacrum which confuses the real with the unreal. Due to such particular effect of the reflective surface, the experience of walking in Mies's Barcelona Pavilion is far more magic than watching reflections of objects only. Seeing the image of oneself within a space of simulacra, the visitor feels becoming a part of this phantasmagorial world. The body is transferred into a compositional element in the creation of surface-space.

Summary

Reflective surface brings dynamic, temporary, and virtual images into the experience of spatiality. In urban space, through the capturing of images from the surrounding environment and context, the reflective surface tends to dissolve the material presence of the building. It is used to suggest a new relationship between the building and its context. When it contributes to spatial formation of a building itself, a reflective surface brings additional spatial relations, with the overlapping of real and virtual spaces increasing the complexity of the spatial experience, sometimes in a confusing way, especially when the image of the observer occurs in that mirror space. Finally, reflection can create a kind of virtual transparency, based on the visual continuity between an object and its reflected image that induces an illusion of the reflective surface disappearing.

1.4. Key Terms of Surface in Modern Architecture

Based on the interpretations above, a list of key terms relating to the surface in modernism can now be summarized. These terms will be used later for the establishment of a diagram that

---

[174] Ibid., 184.

contrasts the surface of the Modernist era with that of the contemporary era. These key terms are classified into three groups: surface agents, design principles, and spatial contents. 1). *Surface agents* consist of terms which are used to describe different types of surface. These terms arise out of specific theoretical propositions, and at the same time are related to different formal properties of surface. In this sense, these terms are seen as the 'agents' of surface, and the prototypes of surface architecture. 2). *Design principles* refer to the specific principles by which the design of surface architecture is informed and guided. 3). *Spatial contents* consist of the phenomenal and spatial effects induced by the formation of surface-space, with the reading of theoretical meanings. These 'spatial contents' are related to the different 'surface agents', or prototypes of surface architecture.

1). Surface agents

Enclosure: As wall, enclosure is the original prototype of both surface architecture and the formation of surface-space. Enclosure concerns not only the visual perception of architecture's externality but also the physical condition of enclosing a place, and the spatial division or separation between the inside and the outside. Historically it has a defensive function and serves for the protection of ownership.

Cladding: Cladding is the outer layer of a wall, traditionally associated with decorative covering. In Modernism, cladding often assumes a simplified form, derived from both standardized industrialized production and modern aesthetics. Used as a metaphor for dressing, cladding is sometimes conceived as the covering of an imaginary body.

Partition: Partition normally refers to an independent, vertical wall, used as a fragmental element in a spatial composition. It is used as a separating element, but at the same time leaves space for openness and connection. The partition is a key element used in the Modernist concepts of flowing space and spatial continuum; for flowing space, the reading of the partition is generally seen in relation to the horizontal Unbroken Plane.

Unbroken Plane: This term refers to continuous horizontal surfaces, of roof or ceiling, and of

the floor. The major characteristic is its continuity which provides both an uninterrupted vision and bodily movement.

Envelope: In Modernism, the term envelope often refers to the vertical enveloping surface, as the exterior wall, which is formed by the composition of surfaces on different elevations, and thus generally defined by the controlling lines of the geometrical shape in particular the edges of the joint at the corner. Continuity is the significant principle of its formation.

Free Façade: This term refers to a composition either of the elements on the surface or of different surface layers. For the latter, the free façade may show the quality of 'shallow space' through the overlapping of layers; this in turn sometimes gives a reading of the interior spatial organization.

Skin: Skin often refers to the thin layer of a glass curtain wall, and has a quality of transparency. Transparent skin thus effectively makes the surface 'disappear' as material, correspondingly making visible the internal structure and spatiality.

Picture Window: With the framing of a transparent glass window or window-wall, a picture window captures either the external natural scenery or urban scene into framed landscapes. It creates a physical separation, but a visual and virtual connection between nature and the interior, or between public and private spaces. It is a visual mechanism for the production of pictorial landscapes, and sometimes the sense of a filmic show.

Display Window: This term refers to the creation of a display space in which the objects are transformed into a world of framed images and signs. It acts as a visual mechanism for the production of the representational space in a culture of consumption.

Reflective Surface: Such a surface creates a mirror space, which captures dynamic, temporary, reflected images from the outside. Through the incorporation, sometimes the framing, of images from the external context, reflective surfaces can make the building appear as if its physical

presence is melted and almost dissolved into a virtual copy of the surrounding. When used as a spatial element for interior space, Reflective Surface makes for a more complex perception through the production of multiple reflected images of other surfaces. Furthermore, reflective surface acts as a medium between mirror space and real space, and through this can create a kind of virtual transparency – an illusion by which it disappears as a surface, and becomes part of the continuity between the object (or viewer) and its reflected image.

2). Design principles

Simplification: This principle is related to the aspiration towards a simple, flat and homogeneous appearance, with the cancellation of additional decoration on the surface. It is almost a general principle of surface in modern architecture.

Composition: This is the major method of the surface-space formation in Modernism, usually named as 'elementary' composition. It includes the principles of continuity, fragmentation and overlapping. The composition of continuity refers to the idea of conjoined surfaces, for example enclosure and envelope. The composition of fragmentation is about the spatial relationship of fragmental elements which are free and independent. The composition of overlapping focuses on the visual effect of superposition of multiple surface layers or images.

Framing: This principle is relating to transparent surfaces, and relies on the 'frame' formed by window frames, mullions and rails of a glass wall. It induces a kind of pictorial space similar to the representation of a picture in frame. Through this framing, things beyond are perceived as the objects for viewing, as images.

Reflection: This principle is obtained through using materials with a polished or shiny surface, for example, glass, stainless steel and polished marble, etc. The spatiality brought about by reflection is defined through virtual images.

3). Spatial contents:

Enclosure: This term is used in this taxonomy to refer to both a quality of the embodiment of

surface (see above) and also to a spatial quality. It is not simply defined by a physical space enclosed by surfaces, but rather by a phenomenal perception of bodily space, as well as the notion of enclosure in terms of ownership and protection. The principle of enclosure is also based on the creation of an artificial world in contrast to nature.

Dressing: As a metaphor, the dressing of architecture is used to describe the externality of the imaginary body of a building. The notion of dressing focuses on the representation of meaning in social space. In modern architecture, it thus tends towards simplification in order to match the ethic and aesthetics of the industrial era and modernity.

Flowing Space: This effect refers to both a visual continuity and to the uninterrupted movement of the body within different spaces or spatial positions. It is based on the breaking of traditional notions of the closed room by using approaches of fragmental composition and transparency. With fragmental composition, the spatiality of flowing space is induced through the spatial relationship of fragmental surfaces. For transparency, it is induced by the visual continuity of extending surfaces. With the engagement of the moving body, flowing space is transferred form a visual representation to a bodily experience of space-time.

Volume: This refers to a geometrical space in contrast to the idea of mass. In Modernism, it is generally defined by the controlling lines of surfaces and Euclidean geometry. Volume is formed by the enveloping surface.

Shallow Space: This is considered as a spatial effect of 'phenomenal transparency'. *Shallow Space* is produced through the stratification of spaces, or the composition of multiple surface layers in different spatial positions. The perception of *Shallow Space* is evoked by the representation of light-shadow and the overlapping of surfaces.

Objective Body: This refers neither to the living human body nor to a notion of building as organism. Rather, it refers to a kind of mechanical form with a spatial structure similar to skin-bone. Moreover, it also means a 'body' seen as no more than an object or volume in space.

Disappearing: This is a specific optical effect of a transparent or reflective surface. For transparent surface, its disappearing brings a visualization of the interior spaces or scene, and thus cancels the separation between inside and outside. For a reflective surface, the disappearing of surface results from the replacement of the physical surface with reflected images from the outside as the prime phenomenal effect.

Pictorial Landscape: This regards 'landscape' more as a pictorial representation than as an environment to be experienced; in other words, it relies more on visual images than 'living' nature and people's activity within it. It is a production of the framing of transparent surface. A continual and wide presentation of Pictorial Landscape, for example through strip windows, produces a series of panorama.

Phantasmagoria: This is generally evoked by framed images on a reflective surface and transparent surface, most clearly in the idea of the display window. Due to the seduction of images and the ambiguous way they are presented, the viewer is transported from the realistic environment towards a kind of half-real and half-imaginary world, as a form of spectacle. The term is often used to describe the visual culture of modernity and in particular that of spaces of consumption.

Mirror space: This is a virtual space as a reflected copy of the real world. The mixture of real space and mirror space can bring about an illusionary experience, such as the illusion of transparency, virtual symmetry, and the collage of different sceneries. When it captures the image of the body, of 'myself', the difference between real and unreal spaces can become confused.

Chapter Two:

Phenomenal Demateriality and Spatiality of Contemporary Surface Architecture

2.1. Scope

The subject of this chapter is the phenomenal dematerialiity and spatiality of contemporary surface architecture. The discussion will focus on the correspondence between the formation of surface and the phenomenal relationship between spaces, especially between inside and outside; this will also be related to social, cultural and political aspects. The research will try to investigate and explore the question in three ways. What is the particular dematerialiity of contemporary surface architecture in comparison with that of modernism? How does its formation induce and intervene in phenomenal spatial relations between inside and outside? Why may such transaction of surface-space not only concern perceptional experience but also relate to social, cultural and political dimensions?

As defined in the introduction of this thesis, the phenomenal dematerialiity of surface architecture does not refer to the actual absence of matter or the abolishment of the solid materials of construction. Rather it describes the phenomenal perception of a particular spatialisation that the surface creates through either the way it is formed or through the optical quality of its materials. Dematerialisation thus refers to the way that a surface is primarily perceived through other qualities than its specific materiality, in particular, as will be discussed, the formation of the surface through folding and the visual quality of translucency. The phenomenal dematerialiity of contemporary surface architecture is therefore a perceived dematerialisation. In this context, phenomenal dematerialiity and spatiality are two inseparable contents. Importantly, the phenomenal dematerialiity and spatiality of contemporary surface architecture cannot be discussed without the presence of the subject, and invokes not only visual aspects of space but also bodily space. This reading of phenomenal space takes its cue from Merleau-Ponty who notes that space "before being a relation between objects, is based on my relation to things."[1]

For Merleau-Ponty, bodily space is created when our body "inhabits space and time."[2] As he

---

[1] M. Merleau-Ponty (1962), trans. by Colin Smith, *Phenomenology of Perception*, (London and Henley: Routledge & Kegan Paul), 286.
[2] Ibid., 139.

argues:

I am not in space and time, nor do I conceive space and time; I belong to them, my body combines with them and includes them. .....The space and time which I inhabit are always in their different ways indeterminate horizons which contain other points of view. The synthesis of both time and space is a task that always has to be performed afresh. Our bodily experience of movement is not a particular case of knowledge; it provides us with a way of access to the world and the object ... which has to be recognized as original and perhaps as primary.[3]

The combination between thought and the motility of body establishes the foundation of bodily space, and this offers an opportunity for "spatiality of situation" in comparison with "spatiality of position." Spatiality of situation refers to neither a geometrical description of the space of "external objects," nor psychological "spatial sensations," but to one in which the body conceives "an attitude directed towards a certain existing or possible task."[4] Through this quality, bodily space differs from objective space or representative space, and at the same time phenomenal perception differs from the pure act of thought. Furthermore, bodily space is not simply about the physical experience of the body as object, but an experience of the body in the world, which "expresses our power of dilating our being in the world, or changing our existence by appropriating fresh instruments."[5] Through the motility of body and the spatiality of situation, bodily space thus relates us to cultural conditions.

The argument about the relation of the body to space is further developed by Henri Lefebvre, who argues that the body is involved in the production of space "both as point of departure and as destination."[6] For Lefebvre, the body and its activity are unavoidable in the understanding of the foundation of social space. The formal and material foundations of social space he describes are constituted by various "modalities of demarcation and orientation" corresponding to social activities and spatio-temporal experience.[7] The spatiality of demarcation and orientation is

---

[3] Ibid., 140.
[4] Ibid., 100.
[5] Ibid., 143.
[6] Henri Lefebvre (1991), trans. by Donald Nicholson-Smith, *The Production of Space*, (Oxford and Cambridge Mass.: Blackwell Publishers), 194.
[7] Ibid., 192.

determined by the relationships established by all kinds of boundaries and conditions. Such relationships are not established 'objectively', but according to the body. As Lefebvre argued, the body is born as a "spatial body" which, "as produced and as the production of a space, is immediately subject to the determinants of that space."[8] In this instance, the "spatial body" could be understood as similar to the subject of the "bodily space" of Merleau-Ponty. It is such a spatial body that allows the production of space and, through the engagement of the subject, spatial boundaries and relations receive their social and political contents, inasmuch as the subject described in particular by Lefebvre is a social and political being. With bodily space, phenomenal spatial relations between inside and outside are therefore not merely a visual condition. This also means that surface formation can not be seen as an autonomous form. Both of them concern the relationships between people and construction, building and context, form and content, or what will be described later as the exteriority and interiority of architecture.

In the eyes of Merleau-Ponty, the perception of space is based on phenomenal depth or distance, which is not dependent on the topological relationship between objects or their geometrical characteristics, but rather their relation to the body.[9] Merleau-Ponty regards 'depth' as a phenomenon "in reality a juxtaposition of points" which can be perceived through the distances between those points and the observer. In this way, the relation between inside and outside spaces is actually a question how their phenomenal depth or distance is perceived in relation to one another. Surface architecture as a boundary between inside and outside is therefore an instrument that configures such perception or experience. As discussed in the last chapter on Modernist surface architecture, surface then could be described variously in terms of enclosure, envelope, partition, skin etc to configure and induce the perception of space. In the Modernist era, surface's basic configuration for the relation between inside and outside spaces could be summarized as a paradigm of separation and connection. In contemporary surface architecture, in contrast, there is a trend which exploits the tension between separation and connection, resulting in a particular spatiality of situation. This tension is a perceived effect of 'in-between',

---

[8] Ibid., 195.
[9] M. Merleau-Ponty (1962), trans. by Colin Smith, *Phenomenology of Perception*, (London and Henley: Routledge & Kegan Paul), 254-280.

seen as a situation of indeterminacy caused by multiple or ambiguous relationships. As will be argued, this property makes contemporary surface architecture different from that developed under Modernism. It does not mean such contemporary surface architecture has simply displaced previous models as a completely new creation that ignores former ones; the new surface can be seen in relation to, and as a development of, previous versions. However, this chapter will focus on the new formations of surface and their resultant spatiality, and try to explore how these new conditions are different with the previous approaches to surface.

The separation and connection of inside and outside spaces can be discussed in two main conditions of opaque and transparent surface respectively. According to James J. Gibson, an opaque surface defines enclosure or object through its characteristic shape, i.e. geometrical character.[10] In this argument, the form of surface architecture configures enclosure or volume as a perception of space from inside or outside respectively. For opaque surface, the physical openness is the way to allow inside out, or outside in. In contrast, the transparent surface endows a precise approach for this perception without an actual openness, but through its optical effect. Reflection occurs as another optical character, usually associated with transparent materials; it induces a phenomenal distance between the reflected image and the object's original position. These factors, opacity, transparency and reflectivity, basically determine the relationship between the formation of surface and the phenomenal spatial relations of inside and outside. For the modern era, Colin Rowe and Robert Slutzky defined two kinds of transparency, the literal transparency of materials and the phenomenal transparency of spatial structure. In comparison, the connection between inside and outside spaces, and the perception thereof, in the contemporary era can be observed and discussed through two approaches of material quality and form, as discussed in this chapter, as translucent surface and folding surface respectively. Based on these two contemporary models, it will be investigated and explored how the new trend of contemporary surface architecture brings a particular tension between separation and connection, in comparison with conventional modernist conditions of enclosure, envelope and skin etc.

---

[10] James J. Gibson (1979), *The Ecological Approach to Visual Perception*, (Boston: Houghton Mifflin Company), 29.

Because this chapter is based around an investigation of the phenomenal demateriality and spatiality of contemporary surface in correspondence with the relationships between inside and outside spaces, it will not discuss some of the other contemporary trends in surface architecture, many of which are focused on the externality of surface and its representation, or immaterial surface and virtual spatiality. This includes on the one hand those new styles of ornamental or expressional surface based on graphical patterns, texture or colours, and on the other surfaces that incorporate digital, electronic or photoelectric projections and screens, though these approaches are prevalent in significant portions of contemporary surface architecture. The former is the realm of ornament and certain materiality, and in terms of perception privilege the visual and the appearance of materials. Whilst they are concerned with the effect of surface on space, that spatiality is neither a matter of phenomenal depth or distance, nor to do with the motility of body. Rather, it is about either pictorial space based on the representation of surface, or "sensory experience," as Merleau-Ponty defined, according to purely psychological and intellectual analysis.[11] The latter, immaterial approach concerns the space of virtual representation and information. It does not relate to the relationship between the dematerialisation of physical surface and the phenomenal world of bodily space. Though there are some experiments of virtual reality in correspondence with bodily perception and action, such as Christopher Romero's project for Vortex 2000, they are not focused around issues of real surface but rather the interface of cyberspace.[12]

The digital approach to surface is a very contemporary trend due to the rapid development of computational techniques in architecture since the middle of the 1990s. This trend mainly concerns the production and representation of digital techniques. As Therese Tierney argues, as a result of digital technique, the architectural image is transformed into a new kind of media, which "now operates within a field of complex, interactive, and continually changing relationships involving cognitive abilities, social forces, and technological modes of

---

[11] M. Merleau-Ponty (1962), trans. by Colin Smith, *Phenomenology of Perception*, (London and Henley: Routledge & Kegan Paul), 225-228.
[12] Christopher Romero (1998), "Vortex 2000", in Neil Spiller (ed.), *Architects in Cyberspace II, Architectural Design* Vol. 68 No.11/12 1998, 46-47.

expression."[13] Based on advanced computing software, the image is transformed from a conventional two-dimensional, static representation to a three-dimensional, changeable effect. The spatiality of digital images is based on the "conceptual or cognitive space" as Tierney clarified, in which "the digital is an interface between cognition and expression."[14] Going beyond the condition of flat screen, interface and cyberspace are further used to produce a world of virtual reality "to question the nature of our surrounding environment."[15] Such virtual reality is "a graphic, three-dimensional, computer-constructed world that does not look real but feels real."[16] It is generally a result of electronic installations in physical world. As Karen A Franck indicated, though the experience of virtual reality is based on the perception of body, the objects and spaces in virtual worlds have very different visual and kinaesthetic qualities from those in the physical world, because "experiences of gravity, density, mass, weight, long distance, and the cumbersomeness of matter are absent."[17] Some examples of digital interface and cyberspace can be found in the *AD* issue *Architects in Cyberspace* in 1995, and the second issue in 1998. With the instruments of digital, electronic, interactive programme or software, digital techniques are adopted to explore the mediation between virtual and real spaces, or virtual environment and physical world. This approach is a particular topic of contemporary surface architecture. In this instance, though not as the interest of this thesis, some specific cases of this topic will be briefly introduced, before moving on to the main discussion on folding and translucency.

Hypersurface: this theory was introduced by Stephen Perrella of Columbia University, in two issues of *Architectural Design*: *Hypersurface Architecture* of 1998, and *Hypersurface Architecture II* of 1999. In mathematics, hypersurface refers to a surface in hyperspace, i.e. a multi-dimensional space beyond our general understanding of three dimensions.[18] For Perrella, hypersurface is a composite term: *hyper* – media – and *surface* – topological architecture. Perrella gave this concept a somewhat complex definition in his first issue:

---

[13] Therese Tierney (2007), *Abstract Space: beneath the media surface*, (Abingdon: Taylor & Francis), 7-8.
[14] Ibid., 19-20.
[15] Maggie Toy (1998), "Editorial", in Neil Spiller (ed.), *Architects in Cyberspace II, Architectural Design* Vol. 68 No.11/12 1998, 7.
[16] Karen A Franck (1995), "When I enter virtual reality, what body will I leave behind?", in Martin Pearce and Neil Spiller (eds.), *Architects in Cyberspace, Architectural Design* Vol. 65 No.11/12 1995, 20.
[17] Ibid., 20.
[18] Stephen Perrella (1998), "Hypersurface Theory: Architecture><Culture", in Stephen Perrella (ed.) (1998), *Hypersurface Architecture, Architectural Design* Vol. 68 No 5/6: 1998, (London: John Wiley & Sons Limited.), 8.

Hypersurface is an emerging architectural/cultural condition that is effected through an intertwining of often opposing realms of language and matter into irresolvable complexities that create middle-out conditions. .....As a verb, hypersurface considers ways in which the realm of representation (read images) and the realm of instrumentality (read forms) are respectively becoming deconstructed and deterritorialised into new image-forms of intensity.[19]

For Perralla, hypersurface aims to conjoin mediatised culture and topological architecture into an "intertwined dynamic."[20] The former refers to the current media-based culture of everyday advertisements or signs, internet and tele-technology etc; the latter refers to the issues of topological forms based on Deleuzian theory and computer technology. Perrella argues that the "media complex" affects people prior to their experiences with the contemporary built environment, and therefore needs to be taken into account in any understanding of architecture.[21] His hypersurface is thus considered as an architectural and cultural mechanism which involves people, materials and information together in an interconnected, dense, weblike space in correspondence with "animation software, augmented reality, computer-aided manufacture and informatics."[22] In this way, Perrella believed hypersurface could exceed the binary concepts of form and program of architecture that dominated modernism; this series especially the case for architecture in an epoch of media, as mentioned by many theorists and architects since Venturi. If, in the first *AD* issue, hypersurface sounds more like a theoretical announcement, the second issue tried to turn it to more technical principles. Perrella now regards hypersurface as "systems of exchange" between media and matter.[23] As an example, he found in animation software, a form of technology that easily joins images and forms together in a dynamic transformation.

Transarchitecture is a notion that is referred to together with the term 'hypersurface' by Marcos Novak, in his paper in the *AD* 1998 issue, on *Hypersurface Architecture*. For Novak,

---

[19] Ibid., 7.
[20] Ibid., 7.
[21] Ibid., 13.
[22] Ibid., 11.
[23] Stephen Perrella (1999), "Electronic Baroque", in Stephen Perrella (ed.) (1999), *Hypersurface Architecture II, Architectural Design* Vol. 69 No 9/10: 1999, (London: John Wiley & Sons Limited.), 6.

transarchitecture is the architecture of "transmodernity", which he describes as a social state between modernity and virtuality in which the solid "melts into information" through either general screens such as mirrors, cinema, television, computer monitors, interface etc, or "psychological screens of interpersonal and social mirroring, identity formation, and political representation."[24] The conceptual and design proposal based on such transarchitecture is the "screening" of hypersurface and hyperspace, i.e. a generative architecture contained within the virtual space of computer and on screen. As Novak argued, hypersurface and hyperspace are a production of space-time in both "an electronic, fully spatialised public domain" and interactive cyberspace. For such transarchitecture, Novak adopted a series of arguments:

...we conceive algorithmically (morphogenesis); we model numerically (rapid prototyping); we build robotically (new tectonics); we inhabit interactively (intelligent space); we telecommunicate instantly (pantopicon); we are informed immersively (liquid architecture); we socialise nonlocally (nonlocal public domain); we evert virtually (transarchitectures).[25]

Generative surface: this is largely the outcome of the "genetic architecture" of Karl Chu.[26] It is a pure computing architecture. He writes software for the continuous generation and variation of very complex surfaces, and his forms are produced in computer through the operation of such software. Chu regards his genetic architecture as a "morphogenetic" system.[27] Conceived as a completely autonomous architecture, it is a combination of computation and biogenetics, that transfers physical reality into a post-human world which "is emerging maybe like a jungle in which multiple species, including protospecies of genetic architecture, coexist within a virtual ecology comprised of artificial life and abstract machines."[28] The only logic for such genetic morphogenesis is the algorithm written within Chu's software.

Hyposurface: this idea is proposed by the French firm of dECOi, as founded by Mark

---

[24] Marcos Novak (1998), "Transarchitectures and Hypersurfaces: Operations of Transmodernity", in Stephen Perrella (ed.) (1998), *Hypersurface Architecture, Architectural Design* Vol. 68 No 5/6: 1998, (London: John Wiley & Sons Limited.), 85-86.
[25] Ibid., 87.
[26] Alicia Imperiale (2000), *New flatness: surface tension in digital architecture*, (Basel, Boston, Berlin: Birkhäuser), 67.
[27] Karl Chu (2003), "Toward Genetic Architecture", in Bernard Tschumi and Irene Cheng (eds.) (2003), *The State of Architecture at the Beginning of the 21st Century*, (New York: The Monacelli Press), 62.
[28] Ibid., 62.

Goulthorpe and Yee Pin Tan. It is a psychological and technical concern of "subliminal", "pre-scient forms of electronic generation in architecture."[29] This argument has a practical form as in the Aegis project which was developed in 1999 for the competition to design an interactive art-work for the foyer of Birmingham Hippodrome theatre. It involved a simple, dynamic surface made of facetted metallic panels that react in response to electronic stimuli from the environment of movement, sound, light etc. As an electronic-mechanical device, this surface shows an effect of the transition between indeterminate, immaterial factors of environment and numerically generated form. It is therefore a real-time event, showing randomness through a kind of "electronic sensory-input".[30] This, for dECOi, is the meaning of "hypo-", or "subliminal".

Armed Surface: this is a notion introduced by Dagmar Richter, a German architect and researcher, in her 2004 book *Armed Surfaces*. Richter's aim is to create a surface "as structure and primary experiential mass – the armoured surface – (which) includes multiple performance criteria from the constructive, technical and atmospheric to the cultural, political, poetic, visual and tactile."[31] Her design projects are established through a combination of topological form making – created by 3D software – and projective media images. The difference between Richter's and other computer generated surfaces is that her armed surfaces try to conjoin software programming and a programme of realistic functions relevant to the complexities of contemporary society. As Andrew Benjamin comments, "Dagmar Richter's work opens up a way beyond the formalism in which the appearance of the architecture of animation software is simply the realization of the diagram and thus is the effacing of the diagrammatic."[32]

The examples listed above obviously do not include the whole range of digital approaches to contemporary surface. There is a long list of architects, designers or researchers working in this field. Many of them have focus their work on the generation of form through the computer and

---

[29] dECOi (1999), "Aegis Hyposurface: Autoplastic to Alloplastic", in Stephen Perrella (ed.) (1999), *Hypersurface Architecture II, Architectural Design* Vol. 69 No 9/10: 1999, (London: John Wiley & Sons Limited.), 60.
[30] Ibid., 64.
[31] Dagmar Richter (2004), *Armed Surfaces*, (London: Black Dog Publishing Limited), 14.
[32] Andrew Benjamin (2004), "Performing, Effecting Surfaces", in Dagmar Richter (2004), *Armed Surfaces*, (London: Black Dog Publishing Limited), 9.

other contemporary media, such as Reiser+Umemoto, Asymptote, Grey Lynn, NOX, UN Studio, Kolatan+MacDonald etc. Many of these people are also associated with academia, where there is a proliferation of algorithmic and geometrically based surface architecture in such schools at the Architectural Association and Columbia University, etc.

It should also be noted that this chapter does not explore in depth the relation between surface and structure or tectonics. Sometimes, as will be seen, the discussion of contemporary surface is mainly seen in relation to the development of new technology. Moreover, nor will the chapter look in detail at those cases of cotemporary surface that only concentrate on sculptural form, or the tactility and sensation of materials. The reason is that these approaches are not founded on the phenomenal relationship between spaces. Elsewhere, there is also an interest in architecture created by immaterial phenomena without real surface form. The best-known example case might be the Blur Building, a pavilion at the 2002 Swiss Expo designed by Diller + Scofidio. Rather than normal solid surfaces, this building was formed as a cloud produced by spraying water fog, which is regarded by them as "surfaceless space."[33] It is already not a matter of surface architecture but rather a complex of multimedia, simulation, telecommunication for a "live" event and people's interaction with it.[34]

In contrast to these varied approaches to contemporary surface, what will be discussed now is a surface architecture which is considered specifically as a boundary between inside and outside spaces, based on concrete form and the phenomenal perception of space. It will be described in two parts. The first is the 'folding surface', which adopts topological inflection as its main strategy of formation. It is a model in contrast with the elemental composition of Modernism. The other is the 'translucent surface', which explores the effect of translucency in contrast to that of transparency. Some people in above list will be referred to, but not according to their interest in the digital or other media, but rather because of their theoretical arguments or designs that develop ideas of material form in relation to surface.

---

[33] Elizabeth Diller (2003), "Liveness and mediation", in Bernard Tschumi and Irene Cheng (eds.) (2003), *The State of Architecture at the Beginning of the 21st Century*, (New York: The Monacelli Press), 110.
[34] Ibid., 110.

2.2. Smoothness and Folding Surface

The term smoothness is used here to describe a phenomenal quality of contemporary surface-space formation. Smoothness is visualized and realized by the architecture of the folding surface. It is firstly based on formal inflection, according to the geometrical characters of the continuous and heterogeneous. Moreover, as we shall see, through producing spatial intervals, it evokes a tension between volume and animation, enclosure and inclusion, and finally the interiority and exteriority of architecture. The folding of surface is more than a method of form making. When it is adopted in contemporary surface architecture, the term folding has its particular concerns and meaning. It is not only a paradigm of formation in comparison to the 'elementary composition' which typified Modernism, but also a concept that has philosophical origins. In this context, the notion of smoothness therefore refers not to a simple formal quality of the smooth but rather a spatiality which is both continuous and heterogeneous. This was defined by Greg Lynn in *Folding in Architecture*, an issue of *Architectural Design* published in 1993, in which the terms 'folding' and 'smoothness' were for the first time highlighted in the contemporary discussion of architecture. As Lynn noted:

Neither the reactionary call for unity nor the avant-garde dismantling of it through the identification of internal contradictions seems adequate as a model for contemporary architecture and urbanism. .....Presently, an alternative smoothness is being formulated that may escape these dialectically opposed strategies. Common to the diverse sources of this post-contradictory work – topological geometry, morphology, morphogenesis, catastrophe theory or the computer technology of both the defense and Hollywood film industry – are characteristics of smooth transformation involving the intensive integration of differences within a continuous yet heterogeneous system Smooth mixtures are made up of disparate elements which maintain their integrity while being blended within a continuous field of other free elements.[35]

Lynn argued that the architecture of the previous two decades, especially the 1980s, considered 'contradiction' as a key in response to the relationship between a building and its physical,

[35] Greg Lynn (1993), "Architectural Curvilinearity: The Folded, The Pliant and the Supple", in Greg Lynn (ed.) (1993), *Folding in Architecture*, *AD* Vol.63, (London: Academy Group Ltd.), 8.

cultural and social context. On one hand, for both Venturi and Eisenman in their own ways, with the paradigm of contradiction, "architecture represents difference in violent formal conflicts."[36] On the other hand, against the idea of formal conflict, contradiction is seen as part of a trend towards what Lynn identifies as 'unity.'

Unity is constructed through one of two strategies: either by reconstructing a continuous architectural language through historical analyses (Neo – Classicism or Neo – Modernism) or by identifying local consistencies resulting from indigenous climates, materials, traditions or technologies (Regionalism).[37]

In the eyes of Lynn, both 'conflict' and 'unity' are responses based on the paradigm of contradiction; they are but two sides of one coin. In contrast, what Lynn wanted to argue in *Folding in Architecture* that 'smoothness' is exactly a new paradigm to deal with the relationship between architecture and context, and its formal presentation.

Lynn's notion of smoothness has its roots in the work of the French philosopher Gilles Deleuze. In *A Thousand Plateaus*, Deleuze and Guattari described a notion of "smooth space" in comparison with "striated space". In contrast to "the striated", "the smooth" has a qualities of the nomad, openness, the haptic, heterogeneity and multiplicity. "The smooth space of patchwork is adequate to demonstrate that 'smooth' does not mean homogeneous, quite the contrary: it is an *amorphous*, nonformal space prefiguring op art."[38] Such an understanding of "the smooth" clearly informs the theoretical basis of Lynn's concept of "smoothness". As a model which works against conflict or unity, a kind of flexibility or "smooth mixture" called for by Lynn could be ideally achieved by the form of folding. "If there is a single effect produced in architecture by folding, it will be the ability to integrate unrelated elements within a new continuous mixture", says Lynn.[39]

---

[36] Ibid., 8.
[37] Ibid., 8.
[38] Gilles Deleuze and Félix Guattari (1988), trans. by Brian Massumi, *A Thousand Plateaus: Capitalism and Schizophrenia*, (London: The Athlone Press), 476.
[39] Greg Lynn (1993), "Architectural Curvilinearity: The Folded, The Pliant and the Supple", in Greg Lynn (ed.) (1993), *Folding in Architecture*, *AD* Vol.63, (London: Academy Group Ltd.), 8.

In contrast to the dualism of conflict–unity, the notion of smoothness and folding proposes a kind of 'multiplicity', i.e. a relationship which is both continuous and heterogeneous. Such an idea also has its original source in the philosophy of Deleuze. In the issue of *Folding in Architecture*, the inclusion of a short section of *The Fold*, as written by Deleuze in 1986 and then translated into English in 1993 by Tom Conley, began to suggest the parallels between folding architecture and the philosophy of folds. For Deleuze, multiplicity is both a concern of smooth space and a consideration of folding. As he argued: "A labyrinth is said, etymologically, to be multiple because it contains many folds. The multiple is not only what has many parts but also what is folded in many ways."[40] In the view of theorist and critic John Rajchman, the idea of multiplicity in Deleuze conceives a new type of complexity, which focuses not on the elements per se but what is in-between them, their intervals or 'disparities'. It thus brings architecture an opportunity to rethink the conventional model of contradiction, which was marked by Robert Venturi in his book of 1966, *Complexity and Contradiction in Architecture*. For Rajchman, multiplicity differs from either Venturi's notion of a contradictory or "difficult whole" or Colin Rowe's picture of Cubist collage and Gestaltist perception. As he notes:

Thus the multiple is not fragments or ruins of a lost or absent Whole, but the potentiality for divergence within any given unity. In this manner, the concept of complexity is freed from the logic of contradiction or opposition and connected instead to a logic of intervals: it becomes a matter of a 'free' differentiation (not subordinated to fixed analogies or categorical identities) and a 'complex' repetition (not restricted to the imitation of a pre-given model, origin or end).[41]

This difference is exactly how Lynn departs from Venturi. Though Venturi also used the term 'multiplicity' in his argument, he does so with a different meaning to Lynn's. Venturi suggested the "difficult whole" to oppose the simplification of Modernism:

It is the difficult unity through inclusion rather than the easy unity through exclusion. Gestalt psychology considers a perceptual whole the result of, and yet more than, the sum of its parts. The whole is dependent on the position, number, and inherent characteristics of the parts. A

---

[40] Gilles Deleuze (1993), trans. by Tom Conley, *The Fold: Leibniz and the Baroque*, (London and New York: The Athlone Press Ltd), 3.

[41] John Rajchman (1993), "Out of The Fold", in Greg Lynn (ed.) (1993), *Folding in Architecture*, *AD* Vol.63, (London: Academy Group Ltd.), 62.

complex system in Herbert A. Simon's definition includes "a large number of parts that interact in a non-simple way." The difficult whole in an architecture of complexity and contradiction includes multiplicity and diversity of elements in relationships that are inconsistent or among the weaker kinds perceptually.[42]

In comparison with Venturi, Lynn's argument of multiplicity conceived continuity and heterogeneity simultaneously:

A multiplicity is a collection of components that is neither reducible to a single entity nor to a collection of multiple entities. A multiplicity is neither one nor many, but a continuous assemblage of heterogeneous singularities that exhibits both collective qualities of continuity and local qualities of heterogeneity.[43]

The difference between Venturi and Lynn's interpretations of complexity might be difficult to identify literally, but it can be clarified through their different treatment of form. As already indicated by Rajchman, the key formation of Venturian complexity is the collage of contradictory elements. But for Lynn, it is the inflection or curvature of the folding surface as a topology. When Venturi uses the notion of "inflection" as the design method for his "difficult whole," his "inflection" is a way to make independent elements fragmental in the manner of fragmental geometry, and at the same time allow these elements to signify different meanings. As he said:

In the complex compositions, a special obligation toward the whole encourages the fragmentary part or, as Trystan Edwards calls it, the term, "inflection". Inflection in architecture is the way in which the whole is implied by exploiting the nature of the individual parts, rather than their position or number. By inflecting toward something outside themselves, the parts contain their own linkage: inflected parts are more integral with the whole than are uninflected parts. Inflection is a means of distinguishing diverse parts while implying continuity. .....In terms of perception it is dependent on something outside itself, and in whose direction it inflects. It is a

---

[42] Robert Venturi (1977), *Complexity and Contradiction in Architecture* (Second edition), (New York: The Museum of Modern Art), 88.

[43] Greg Lynn (1999), *Animate Form*, (New York: Princeton Architectural Press), 23.

directional form corresponding to directional space.[44]

In contrast to Venturi's notion, the correspondence between inflection and multiplicity – a new claim of complexity – has its own context in contemporary discussions. This correspondence is not only formal, but also spatial. The relation between multiplicity and space has its original interpretation in mathematics. As described by Manuel DeLanda, multiplicity refers to a differential space as a prototype of *non-metric* space in contrast to *metric* space. The demarcation between metric and non-metric space is decided by whether 'length' is fundamental or not:

Mathematically a space is defined by a set of points and a definition of 'relations of proximity' between points, in other words, of the relations which define a given subset of the points as a neighbourhood. If proximity is defined via a minimum length (for example, all points less than a given distance away from a centre form a neighbourhood) the space is said to be metric (whether flat, as in Euclidean geometry, or curved, as in the non-Euclidean versions). If some other criterion is used the space is said to be non-metric (as in projective, differential or topological geometries).[45]

As an example of non-metric space, multiplicity and differential space are formed by the different rates at which *curvature* changes at points, so that it becomes "a field of rapidities and slownesses".[46] Multiplicity is therefore understood not within a fixed coordinate system, but rather as a kind of uncertainty and flexibility. It is not formed by lines but curvatures or inflections.

Precisely because the topological folding surface offers a perfect formal presentation of multiplicity in the manner of various curvatures or inflections, it is adopted by Deleuze to connect the concept of fold and Baroque architecture. It is also why, contemporarily, the topological folding surface is considered by Lynn as a specific and effective method of

---

[44] Robert Venturi (1977), *Complexity and Contradiction in Architecture* (Second edition), 89-90.
[45] Manuel DeLanda (2005), "Space: Extensive and Intensive, Actual and Virtual", in Ian Buchanan and Gregg Lambert (eds.) (2005), *Deleuze and Space*, (Edinburgh: Edinburgh University Press), 84.
[46] Ibid., 84.

formation that presents the paradigm of smoothness. In *The Fold*, Deleuze argued: "Inflection is the ideal genetic element of the variable curve or fold."[47] Here, inflection is equivalent to curvature. It develops a multiplicity because "the inflection in itself cannot be separated from an infinite variation or an infinitely variable curve."[48] For Deleuze, it is such spatial formation that is constitutive of Baroque architecture, matching the formal presentation of the fold with the arguments of the Baroque philosopher Gottfried W. Leibniz, who can be seen as the founder of primitive topology. In comparison with Deleuze, the main resource of Lynn comes from the development of modern topology in the 20th century, such as the French mathematician René Thom's catastrophe theory. As Lynn noted: "Topological geometry in general, and the catastrophe diagrams in particular, deploy disparate forces on a continuous surface within which more or less open systems of connection are possible."[49] In addition: "Form can be shaped by the collaboration between an envelope and the active context in which it is situated", and in this context, "topology allows for not just the incorporation of a single moment but rather a multiplicity of vectors, and therefore, a multiplicity of times, in a single continuous surface."[50] Just as the concept of the fold was used as an ideal agent, both in its form and content, to engage a new harmony by Deleuze, the strategy of folding surface was adopted by Lynn and others to present the new paradigm of a smooth relationship between building and context. As Paul A. Harris commented:

Folding architecture creates continuities between site and structure, implementing conceptual designs that entrain perception to follow patterns that connect outside and inside, both physically and psychologically.[51]

Though both of them affect the phenomenal perception of space in complex ways, contemporary folding surface differs from the curved surfaces of Baroque architecture. Baroque curvature is often primarily an internalised spatial condition, particularly in the great Italian

---

[47] Gilles Deleuze (1993), trans. by Tom Conley, *The Fold: Leibniz and the Baroque*, (London and New York: The Athlone Press Ltd), 14.
[48] Ibid., 16.
[49] Greg Lynn (1993), "Architectural Curvilinearity: The Folded, The Pliant and the Supple", in Greg Lynn (ed.) (1993), *Folding in Architecture*, *AD* Vol.63, (London: Academy Group Ltd.), 13.
[50] Greg Lynn (1999), *Animate Form*, (New York: Princeton Architectural Press), 10.
[51] Paul A. Harris (2005), "To See with the Mind and Think through the Eye: Deleuze, Folding Architecture, and Simon Rodia's Watts Towers", in Ian Buchanan and Gregg Lambert (eds.) (2005), *Deleuze and Space*, (Edinburgh: Edinburgh University Press), 37.

baroque churches of Bernini, Borromini, Vittone and Guarini, but contemporary folding surface creates immediate relationships between inside and outside spaces. The connection of the inside and the outside of Baroque architecture in Deleuze is more conceptual, emotional and expressional, representational of the "infinity" of "soul" and "spirit",[52] but for contemporary folding surface it is an immediate effect in sense of being phenomenal, experiential and active. The topological form of the folding surface not only represents but also supplies a continuous but heterogeneous connection between inside and outside space, which significantly affects the relation between building and context.

The visualization and realization of a folding surface based on topological geometry rather than Euclidean geometry offers the potential to get away from the ongoing prevalence of "signified geometry", the term used by Robin Evans to define geometry as metaphor or symbol, whether as a representation of something else or of geometry itself.[53]. If, following Evans' argument, it could be agreed that the formation of architecture has been constantly decided by fragmental composition from Modernism to Post-Modernism until Deconstructive architecture,[54] then 'folding' – involving as it does perception, experience and practice – brings an alternative strategy which is not merely a geometrical transaction but rather a formation of architecture, and finally everyday life. As the French theorist and designer Bernard Cache argues, the aim of inflection in the folding surface is precisely to create "smooth intervals that increase the probability of emergence of new forms of life."[55] It not only establishes a tension between volume and animation, enclosure and inclusion, building and context, ground and landscape etc, but also through these formations might claim a potential role in the cultural, social and political realms.

The smoothness of the folding surface is based on the formation and perception of smoothing, folding and interconnecting. It is not primarily a representational effect but a phenomenal one,

---

[52] Gilles Deleuze (1993), trans. by Tom Conley, *The Fold: Leibniz and the Baroque*, (London and New York: The Athlone Press Ltd), ix-x.
[53] Robin Evans (1995), *The projective cast: architecture and its three geometries*, (Cambridge, Mass. and London: The MIT Press), 349.
[54] Ibid., 55.
[55] Bernard Cache (1995), *Earth Moves: The Furnishing of Territories*, (Cambridge, Mass. And London: The MIT Press), 25.

radically affecting our understanding and perception of space. Relating to different types of folding surface and their various emphases, three aspects will be discussed below in terms of *blob*, *folded surface* and *topographical surface* respectively. The 'blob' refers to those topological folding surfaces which are more concerned, in comparison with the envelope of Modernism, with the relation between volume and environment. It generally adopts a form of fluidity. The 'folded surface' is specifically used to describe a formation which joins compositional elements, i.e. wall, floor and ceiling etc, into a continuously inflected surface. It presents an alternative model for flowing space, i.e. a phenomenal connection between inside and outside spaces. In this manner, it suggests a different spatiality in contrast to the enclosure or partition of Modernism. The 'topographical surface' refers to those folding surfaces which are based around an interconnection with the ground, developing a relationship between context and landscape. With its deformation of conventional stability, the folding surface intervenes in not only the relation between inside and outside spaces, but also the interiority and exteriority of architecture. The interiority refers to the particular principles of the building, e.g. materials, form, architectural space, usage etc. The exteriority of architecture refers to its given meanings in a wide range of social and cultural domains. All of three types of folding surface present a different kind of demateriality in contemporary surface architecture which embodies somehow the spatiality of multiplicity and smoothness.

2. 2.1. Blob

The blob is not a simple bubble-shape with curved surfaces but rather a specifically theorised and conceptual consideration of contemporary surface architecture, developed as a particular sub-catalogue of folding surface by Greg Lynn, first as a theoretical invention in the 1990s. The proposal of blobs can be loosely summarized by two related concepts. On the one hand, it is suggested to rethink the concept of complexity, in using the notion of multiplicity or intricacy. On the other hand, it develops a series of presentational forms, based on topological geometry. As a fluid or animated envelope, it induces a perception of the presence of volume, or the tension between inside and outside spaces, in the manner of smoothness. Lynn used the term of blobs in his paper "Blobs" published in 1995 and then further in "Blobs: Why Tectonics is Square and Topology is Groovy" in 1996. As he noted:

Complexity, therefore, is not only always present as potential in even the most simple or primitive of forms; but, even more so, it is measured by the degree of both continuity and difference that are copresent at any moment. This measure of complexity (the index of which is continuity and differentiation) might best be described as the degree to which a system behaves as a blob.[56]

As introduced in the beginning of this chapter, such a claim of new complexity has its philosophical basis in Deleuze. On top of this conceptual foundation, Lynn's blobs have been generally established on three other resources: topological geometry, morphogenesis of biology and computing software. The first one is the theory of topological geometry based on its mathematical qualities. Topological geometry concerns the continuity of transformation of form. Following a topological change, an object could be endowed different forms but keeps some of the characteristics of its previous state. This condition is also applicable to the connection of two objects. When two independent objects are conjoined in one, the result is a new form but one that keeps some of the characteristics of the two previous bodies. In this instance, it is thus suggested by Lynn that a topological form could have the properties of both continuity and heterogeneity, both singularity and multiplicity. The latter means it is singular, but also involves multiple connections or relationships. A topological relation is therefore different to the simple relation of unity or conflict. As Lynn said, it "abandons either the single or the multiple in favor of a series of continuous multiplicities and singularities", and "is one way of escaping the definition of identity through dialectic contradiction."[57] In relation to architecture, it provides a theory of formation and spatial organization: a volume is not simply added to an existing space or volume in a manner of either conflict or unity, but rather joins in a generation of smooth relations with existing objects. Topological geometry for Lynn implies the preferential adoption of curvature, i.e. curved form, because it can satisfy the mathematic quality of topological transformation.[58]

---

[56] Greg Lynn (1995), "Blobs", in Greg Lynn (1998), *Folds, Bodies & Blobs*, (La Lettre Volée), 166.
[57] Ibid., 161.
[58] Greg Lynn (1999), *Animate Form*, (New York: Princeton Architectural Press), 22-23.

The second resource for blobs comes from biology, as in the morphogenesis model of the Scottish biologist D'Arcy Thompson. Put simply, morphogenesis refers to the dynamic process of the development of organic form. For the development of organism, the morphogenetic model follows a principle of maximum "smoothness" within its boundaries; in other words, there is no sudden jump from one to another adjacent field.[59] In his book, *On Growth and Form*, D'Arcy Thompson invented a geometrical model to describe and analyse such "smoothness" or "topological similitude" through a transformation from organic forms into a topological co-ordinate system. The principal character of this co-ordinate system lies in deformation. As Thompson argued, the deformation of a complex figure offers an easy way to make a pictorial description for the comparison of related forms. [60] Through topological deformation, Thompson creates a graphic system to describe the principle of continuous but heterogeneous growth, in terms of the relation between geometrical formation and the morphogenesis of organism. When Lynn regarded the formation of blobs as a process of animated form, Thompson's model provided him with a basis to use topology as a means of describing changing form.

The last resource that Lynn uses is the specific types of three-dimensional software that are based around principles of topological geometry: software that can generate forms and thus transfer the mathematical character of topological geometry into surface form. In his essay "Blobs", Lynn argues:

A class of topological geometric types for modeling complex aggregates that exhibits the qualities of multiplicity and singularity outlined above has recently been developed. The most interesting example of these topological types are ***isomorphic polysurfaces*** *or what in the special effects and animation industry are referred to as* ***meta-clay***, ***meta-ball*** *or* ***blob*** *models. The explanation of the organization of these topological geometries actually outlines a working schema for a new typology for complexity.*[61]

---

[59] Brian Goodwin (1997), "Generic Dynamics of Morphogenesis", in Charles J. Lumsden, Wendy A. Brandts and Lynn EH Trainor (eds.) (1997), *Physical Theory in Biology: Foundations and Explorations*, (London: World Scientific Publishing), 189.

[60] D'Arcy Wentworth Thompson (1961), *On Growth and From*, (Cambridge: Cambridge University Press), 271.

[61] Greg Lynn (1995), "Blobs", (La Lettre Volée), 163.

For example, Lynn developed his notion of "Meta-Balls" using the 'Explorer 3Design' software programme of Wavefront Technologies. In the virtual space of software, each blob has its micro-environment defined by set parameters which controls its formal character. With this software, it is possible to develop a process of generation in which two or more independent blobs join together to form a new combined blob; the software demonstrates how the individual geometrical characters of the initial forms will impact that generative process and become a part of the final identity of the new blob. The joined blobs become a part of the new one and share a common smooth surface, but at the same time they still keep their original geometrical characters, combining the quality of continuity with heterogeneity that Lynn seeks in his blobs.

All these three references are used to give the architecture of blobs a connection between topological geometry and spatial formation, providing the folding surface a spatiality of smoothness and multiplicity. The model of blobs developed by Lynn is expected to offer a new paradigm for the relationship between building and context in comparison with the paradigm of contradiction. Because it is seen as process of generation, the formation of blobs takes body, time, and force as three key aspects. Topological geometry gives blobs a smooth surface, a form of volume or body. The duration of time allows that process to happen dynamically. Force decides the conditions of generation and the intensity of relations. These three key points establish the foundation for Lynn's theory and practice of blobs. However, the weakness of Lynn's work, and the conflict between his theory and practice, can be discovered by following through these three points. Paradoxically, at the same time, such three notions may also conceive a hidden energy for the rethinking of blobs.

Body, time and force

In his paper "Multiplicitous and In-organic Bodies" of 1992, Lynn argued that architecture needed to be considered as a kind of independent "organism" or "whole", i.e. an autonomous discipline which develops a kind of "consistency" according to a set of internal regulations. In this instance, architecture formalizes its interior "body" without response to the outside but

following "the logic of self-enclosure, self-regulation and self-determination."[62] In Lynn's eyes, this consistency is based on a kind of typology which is formalized through changing geometrical proportions of either the external representation or the interior spatial arrangement. To challenge the "consistency" of architecture the first task, for Lynn, is thus to seek an alternative geometrical form which could create a quality of vagueness and multiplicity to allow possible and flexible relations between the "body" of architecture and outside forces. Through this multiplicity, a new organism occurs: "it is continually, dynamically and fluidity transforming itself in response to its intensive involvement with both the external forces of its context and the internal forces of its members."[63]

Lynn used the concept of "body without organs" as a reference to a new paradigm for formal organisms. This notion comes from Deleuze and Guattari in their book *Anti-Oedipus*, published in 1972 and translated to English in 1983. Lynn believed this concept could help architecture depart from its conventional "organism" or "whole" of consistency. However, when Lynn connected this idea with a particular logic of form generation, i.e. turned "body without organs" into a mechanism producing geometrical "bodies" of architecture, especially blobs, he was in danger of losing its original energy. Going back to Deleuze and Guattari, the "body without organs" is firstly "not a projection; it has nothing whatsoever to do with the body itself, or with an image of the body."[64] Instead, used as a tool for the analysis of capitalism, the "body without organs" is a matter of living mechanism which creates the dynamic interaction between the real body – people – and the world. For example, capital is a "body without organs" for the capitalist. The term is therefore concerned with production and social relationships, and must always be seen in relationship to its social and cultural content: "It is perpetually reinserted into the process of production."[65]

When architecture is considered as a kind of "body without organs", it becomes an "abstract

---

[62] Greg Lynn (1992), "Multiplicitous and In-organic Bodies", in Greg Lynn (1998), *Folds, Bodies & Blobs*, (La Lettre Volée), 41.
[63] Ibid., 44-45.
[64] Gill Deleuze and Félix Guattari (1984), trans. by Robert Hurley, Mark Seem and Helen R. Lane, *Anti-Oedipus: Capitalism and Schizophrenia*, (London: The Athlone Press), 8.
[65] Ibid., 8.

machine." This is a conceptual term used by Deleuze in his book, *Foucault*, meaning a living mechanism that both absorbs and produces forces, and then intervenes in social space and practice. In this context, it might be that Lynn conceptually had the aspiration to turn architecture into such an organism, which he designated as "multiplitious body" or "animate form". However, what in fact happens is that a mechanism of social life is quickly reduced to a mechanical technique for form-making:

Techniques, as opposed to technology, become an expression of cultural, social, and political relations rather than as an essential power. The effects of abstract machines trigger the formation of concrete assemblages when their virtual diagrammatic relationships are actualized as a technical possibility. .....It is in the spirit of the abstract technical statement yet to become concrete that topologies, animation and parameter-based modeling are being explored here. .....If there is a single concept that must be engaged due to the proliferation of topological shapes and computer-aided tools, it is that in their structure as abstract machines, these technologies are animate.[66]

With Deleuze, the "abstract machine" is always social and political in both form and content. In negotiating the relationship between social and political forces, the "abstract machine" is never simply a mechanical device.[67] When the "abstract machine" is simplified into an autonomous mechanism based on mathematical calculation, it loses all of its initial social and cultural implications, and can only be transferred into a pure abstract space in the manner of geometry and representation. When Lynn gets lost in computing space, the organism of architecture could not be seen as a Deleuzian "abstract machine" but rather a programmatic machine in technique, and topological surface, something that might be no more than a mechanical recorder of vector, time and motion.

Though Lynn argued that his adoption of the computer and engagement with animation software concerned the establishment of the interaction between architecture and environment, the reality

---

[66] Greg Lynn (1999), *Animate Form*, (New York: Princeton Architectural Press), 40-41.

[67] Gilles Deleuze (1988), trans. and ed. by Seán Hand, *Foucault*, (London: The Athlone Press).

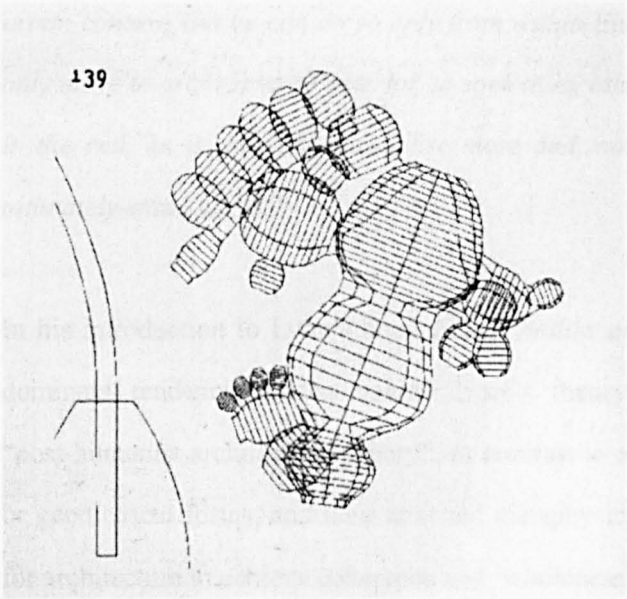


Figure 2.1
The project of the Cardiff Bay Opera House Competition, UK, 1995, by Greg Lynn.

is that Lynn's blobs, and his desire for multiplicity, might be no more than a new autonomous architecture engaged with mathematics and geometry. Thus his project for the Cardiff Bay Opera House Competition of 1995 is shown as no more than form generation which produces multiple blob-shapes (Figure 2.1). Such autonomous architecture has its roots in the history of American avant-garde, as Michael Speaks has indicated. Speaks, in his paper of *"IT'S OUT THERE...: The Formal Limits of The American Avant-Garde*", critically points out that the essential weakness and limitation of American avant-garde architecture from Eisenman to Lynn was precisely its powerful interiority of 'form generation'. In the eyes of Speaks, both the 1988 MOMA Deconstructivist Exhibition and 1993 publication on *Folding in Architecture* in *AD* are typical models of architecture following such interiority, even if they deal with radically different formal solutions. In the context of such "form following form", Speaks comments:

Lynn wants new forms which answer to new, exterior conditions, but he neglects the critical question raised by Eisenman about the interiority of architecture; about in other words, what architecture is and does. Eisenman calls into question architecture's humanist interiority – architecture, that is, as a practice of housing and making safe. But he does this only in order to establish a new interiority, that of form generation. Eisenman wants to replace the humanist, modernist, form-follows-function interiority with a form-follows-form interiority. Lynn, on the other hand, wants to move architecture away from this interiority to its exteriority, from static form – typologies, deep structures, etc – to stable form which interacts with the dynamics of its

urban context. But he can do so only from within Eisenman's interiority of form; that is, he can only move to architecture's exterior, to something other than form, by way of form itself. .....but in the end, he is only able to devise more and more animate techniques to design what are ultimately static forms.[68]

In his introduction to Lynn's book *Folds, Bodies and Blobs*, Ole Bouman points out that the dominant tendency hidden behind Lynn's theory is a kind of "anti-subjectivism" as a "post-humanist architectural theory", in contrast to a humanist tradition in which mathematical or geometrical forms, and their attached metaphysical meanings, have been seen as the means for architecture to achieve coherence and 'wholeness'. Bouman traces this line from Pythagoras, via Vitruvius and Alberti, to Colin Rowe.[69] To legitimise this move, Lynn sets the geometry and form of architecture as an autonomic response to outside forces, which is seen as a factor that is more scientific than cultural. As Bouman clearly suggests, having regarded the mathematics of form as the only content and transcendent value of architecture, Lynn's architecture tends towards an amoral reality.[70]

Unfortunately, though Lynn expected to find a new architecture as a bio-mechanism of "supply", his practice of blob making moved into pure shape making. As Paul A. Harris argues, the main task of Lynn becomes a seeking for the reconfiguration between the body (of architecture) and topological geometry. Harris comments: "Lynn seeks to replace the fixity of the architectural frame with a notion of the frame as a probabilistic envelope within which bodies or forms may develop into different configurations."[71] Just like René Thom's 'balls', D'Arcy Thompson's morphogenesis graph, or Meta-Balls in 3D software, Lynn's architecture turned to the geometrical body of bio-mechanism, and such bodies are autonomic and animate in producing a spatiality of body-space of themselves. Architecture becomes body, but at the same time, the

---

[68] Michael Speaks (1998), "IT'S OUT THERE...: The Formal Limits of The American Avant-Garde", *Architectural Design*, Vol.68 No.5/6 1998, 30.
[69] Ole Bouman (1998), "Amor(f)al architecture or Architectural Multiples in the Post-humanist age", in Greg Lynn (1998), *Folds, Bodies & Blobs*, (La Lettre Volée), 8-9.
[70] Ibid., 7-11.
[71] Paul A. Harris (2005), "To See with the Mind and Think through the Eye: Deleuze, Folding Architecture, and Simon Rodia's Watts Towers", in Ian Buchanan and Gregg Lambert (eds.) (2005), *Deleuze and Space*, (Edinburgh: Edinburgh University Press), 45.

real body – the human one – is ignored and thus disappears. The space of architecture is thus turned into an autonomic space of bio-mechanism without interest in the negotiation with people. As Harris notes: "Lynn's reconceptualisation of the body in architecture essentially replaces the human form as the basis for spatial types with biological models of morphological change."[72]

As an autonomous body-space of bio-mechanisms, Lynn's blobs find their natural locus in the computing environment, in which the self-organization of forms becomes the norm. In contrast to the conventional "abstract space of design", which is seen as "an ideal neutral space of Cartesian coordinates", Lynn proposed instead "an environment of force and motion rather than as a neutral vacuum".[73] The computing space is the perfect environment for such manipulation. The computer not only works as a presentational device for digital rendering and imaging, but also sets certain conditions for design and the production of form. Used with specific 3D software, the computer provides particular conditions in terms of topology, time and parameters. Firstly, in contrast to 'line', the drawing tool of the 'spline' curve, controlled by vectors, gives a specific facility to make topological surface, generally called 'NURBS Surface'. This facility makes it easy to control topological inflection through the setting of certain 'force' parameters. Secondly, in cooperation with force, time becomes a condition of the generation of form, and a representation of motion when the filmic process of morphogenesis is shown on screen. Lastly, it makes spatial forces readable and controllable. In this context, the computing environment is actually not a Cartesian absolute and static prearranged space, but rather a relative and active space which privileges the display of the process of form generation. The computer here becomes the most expedient means for Lynn to transfer the space concept of Leibniz and Deleuze into form-making and building organisation. As he said:

Once design is posed within a Leibnizian monadological space, architecture may embrace a sensibility of micro and macro contextual specificity as a logic that can not be idealized in an abstract space of fixed coordinates. In such an abstract active space, the statics of fixed points in neutral space is replaced by the stability of vectors that balance one another in a phase

---

[72] Ibid., 46.
[73] Greg Lynn (1999), *Animate Form*, (New York: Princeton Architectural Press), 10.

space.[74]

Blobs obtain their space-time in mathematic space in which generative forms are generated following the rules of topological geometry, with the process being shown on the screen. People, in this instance, are no more than observers in front of that screen. In the end, the final production of form generation – the last curvilinear shape of blobs – is supposed as a recorder and "description" of this active process. The ability of topological inflection allows the curvilinear shape to become an ideal model to record and present the continual changing of form. In the computing environment, time is represented as the process of form generation, for example, how several blobs are joined into a combined one. Such time of process could only be shown through animation on the screen or through cinematic diagrams on paper. Force is implied in the definition of the blobs's geometrical characters and the degree of inflection. Force is thus represented through the topological changing of surface; without the presentation of this generative process, the final result is merely a static complex form. In this context, topological folding surface is a direct representation of mechanical time and force, and vice versa. The topological folding surface does not break the limitation of "signified geometry", as Evans called for; instead, it is no more than a representation of geometry itself. However, when blobs join in the negotiation of the actual space of architecture and body, folding has to face up to the realities of time and force. Buildings might be stable, but people never are. The engagement of people's presences, not only the motion of eyes but also the movement of bodies, makes the relation between spaces always dynamic and changing. In this way, time is not representational but phenomenal and experiential. It is not a process of autonomic morphogenesis but a process of generation of space-time in relation to the body's practices. The same is true of force. Force is understood not as mathematic calculation alone, but also in term of its phenomenal aspects such as gravity. Force in this way is perceived in the context of the relationship between the body's space and architectural form. In this instance, blobs could be read not merely as a shape of inflection, but as a smoothness and multiplicity in cultural, social and political dimensions. The topological body of the building, or volume, could induce a perceptional animation

---

[74] Ibid., 15.

corresponding to its formal inflection. It is this aspect of blobs that is underplayed in Lynn's analysis.

Fluidity, animation and context

In his 1996 paper "Blobs: Why Tectonics is Square and Topology is Groovy", Greg Lynn argued that the conventional tectonics of architecture implies a contradiction between the particular and general, the former being contingent and changeful, the latter permanent. He wrote:

Historically, discussions of tectonics have involved the difficult task of combining the particular with the general. In this instance, the particular is understood to be contingent factors such as the highly localized techniques of construction and the spatial techniques associated with use and organization. The general, meanwhile, stands for universalized ideals which are embodied in spatial typologies. Discourses on tectonics inevitably attempt to negotiate, however uneasily, the contingent, local concerns of the present with generalized typologies considered to be essentially timeless.[75]

In the eyes of Lynn, the contradiction between the particular and general is suppressed and hidden through the conventional typologies of architectonic form. In contrast, the blob suggests "alternative strategies of structural organization and construction that provide intricate and complex new ways of relating the homogeneous or general to the heterogeneous or particular," because the blobs are not typological but could interrelate with the particular place due to the active relationship with their context when they are placed there.[76]

In contrast to the stable form of typology, Lynn found a model of fluidity in images from a series of Hollywood horror films from 1950s to 1980s, such as the 1988 film *The Blob*. In these films, blobs looks like moving "organisms" with fluid-like smooth surfaces which "have no internally regulated shape, but depend on contextual constraints or containment for their form."[77] Lynn suggested this fluidity presented a particular spatiality relevant to movement. In

---

[75] Greg Lynn (1996), "Blob Tectonics, or Why Tectonics is Square and Topology is Groovy", in Greg Lynn (1998), *Folds, Bodies & Blobs*, (La Lettre Volée), 169.
[76] Ibid., 169-170.
[77] Ibid., 171.

Lynn's eyes, 'blobs' in those films can move through space as if space were aqueous, and can absorb objects around them as if they were liquefied. What could be seen is that the combination of smooth surface and fluid movement gives rise to a new kind of fluid spatiality due to the topological changing of surface-space formation. A fluid surface envelops a dynamic volume which inflects in correspondence with contextual conditions and thus is formalized by the surface tension between the blob and its environment.

To prove the availability of such "blob construction", Lynn questioned the conventional paradigm relating gravity and form. He argued there was an outmoded notion of gravity as a simple, unchanging, vertical force, and correspondingly a standard notion of vertically determined form:

The relationships of structure to force and gravity are by definition multiple and interrelated, yet architects tend to reduce these issues to what is still held as a central truth: that buildings stand up vertically. .....Of course architects and structural engineers do not ignore these other structural factors, but the primary perception of structure has always been that it should be vertical.[78]

What should be clear is that Lynn's critique of the notion of gravity and vertical form does not primarily propose to improve the rationality of structural design, but rather tries to question the habitual model of verticality, in terms of orthogonal form, in responding to the representation of the concept of gravity. In this context, Lynn argues for alternative formations which could present different ways of dealing with gravity, in other words, a kind of spatiality of weightless or lightness. This idea draws on a comment of John Rajchman:

Gravity (and so lightness) would thus be best shown in a static, delimited comparative space. To rethink lightness is to imagine another sort of space than the classical, which defines gravity in relation to vertical elevation. Lightness may then be thought of as a release from the traditional burden-support space of architecture.[79]

---

[78] Greg Lynn (1999), *Animate Form*, (New York: Princeton Architectural Press), 14.
[79] John Rajchman (1998), *Constructions*, (Cambridge Mass., London: The MIT Press), 40.

Lynn found that his interest in fluid form could challenge the conventional representation and perception of gravity in architecture. He regarded the topological surface of fluid form as an opposition to the determinism of the paradigm of gravity in architecture, because it conceived an alternative construction in contrast to the model of "standing upright".[80] Lynn's critique of traditional notions of gravity can be traced back to his 1994 paper "Differential Gravities", in which he argued "the concept of differential gravities is based on a more flexible notion of the ground and grounding," or a multiplicity of "ground form".[81] For Lynn, gravity should not be seen merely as a single and uniform force but also represented as the tension of geometrical "vectors" which could be observed in formal relations between masses, and between masses and the ground. In this context, the form of weightless or lightness could thus be understood as "a more complex and intricate question of relationships between surfaces and grounds that are multiple and loosely connected."[82] As an option, a topological form of so-called "diffused structuring" is regarded by Lynn as a way of "flotation", i.e. weightlessness, in which "weight is carried through many different vectors that are not subject to the right-angle pull of the earth's gravity."[83] For Lynn, the inflection of topological surfaces shows a dynamic form against the conventional static form of "standing upright", and thus challenges the habitual perception of gravity.

To some extent the use of inflected form to create the illusion of challenging gravity can be found in the Baroque. As Giedion notes: "The baroque period felt strongly attracted to constructions which seemed to defy the force of gravity."[84] Francesco Borromini's San Carlo alle Quattro Fontane built in 1662-1667 is a significant example (Figure 2.2). In the opinion of Giedion, with the "undulating wall" was a form of inflection that offered a visual dynamic

---

[80] Greg Lynn (1995), "Blob Tectonics, or Why Tectonics is Square and Topology is Groovy", in Greg Lynn (1998), *Folds, Bodies & Blobs*, (La Lettre Volée), 175-176.
[81] Greg Lynn (1994), "Differential Gravities", in Greg Lynn (1998), *Folds, Bodies & Blobs*, (La Lettre Volée), 96.
[82] Ibid., 102.
[83] Ibid., 102-104.
[84] Sigfried Giedion (1949), *Space, Time and Architecture: the growth of a new tradition* (Second edition), (London: Oxford University Press), 59.

Figure 2.2
San Carlo alle Quattro Fontane at Rome, Italy, 1662-1667,
by Francesco Borromini.

relationship between the inside and outside spaces of the building through infusing movement into the whole body of architecture.[85] What makes Lynn's fluid forms different with Borromini's Baroque architecture or Giedion's notion of "flexible inflection" is his insistent questioning of the ideology of traditional unity, of treating architecture as a 'whole'. His forms also differ formally, with the Baroque being based around the assembly of inflected elements into a formal composition, whereas Lynn promotes the idea of formlessness based around topological geometry. In his 1993 paper "Probable Geometries: The Architecture of Writing in Bodies", Lynn argued that the tradition of architecture conceived as a 'whole' is based around the use of geometrical symmetry and proportion. Through the cancellation of such properties, Lynn argued that an asymmetrical geometry might bring about a revolution in the existing paradigm of architecture, and present a kind of random and contingent form.[86] His architecture of blobs is neither actually fluid nor without a form, but rather induces an asymmetric and uncertain spatiality through inflection and its multiple orientations, in contrast to Euclidean geometry and the Cartesian co-ordinate system.

More recently Greg Lynn has developed the concept of fluidity into that of 'animation' in his

---

[85] Ibid., 44-54.
[86] Greg Lynn (1993), "Probable Geometries: The Architecture of Writing in Bodies", in Greg Lynn (1998), *Folds, Bodies & Blobs*, (La Lettre Volée).

1999 book titled *Animate Form,* which acts as a summary of his theoretical thinking in 1990s. For Lynn, the notion of "animation" is a critique of the paradigm of "stasis" in architecture; however, it has a different meaning to mere motion or movement:

Animation is a term that differs from, but is often confused with, motion. While motion implies movement and action, animation implies the evolution of a form and its shaping forces; it suggests animalism, animism, growth, actuation, vitality and virtuality. .....What makes animation so problematic for architects is that they have maintained an ethics of statics in their discipline.[87]

In contrast to "the ethics of statics", i.e. "stasis", in which notions of permanence or timelessness are related to the purity and autonomy of form, Lynn suggested "an ethics of motion" in the manner of "animate form". For Lynn, it is neither the artistic representation of movement in the Baroque or Futurist painting, nor in contemporary digital architecture such as that of Karl Chu, because all these cases could be seen as only the representation of images in motion. This is different, argued Lynn, from the concept and process of producing form "shaped by the collaboration between an envelope and the active context in which it is situated."[88] In contrast to static form, such a "performance envelope" is assumed to make flexible, mutable and differential architecture.

Whether fluidity or animation, fluid form or performance envelope, all concern an interactive relationship between form and the context of form generation. Whilst I have argued that the blobs of Lynn's computer works consists only of autonomous forms and a mathematic environment, blob architecture in the real environment has the potential to radically affect the relationship between building and context. The adoption of topological folding surface could redefine the conventional role of envelope, and induce a tension between volume and animation as the spatiality of smoothness.

---

[87] Greg Lynn (1999), *Animate Form*, (New York: Princeton Architectural Press), 9.
[88] Ibid., 11.

Blob-shape building and urban context

Recently some blob-shape forms have occurred in architectural practice. For example, there are two notable buildings, the Kunsthaus in Graz, Austria, and the new Selfridges in Birmingham, both built in 2003. These buildings are usually seen as 'blob architecture' only because of their blob-like shapes. They should not be seen as a direct link of practice back to Lynn's theory of the blob. However, it might be a chance to use these buildings to observe the effect and availability of fluidity and animation, because they share a similar curvilinear form of topological surface.

The new Selfridges, designed by Future Systems, is located in the Bull Ring, a multi-storey shopping centre in the centre of Birmingham. The Bull Ring is composed of both old and new buildings in a fairly disorderly arrangement. Facing such a complex and chaotic context, the new Selfridges building presents a kind of fluidity with its blob-form. It is built with a steel load-bearing structure and then covered with smooth surface, consists of a layer of sprayed concrete on steel mesh, and a thin coating of waterproof blue-painted concrete to which is finished with a sequin-like skin of 15,000 pieces of 600mm-diameter polished anodized-aluminium discs.[89] Such a smooth surface brings to the building an uncertain and fluidic form through its topological curvatures. At a formal level, the building meets the criteria of the blob; however, it was not the architect's intention for the building to create a smooth relationship with its context, but rather an ambition to create a landmark which stands out from the existing chaotic context.[90] The building has a smooth surface, but is not concerned with the notions of smoothness as raised by Lynn: in terms of the relationship with the context it is heterogeneous but does not invoke the continuity that Lynn aspires to. However, in terms of its spatiality, it does evoke a sense of fluidity and multiplicity. The perception of this blob is dominated by the reflective aluminium discs, and these discs precisely reveal and increase the perception of fluidity and multiplicity. These discs act as the controlling points of topological geometry in displaying a changing and uncertain spatial relationship. Because of their size (they

[89] Department Store in Birmingham, on website of *Detail*, http://www.detail.de/Archiv/En/HoleArtikel/5230/Artikel, downloads on 2004-12-15.

[90] James S. Russell (2004), "Future System's curvaceous outpost in Birmingham has helped turn the dowdy SELFRIDGES department-store chain into a must-shop destination", *Architectural Record*, Jun 2004, Vol. 192, issue 6, 234.

are 600mm in diameter), when facing the discs people correspondingly become a point of that topological space through their reflections. It is not only that the topological relation of discs is perceived and engaged with by the observer, but also walking around the surface creates an animated relation between surface and people. When a topological surface such as Selfridges evokes a spatiality of fluidity, visualizes an animation, and formalizes a surface-space in its multiplicity, the body of observer is involved in the result of this spatial dynamic. In practice, the mathematic space is transferred to a bodily space. This effect might not have been the intent of Future Systems; however, the blob-shape of Selfridges displays how the fluidity and animation of topological surface could intervene in the perception of phenomenal space that cannot be obtained on screen of computer.

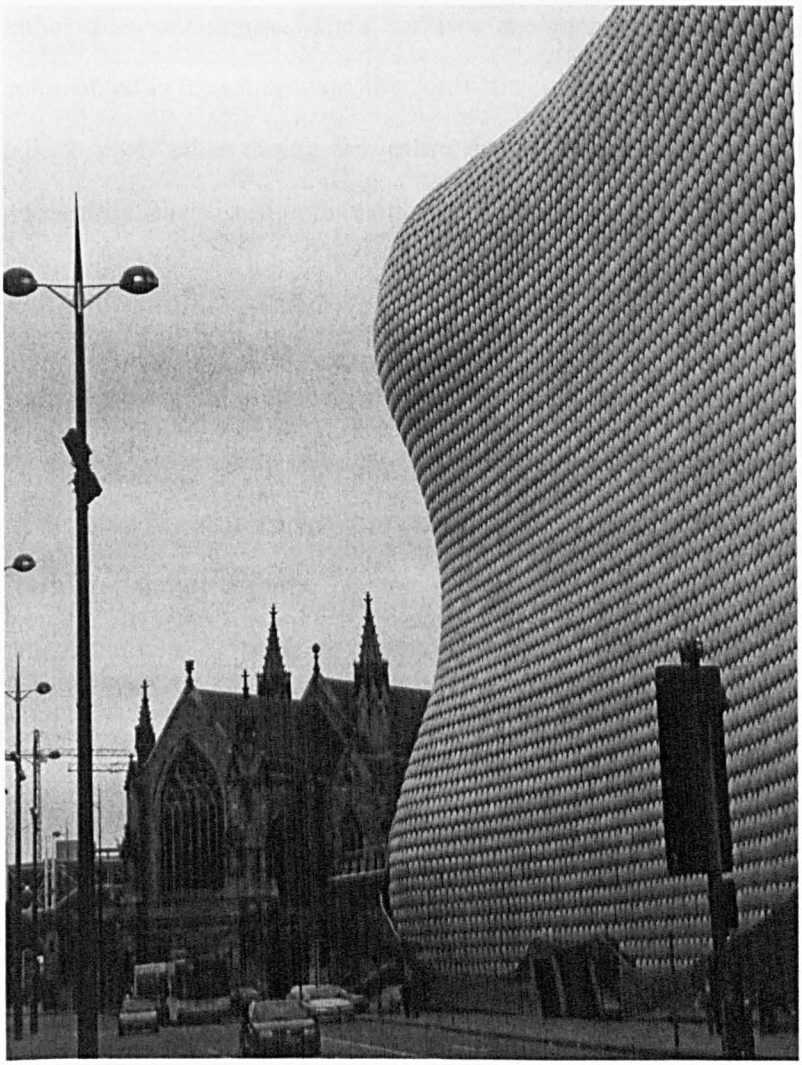


Figure 2.3
New Selfridges Birmingham, UK, 2003,
by Future Systems.

Though the blob-shape of the new Selfridges building gives a spatial effect of fluidity and animation, it does not therefore create a relation of smoothness with its urban context, as Lynn argued was a condition of the blob. Its conflicting relation with the nearby St Martin's Church is obvious (Figure 2.3). The contradiction between religious and commercial has a social and economic connotation that is probably beyond the control of the architect. However, the treatment of the building as autonomous shape and outstanding icon, which is a specifically architectural intent, heightens the disjunction with the context. This is not just in terms of the church, but also the other shopping accommodation that is attached to the new Selfridges. Built before the Future Systems' building, this mall is a "boxy volume wrapped in a queasy mix of Tuscan stripes and Modernist steel beams."[91] Rightly or wrongly Selfridges makes no concessions to this context, so that a situation of contradiction is produced by two buildings, rather than smoothness. Their surfaces are connected but not continuous. As Kieran Long commented in *icon* magazine, the conflicting relation looks like two architects "had bothered to talk to each other during the entire design process."[92] The blob-shape here thus does not necessarily lead to a smooth relation between building and context.

The Graz Kunsthaus, in Austria, designed by Peter Cook and Colin Fournier, also adopts a fluid form of a blob, but is conceived of as a "friendly alien"[93] by the architects and accepted as such by locals. The building is a contemporary art museum on the city's riverfront; on the other side of the Mur River, there is a historical landmark, the Clock Tower, on the top of a hill which is the high-point of the city. The site is located in a historical area, a part of the busy city core, which consists of three or four-storey traditional buildings in coloured render; this is an important historical site, especially the Eisernes Haus. This 1852 structure is the first cast-iron building in Austria, imported from Sheffield to Graz. It becomes an important reference point for the architects of the Kunsthaus. "In Cook's view, the English derivation makes it extremely germane to his own building – another equally high-tech experiment."[94] The task of the project,

---

[91] Ibid., 234.
[92] Kieran Long (2003), "bullring", *icon* Vol. 005, September 2003.
[93] Colin Fournier (2003), "'A Friendly Alien': The Graz Kunsthaus", in Bernard Tschumi and Irene Cheng (Eds.) (2003), *The State of Architecture at the Beginning of the 21st Century*, (New York: The Monacelli Press, Inc.), 84.
[94] Liane Lefaivre (2004), "Kunsthaus Graz, Austria: Spacelab Cook-Fournier; Yikes! Peter Cook's and Colin Fournier's perkily animistic KUNSTHAUS in Graz recasts the identity of the museum and recalls a legendary design

besides offering a new space for art exhibition, concerns a renewal of urban space and at the same time avoiding an antagonistic relationship with the context. The architects say the "sleek cocoon" shape was formed primarily to let the space "flow" into its uneven site boundary.[95] The Kunsthaus is a near-complete blob-form. The smooth surface spreads from roof to the bottom of the first floor, and then stops at the inner partition wall. This blob-form is lifted up and supported by the structure of the ground floor, itself enveloped by a curved concrete surface. The whole surface of the blob has two layers. The inner one is made of concrete with a total thickness of almost 900mm. Within this concrete surface, the actual primary structure consists of polygonal, rectangular, steel box girders, arranged parallel to each other. Between them, standard square tubes are structured in a triangular formation, transforming the load-bearing layer into a shell. On the inside, these steel girders are covered with a fire-resistant coating and the shell is closed off from the outside with curved steel sandwich panels. Outside of the structural layer, there is a heat-shaped and doubly curved blue Plexiglass layer which forms the outer surface. Between the two layers of concrete shell and Plexiglass is a cavity of 700mm depth.[96]

In contrast to the new Selfridges, with the blob-shape the Graz Kunsthaus establishes a relation of smoothness with its context (Figure 2.4). This smoothness is a consequence not only of the form of topological surface, but rather it is an intentional result coming directly out of the design process. Firstly, the inflection of surface is used to match the new building to the scale of its surrounding neighbours. As noted by Neils Jonkhans, Cook and Fournier's local assistant and former student: "If we had designed a conventional building with an orthogonal volume, the building mass would have been out of proportion with the old surrounding (structures)."[97] Topological geometry is here considered as a means to reduce the formal conflict between the building and its context. The effect of inflected surface is not only about scale. The Kunsthaus building is very close to existing buildings in the same street block; following the zigzag

---

movement", *Architectural Record*, Jan 2004, Vol.192, issue 1, 92.

[95] Sam Lubell (2003), "In Graz, Austria, a new arts center will speak its own digital language", *Architectural Record*, Mar 2003, Vol.191, issue 3, 177.

[96] Kunsthaus Graz: Archigram, the Original Blobmeister, on website of a-matter, http://www.a-matter.com/eng/projects/Kunsthaus-Graz-pr077-01-pr.htm, downloads on 2004-12-15.

[97] Sam Lubell (2003), "In Graz, Austria, a new arts center will speak its own digital language", 177.

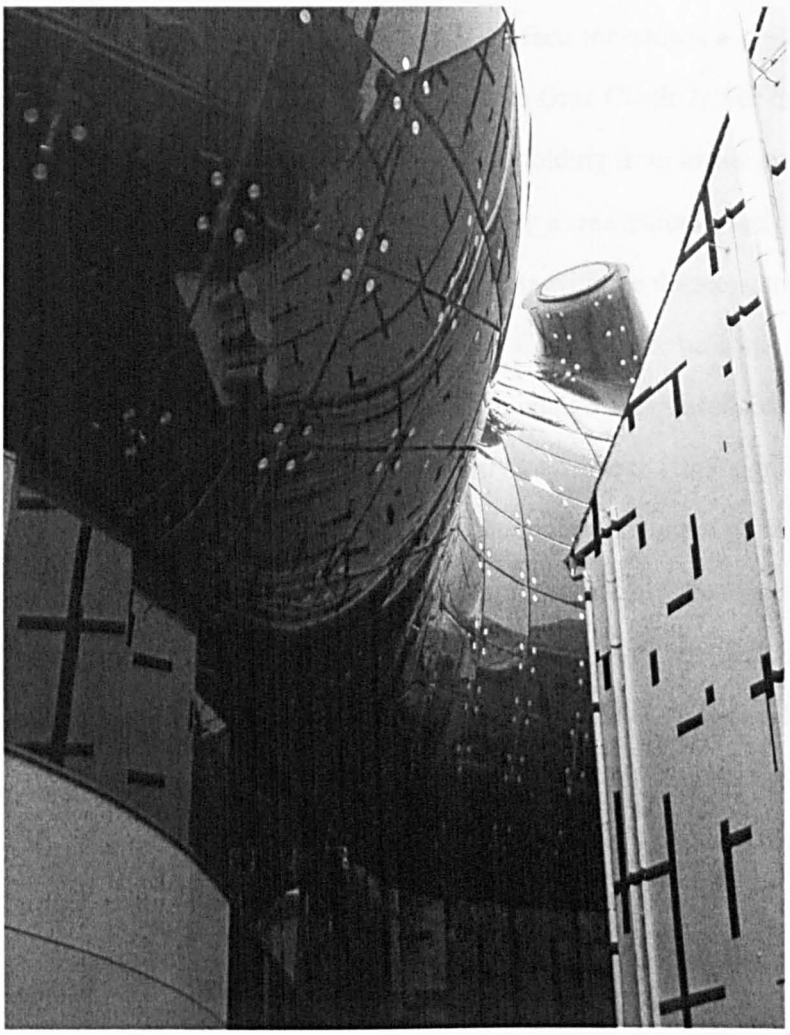


Figure 2.4
Graz Kunsthaus, Austria, 2003, by Peter Cook and Colin Fournier.

boundary defined by its neighbours, the curvilinear form of surface creates a smooth relation with the complex and irregular environment. In this sense, the blob-shape of the Kunsthaus achieves the spatial quality of fluidity and animation as Lynn anticipated. The form of existing buildings becomes a kind of outside 'force' which impacts the form generation of blob. With the obvious influence from the existing urban environment, a continuous but heterogeneous relation is created by the blob; it is a spatiality of smoothness evoked by the spatial relation of surfaces. Moreover, the formlessness – at least when measured against Modernist paradigms – of the Kunsthaus, given by its topological geometry and reflections in the Plexiglass surface, shows an ambiguous relation with the different historical styles of surrounding buildings, in sense of neither mimicing nor conflicting with them; in other words, it manifests neither unity nor contradiction. Through reflecting images from the surroundings, the Kunsthaus visually creates a continuous relation with the context on its surface.

Secondly, the inflection of topological surface introduces a particular connection between the Kunsthaus and the historic landmark of the Graz Clock Tower in the long distance. On the top of the Kunsthaus there are many "nozzles" folding from inside out. These nozzles stick out from the surface of the blob, and are crowned by a transparent Plexiglass panel, of a size similar to the dormers of the surrounding buildings. As with the dormers, these nozzles bring daylight into the interior. Through just one of them the Clock Tower becomes visible from a particular point within the gallery, framed as if it is an image introduced into the exhibition space of the Kunsthaus (Figure 2.5). The particularity of context - the significant historic building of the Clock Tower – and the particularity of building – a unique nozzle as an inflection of surface – have been connected at a precise position, and transferred into the spatial experience of the visitor. In this instance, the Graz Clock Tower acts as another outside 'force' in relation to the inflection of surface. This effect is not a consequence of physical forces as set up by Lynn in a computer environment. Rather, the justification and realisation of this spatial connection can only be appreciated by the engagement of the body when one moves to that particular position and looks up. In other words, the smooth relation between building and context is not a figure of autonomous form generation, but rather a spatial event within bodily space.

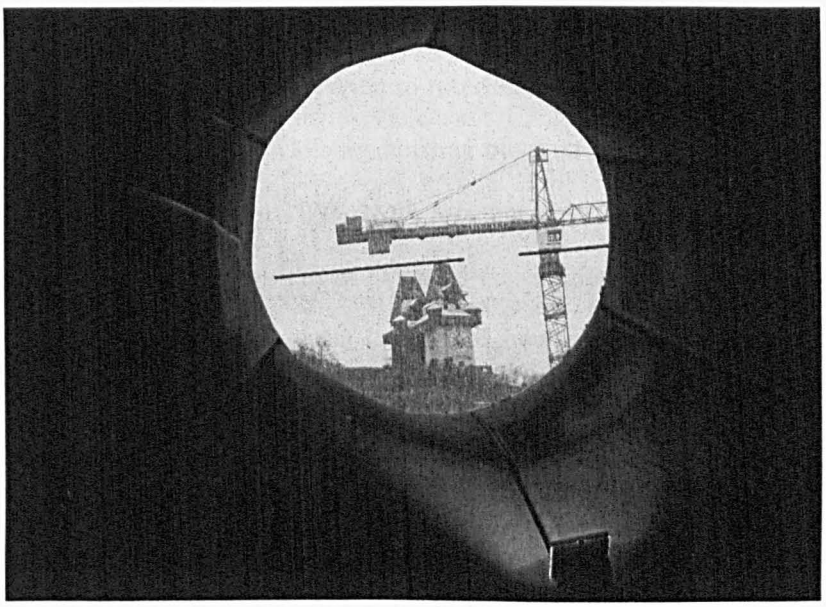


Figure 2.5
Graz Kunsthaus,
Austria, 2003,
by Peter Cook and Colin
Fournier.

Lastly, the smooth relation between the Kunsthaus and its urban context is reinforced by the transparency of the ground floor glass wall and the reflection of the inflected Plexiglass surface.

The surface of the blob-shape of the Kunsthaus folds into the entrance hall and forms a curved ceiling to the ground floor, the boundary of which along the street is formed by a seamless transparent glass wall. The continuity of topological surface induces a spatiality of continuousness between inside and outside spaces, which is intensified by the transparency of the glass wall.

The Kunsthaus Graz has about 1,000 computer-controlled circular fluorescent light tubes mounted behind the Plexiglass skin. In contrast to the aluminium discs of the new Selfridges in Birmingham, these circular light tubes are placed behind the layer of the Plexiglass surface. This design works well, because by being hidden behind the Plexiglass these circular tubes do not disturb the smooth surface in the daytime; but at night, the illumination of these circular fluorescent light tubes reveals a blob form defined by points of topological geometry. Further, its lighting programme (generally designed by a specific artist at any one time) presents a dynamic animation which reinforces the fluidity of the surface.

Animate form and refurbishment

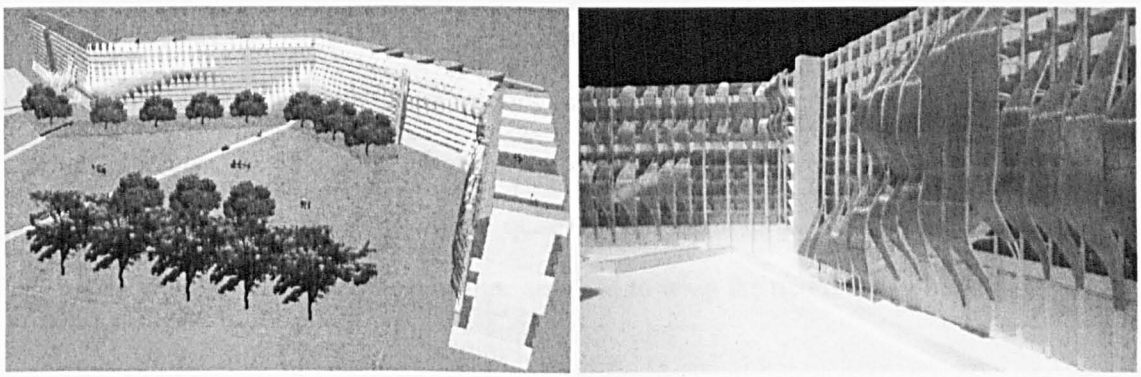
In comparison to the relation between new building and urban context in the two previous cases, there are two further examples which show the transformational effect when topological surface is used as a blob-shape covering to refurbish an existing building. In his design proposal for the transformation of the Kleiburg housing block at Bijlmermeer in the Netherlands, which was a competition winner in 2001, Lynn assumes that the employment of topological surface could create an effect of multiplicity to match the complexity of spatial organization of the refurbished building.[98] Though this time Lynn used new terms such as "intricacy" and "variability", the intent of these terms is in reality no more than what he proposed with "smoothness" and "multiplicity", i.e. a smooth relation, both continuous and heterogeneous, in a complex context. As Lynn notes: "This combination of variability and continuity yields a quality I call 'intricacy', meaning that the parts communicate with the whole to achieve a synthesis or holism."[99] In this

[98] Greg Lynn (2003), "Calculated Variations", in Bernard Tschumi and Irene Cheng (Eds.) (2003), *The State of Architecture at the Beginning of the 21st Century*, (New York: The Monacelli Press, Inc.), 72.
[99] Ibid., 72.

instance, what is emphasised is the organisation between the parts of the building.

The existing 500-unit housing block, built in the early 1970s on the outskirts of Amsterdam, is one of 31 similar buildings that constituted one of the largest social housing experiments in Europe, but which now need reinvigoration. The refurbishment project aims to renew the building and drive the renewal of the whole district. The existing residential building will be transferred to a mixed-use complex of housing and small offices etc, containing a mix of tenants. The form of the existing building is a long strip-shape, with multiple storeys in a zigzag plan (Figure 2.6). Units are accessed through open corridors on one side of the building on each floor. Besides the rearrangement of units, the main transformation of Lynn's project focuses on treating the surface of the corridor side. As proposed, units are rearranged into several groups according to different usages, and the access to these different groups are organised through a mixture of new elevators and escalators attached to the corridors. Escalators are hung off the existing concrete structure by a series of over 150 vertical steel "trusses", rising from ground level to the top of the building. These steel trusses are covered with inflected surfaces of semi-transparent stainless steel fabric. The new surface on the corridor side is made up of a series of single fabric panels with gradual inflections. Topological surfaces fold out to wrap round the escalators and then smoothly fold back. The inflection of surfaces thus refers to the spatial structure of the underlying spaces and uses.

Figure 2.6
Transformation of the Kleiburg housing block at Bijlmermeer (project), Netherlands, 2005, by Greg Lynn.



The topological surface of the Kleiburg project acts as a "performance envelope", in the words of Lynn, and creates an effect of animation. It presents not merely a static geometrical volume

but rather a spatiality of movement and organisation. The "force" of this form generation is the requirement for new circulation and occupation of spaces. In this sense, it might be suggested that the animate form of this project is not a production of autonomous form generation but rather a creation in response to usage and social forces. However, the topological surface of the Kleiburg project plays more a role of representation rather than that of a mechanism of spatial practice. Lynn argued this project could create "an intricate form" which "is the best form for social collectivity", and is "directly linked to a new type of social organization as well as to a new image for the building".[100] Unfortunately, while its animate form might show "a new image" it does not necessarily contribute to the formation of that "social collectivity" and "a new type of social organization". The changing of the spatial, and hence social, arrangement is most clearly enabled by the installation of new elevators and escalators, and the redistribution of functions. The gradual inflection of topological surface is used primarily as a representational image; it is difficult to see how it operates as an active instrument of the "intricacy" and "variability" of the transformation.

As a method of refurbishment, the addition of topological surface can achieve the production of animate effects and a smooth integration of various elements. This can be observed in the case of the Maison Folie de Wazemmes at Lille, designed by the Dutch firm NOX as a renewed mix-use building opened in 2004. The idea of the design revolves around the so-called "Blisters" – a term defined by Lars Spuybroek, the founder of NOX, which has a similar meaning to blob – and focuses on the effect of deformation of "conventional volume".[101] The refurbishment has two parts. One is the renovation of an old textile factory into an art-related complex including exhibition spaces, homes for artists-in-residence, clubs, Turkish baths and small restaurants. The other part is based on a concert hall with foyer and sound studios, which is a newly constructed building with a quite conventional form. Wavy metal fabrics, on a supporting structure of curved steel beams, are used to wrap the two existing buildings with the intent of uniting the two groups of buildings.

---

[100] Ibid., 72.
[101] Lars Spuybroek (2004), *NOX: machining architecture*, (London: Thames & Hudson), 11.

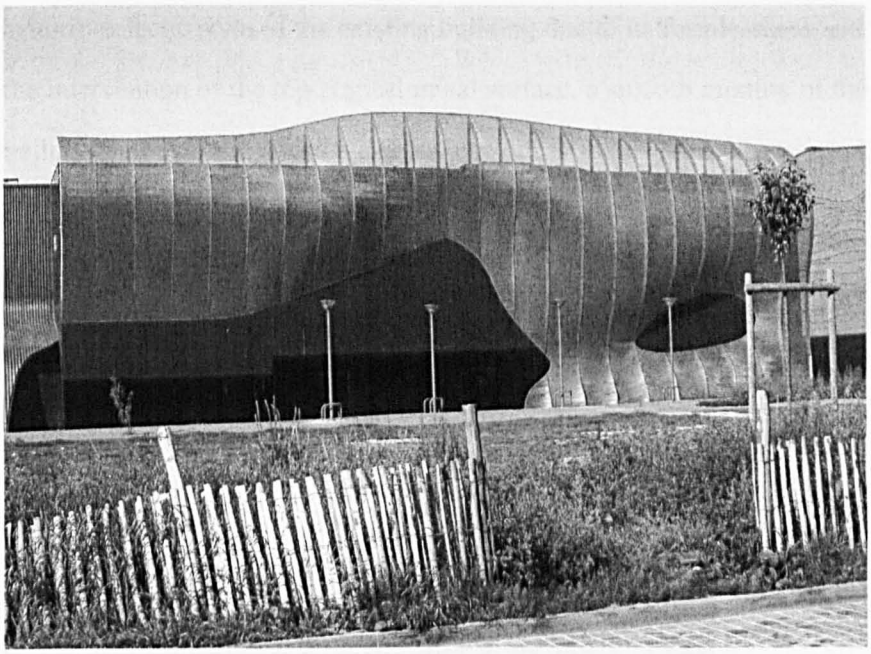


Figure 2.7
Maison Folie de Wazemmes at Lille, France, 2004, by NOX.

With the old textile factory, the waved surface wraps the building from the street façade round to the rear yard (Figure 2.7). The metal fabric is fixed very close to the wall of existing volume; sometimes, it appears to be disappearing into the concrete wall, leaving part of the wall exposed. At the top, the new surface rises far above the existing roof, wrapping a translucent wave-shaped volume. The lightness of this surface-space connects smoothly with the heavy concrete volume below through the continuity and translucency of the topological surface formed by the metal fabrics. The spatial relationship between new surface and existing solid wall is multiple due to the waved inflection of the new surface, which induces not only a morphological fluidity but also a variation in translucency. In this sense, the topological surface evokes a particular spatial tension between the fixed volumes and the animated surface. Meanwhile, its topological inflection and multi-translucency induce an ambiguous boundary between inside and outside spaces.

On the other part, the concert hall, waved metal fabric is only added on the side facing the courtyard (Figure 2.8). It is fixed by a steel structure attached to the existing construction. The distance between the two surfaces is much greater than in other section of the building, because an open, steel-framed staircase is installed between. The new wavy surface covers the external face of the staircase. It does not conflict with, but instead reconciles with the form of the

historic-eclectic style of the existing building due to its formlessness and translucency. Through the intervention of the topological metal surface, a smooth mixture of the old factory, the newly built concert hall and added elements introduces a new public space into Lille.

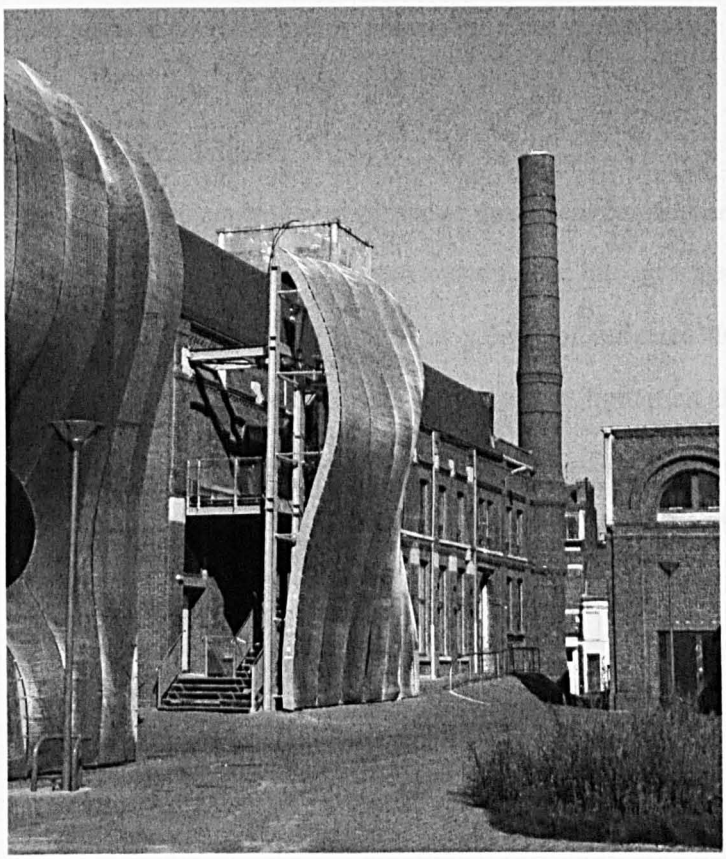


Figure 2.8
Maison Folie de
Wazemmes at Lille,
France, 2004,
by NOX.

Summary

With its topological inflection, the prototype of the 'blob' or 'animate form' can induce a perception of fluidity and animation in comparison with a more regular envelope. With its aspiration to be an active 'body', the blob also differs from the idea of the Modernist 'skin'. The difference between *blob* and *envelope* is most clearly geometric, as one is topological and the other Euclidean. Within a phenomenal space, this geometrical character can be perceived through the spatial experience of body. The difference between *blob* and *skin* is that the former aims to present an active 'body' in response to outside forces, but the latter is likely to show the inner spatial structure of its 'body'. In theory, the ideas of fluidity and animation are more concerned with a correspondence between the form and its environment than the shape itself. For Lynn, blob theory aims to create a relationship of smoothness in a complex context, in

contrast to the paradigms of unity and contradiction. However, as we have seen, the blob-shape form whilst sometimes is effective at a formal level in creating this smooth relationship, does not always create a smooth relation in the social and cultural domains. The effective intervention in the social and cultural context will depend on social and cultural 'forces' also being used as an active factor in the creation of surface-space formation.

2.2.2. Folded Surface

The term *folded surface* here is used to describe a contemporary surface type in which the wall, floor and ceiling or roof are continuously folded into an inflected, smooth and seamless piece of surface-structure. It is not indeed as a kind of inflected decoration appended to the regular structure, but rather an integral surface-space formation that affects the boundary between spaces, especially the inside and outside spaces. If the blob was seen as a performance envelope or animate skin (in comparison to Modernist equivalents), then folded surface defines a contemporary agenda in contrast to the Modernist ideas of *enclosure*, *partition* and *unbroken plane*, because it not only emphasizes the way of enclosing space in a particular manner, but also conceives a specific spatiality in contrast to *flowing space*.

The difference between the spatial effect of folded surface and that of 'flowing space' mainly consists in their different approaches to surface-space formation. Folded surface is formalized through continuous inflections of an integral surface, while 'flowing space' is a consequence of Modernist elementary composition of continuous horizontal planes and fragmental vertical partitions. In the composition of free elements, the perception of flowing space is obtained through the extension and separation of surfaces, together with the movement of observer. At a given moment, the surface-space formation of here and there, or inside and outside, is static and stable. In movement, the spatial experience is a kind of space-time montage composed by continually readjusted and reinstituted moments in which the body is connected to changing perspectives. In contrast, with folded surface, even at a static moment the perceived relation between spaces has a characteristic of flux and uncertainty due to the continuous inflections. If in a flowing space, the ambiguous spatiality has only a two-dimensional orientation (because the movement is usually afforded by a stable, flat, horizontal plane), the ambiguity of folded

surface-space is in three-dimensions, because the inflections between the vertical and horizontal confuse the habitual space of the body, which is vertically oriented.

The significance of folded surface can be identified in terms of form, movement, and inclusion. Each of these three terms will be taken in order.

The form of folded surface

According to Adrian Forty, the term *form* has its roots in the German words 'Gestalt' and 'Form', with *Gestalt* generally referring to "objects as they are perceived by the senses," and *Form* implying "some degree of abstraction from the concrete particular."[102] The notion of *form* is thus not simply about "shape", but rather a matter including meaningful contents. To talk about *form* in architecture, is thus "*merely a device for thought* – it is neither a thing, nor a substance."[103] That said, architectural form is often defined by meaningful ideas, for example, geometry. As Peter Davidson and Donald Bates indicate in their editorial for *Architecture after Geometry*: "For architecture, geometry is measure, eidetic image and ordered system," because "Geometry in the service of architecture as measure and certifiable repetition, is also geometry acting in the *formation* of architecture, providing the eidetic catalogue of architecture's 'proper' form(s)."[104] Through its particular geometry, the folded surface brings an inflected form in contrast to the conventional architectural form of elementary composition. Robin Evans argues that conventionally the "idealities" of geometry "were well adapted to the measuring of things. This was organized into a consistent body of propositions by the Greeks and obtained its classic exposition in Euclid's *Elements*."[105] This "consistent body" is challenged by the topology of folded surface because its formation – the smooth inflection of wall, floor and ceiling or roof – induces a perception of the uncertain and unmeasurable in contrast to the regularity of Euclidean geometry. The form of uncertainty defies the "firmness and stability" of conventional

---

[102] Adrian Forty (2000), *Words and Buildings: A Vocabulary of Modern Architecture*, (London: Thames & Hudson ltd), 149.
[103] Ibid., 150.
[104] Peter Davidson and Donald Bates (1997), "Editorial", in *Architecture after Geometry*, *AD*, Vol.67 No.5/6 1997, 7.
[105] Robin Evans (1995), *The projective cast: architecture and its three geometries*, (Cambridge, Mass. and London: The MIT Press), xxxi.

architecture, which Evans argues is established on the paradigm of Euclidean geometry.[106]

The transformation of geometry and form brought about by folded surface offers a chance to rethink the correspondence between surface and space. The embodiment of "enclosure" shifts from its basis in the Semperian wall to a folding surface-space formation. On the one hand, the folded surface thus recalls the role of spatial boundary, for which the notion of spatial formation per se is more essential than its representational qualities. On the other hand, the notion of 'ground work' is transferred from Semper's *mound* and on to the flooring surface, which because it is contiguous with the wall, induces a spatiality of extension and continuity in contrast to one of separation and limitation. The horizontal surfaces become a part of "enclosure". With its essence of extension, and the aspiration for continuity of folding, folded surface never aims to formalize a closed space. The new form of "enclosure" thus relates to not enclosing and separation but rather a tension between enclosing and disclosing, between separation and connection. While it is possible to begin to grasp this effect as a static viewer, the full experience of continuity is only gained as a moving observer.

Folded surface and movement

In the eyes of Brian Massumi, the embodiment of movement is the specific quality of spatial formation in architecture:

To meet painting and photography in representation, architecture would have to become pictorial (suggesting a centrality of decoration). To meet them in cultural coding, it would have to become language-like (suggesting a centrality of message decoding). Although this latter route was widely followed in late twentieth-century architecture, it backgrounds the undeniable role of construction as a spacing (timing, channeling, filtering) of embodied movement. Movement, not message, is the actual content of architecture.[107]

Folded surface brings an opportunity to transfer the interest of surface from visual

---

[106] Ibid., xxvii.

[107] Brian Massumi (2004), "Building Experience: The Architecture of Perception", in Lars Spuybroek (2004), *NOX: machining architecture*, (London: Thames & Hudson), 322.

representation to the accommodation of movement. This is different from Lynn's "ethic of motion" because it refers to a bodily experience of actual movement, as a particular synthesis of vision and action, optic and haptic.

In conventional architecture, there is normally a certain division between vertical and horizontal surfaces. Horizontal surface encourages movement, but vertical surface stops it. Horizontal and vertical surfaces are thus two elements of composition which are connected but obviously easily distinguished from each other. In contrast, the folded surface introduces a situation 'in-between' the horizontal and vertical. This ambiguous situation challenges the habitual behavior and spatiality of body. Using irregular form to challenge conventional spatiality is not an invention of contemporary architecture. For example, the concept of *oblique architecture* was proposed by Claude Parent and Paul Virilio in the 1960s and 1970s. Parent argued that a surface form of "inclined planes" or "the oblique" emphasised the relationship between spatiality, people's "tactility" and activity.[108] In comparison with "oblique architecture", what contemporary folded surface creates is a smooth inflection between horizontal and vertical, and thus a multiplicity of topological formation which is more than just a visual effect of geometry; rather this topological changing of form relates specifically to the spatiality of bodily experience.

Through the study of biological experiments in animal behavior, the architect Lars Spuybroek notes: "There is always a direct relationship between the system of motion and the internal mapping of movements in the body."[109] This suggests that motile behavior is determined by the correspondence between the immediate perception of the physical environment and the body's inherent and habitual perceptional system. Spuybroek argues that the architecture of "the structure of vagueness" – an indeterminate physical environment– could give a more flexible environment for the body to experience, based on the multiplicity of a topologically curved surface, and at the same time, challenging the constant repetition of habitual actions of body which is induced in 'conventional' architecture. For Spuybroek, the openess offered by this

---

[108] Claude Parent (1998), "The Oblique Function Meets Electronic Media", in *Hypersurface Architecture*, *Architectural Design* Vol.68 No.5/6 1998, 75.
[109] Lars Spuybroek (2004), *NOX: machining architecture*, (London: Thames & Hudson), 357.

flexible environment does not aim to produce complete indeterminacy, but rather potential resulting from a tension between "vagueness" and "determination".[110]

According to Merleau-Ponty, the spatiality of the body, as a "body image" or bodily space, is discovered by an awareness of people's position in the physical world. This awareness is due to an inseparable correspondence between one's consciousness and body. It is apprehended in an intelligible, orientated space, and induced by the interrelationship between internal kinaesthetic sensations of the body, the perception of environment, and habitual understanding and behavior. As Merleau-Ponty said:

The relationships between the two spaces would therefore be as follows: as soon as I try to posit bodily space or bring out its meaning I find nothing in it but intelligible space. But at the same time this intelligible space is not extracted from orientated space, it is merely its explicit expression, and, when separated from that root has no meaning whatsoever.[111]

The awareness of spatial orientation gives a condition for the establishment of so-called "figure-background structure", i.e. an understanding of spatial relationship of things and further a relation between the body and its environment. A habitual system of "figure-background" allows and at the same time is confirmed by relevant habitual behavior and movement of body.

In his 1999 paper, *Strange Horizon*, Brian Massumi suggested a Non-Euclidean spatiality of "superfigure" which could be realized by a continual topological transformation, in contrast to a stable figure-background system. Massumi mentioned that the ability to orientate the body relies on a synaesthetic system of two sense systems, which he identifies as "self-referential" and "exo-referential" respectively. The self-referential system is based on "proprioception" which is a "sixth sense" based on specialized sensors in the muscles and joints of body, and according to recent research on spatial orientation, is fundamental to people's spatial experience; in contrast, the exo-referential system is based on perceived distances from the eye, which is used to create

---

[110] Ibid., 357.

[111] M. Merleau-Ponty (1962), trans. by Colin Smith, *Phenomenology of perception*, (London and Henley: Routledge & Kegan Paul Ltd), 102.

the usual 'cognitive maps' through organizing visible forms into a fixed spatial relationship.[112] According to Massumi, this fixed spatial relationship is always "Euclidean" because of its invariability. In comparison with such "Euclidean" space, he argued for a "non-Euclidean" space which could be obtained by changing to the self-referential system of proprioception in a body's movement. This "non-Euclidean" space could be understood as a space-time of "non-Euclidean topology". As Massumi indicates, it is "one that cannot be separated from its duration due to a transitional excess of movement."[113] Thus the "non-Euclidean" space is not an autonomous and atemporal spatial relation of objects but rather a "body image" or the temporal bodily space of experience. As Merleau-Ponty said: "We must therefore avoid saying that our body is *in* space, or *in* time. It *inhabits* space and time."[114] For Massumi, it is only when topological surface does not just give a visual form of uncertainty – as with an exo-referential system – but also as an effective factor intervenes in the movement of body – i.e. affects the self-referential system of proprioception – it is only then that the contribution of design transcends mere topological shape and becomes a topological space, as a kind of spatio-temporal "hyperspace".[115] Folded surface, due to its multiple inflections between vertical and horizontal, has precisely this potential for 'hyperspace.'

Inflection and Inclusion

In *The Fold*, Deleuze notes that *inflection* "is the ideal genetic element of the variable curve or fold", and "is the pure Event of the line or of the point".[116] In mathematics, every point in a curve is uniquely defined by two vectors, a tangential one and a centripetal one. In this context, if a curve is seen as an assemblage of points, it has at the same time a quality of continuality according to its uninterrupted extension but also a kind of intrinsic heterogeneity, i.e. a formation of multiplicity. As Bernard Cache has noticed, "an essential property of variation of curvature is that it constantly sends off new radii toward a variable center," and "vectors of

---

[112] Brian Massumi (1999), "Building, Biograms and The Body Topologic", in *Hypersurface Architecture II*, *Architectural Design* Vol.69 No.9/10 1999, 12-13.
[113] Ibid., 14.
[114] M. Merleau-Ponty (1962), trans. by Colin Smith, *Phenomenology of perception*, (London and Henley: Routledge & Kegan Paul Ltd), 139.
[115] Brian Massumi (1999), "Building, Biograms and The Body Topologic", 16.
[116] Gilles Deleuze (1993), trans. by Tom Conley, *The Fold: Leibniz and the Baroque*, (London and New York: Continuum), 14-15.

concavity thus always move as a cluster or multiplicity."[117] The perception of curvature is equal to the perception of the inflections of these vectors in space-time.

For Deleuze, inflection and fold can be seen as an *event,* not only because of their pure mathematical essence, but also, more importantly, because they could be connected with the subject and "soul" through the concept of *inclusion.* "Inclusion or inherence is *the final cause of the fold,*" Deleuze argues.[118] The transformation from inflection to inclusion begins with a transition from the "physical point" of inflection to the idea of "point of view". The "physical point" of inflection refers to a single point on a curve or inflection. The "point of view" relates to the phenomenal characteristics of this point:

We move from inflection or from variable curvature to vectors of curvature that go in the direction of concavity. Moving from a branching of inflection, we distinguish a point that is no longer what runs along inflection, nor is it the point of inflection itself; it is the one in which the lines perpendicular to tangents meet in a state of variation. It is nor exactly a point but a place, a position, a site, a "linear focus," a line emanating from lines. To the degree it represents variation or inflection, it can be called point of view.[119]

The transition from "physical point" to "point of view" is thus a consequence of perception, in which the subject is included, i.e. an inclusion of space-time and body. In the terms of Deleuze, it is realized through the engagement of the "metaphysical point" of the subject and "soul", which is "what occupies the point of view".[120] As he notes:

When inclusion is accomplished, it is done so continuously, or includes the sense of a finished act that is neither the site, the place, nor the point of view, but what remains in point of view, what occupies point of view, and without which point of view would not be. It is necessarily a soul, a subject.[121]

---

[117] Bernard Cache (1995), trans. by Anne Boyman, *Earth Moves: The Furnishing of Territories*, (Cambridge, Mass.: The MIT Press), 51.
[118] Gilles Deleuze (1993), trans. by Tom Conley, *The Fold: Leibniz and the Baroque*, (London and New York: Continuum), 22.
[119] Ibid., 19.
[120] Ibid., 23.
[121] Ibid., 22.

Inflection is not the invention of contemporary architecture. It was not only common in the Baroque but can also be seen in the architecture of Modernism, where curved surfaces are sometimes used to represent a sense of dynamism or movement. The Einstein tower in Potsdam designed by Mendelsohn, and built in 1919-1921, is one such a case. As Manfredo Tafuri commented:

Though constructed in traditional manner, the Einstein Tower strives to evoke a language adaptable to a form in movement, curling around itself as in the utopian designs of Finsterlin from those same years: the polyphony of life fixed in the dynamic forms.[122]

In these early stages of Modernist architecture, inflection mainly occurs as a curved wall or partition, primarily as a means of visual effect. However, a few design proposals showed the germination of folded surface, for example, "Endless House" series of the Austro-Hungarian architect and designer, Frederick Kiesler. After his first three-dimensional model of the Endless House was shown in the exhibition *The Muralist and the Modern Architect* in 1950, held at the Kootz Gallery of New York, Kiesler developed a series of projects using this motif. These Endless House projects explored the creation of an endless space through the use of fluid, smooth surfaces folding outside-in or inside-out. This early form of folded surface already shows the new potential of this type surface construction and spatial formation. As Andrew Benjamin comments:

In fact, what Kiesler's work, taken into conjunction with his own project descriptions, makes clear is that rearticulating the relationship of the wall and the floor into the continuous surface occurs as the result of an architectural practice necessitating the creation of techniques proper to its potential built realization. The interruption of the relation between wall, corner and floor by the projection of art into a volume, thereby redefining both art's spatiality and the viewing of objects, is an end that is linked to this possibility.[123]

---

[122] Manfredo Tafuri and Francesco Dal Co (1976), trans. by Robert Erich Wolf, *Modern Architecture Vol.1*, (London: Faber and Faber Limited), 143.

[123] Andrew Benjamin (2004), "Notes on the Surfacing of Walls: NOX, Kiesler, Semper", in Lars Spuybroek (2004), *NOX: machining architecture*, (London: Thames & Hudson), 348.

Figure 2.9
Educatorium in University of Utrecht, Netherlands, 1993-97, by OMA.

Unlike a purely visual representation, the contemporary folded surface has the potential for the inflection and *event* of bodily space, and further might evoke a tension between *enclosure* and *inclusion*. For folded surface in contemporary architecture, the experience of inflection is not only an inclusion of the Deleuzian "point of view" but also an actual inclusion of the body and movement. The simplest folded surface is formalized in wrapping vertically from floor to wall to ceiling. The Educatorium at the University of Utrecht is one such case, designed by OMA in 1993 and finished in 1997 (Figure 2.9). Located in the centre of the campus, it is a mixed-use building for students and staff, consisting of two conference halls, three large examination rooms and a canteen. Beginning from the entrance hall, a single surface rises to the lobby of first floor by means of a ramp, and continually from there to a narrow foyer of second floor through gentle staircases on two sides of the building, and then smoothly curves up until it becomes the slab of roof. This folded surface is formed by a curved concrete structure. The two sides are closed by transparent glass. In walking up from the entrance to the end of inflected surface, it is not only vision but also the body that is included in, and affected by, this folded surface. The most particular spatiality is realised in the top foyer where the surface is inflected from floor to ceiling (Figure 2.10). On one hand, the continuity of surface gives a cue for continual movement. On the other hand, walking up a curved surface brings an unfamiliar experience. To keep balance carefully and change posture in time, one's bodily space is mainly

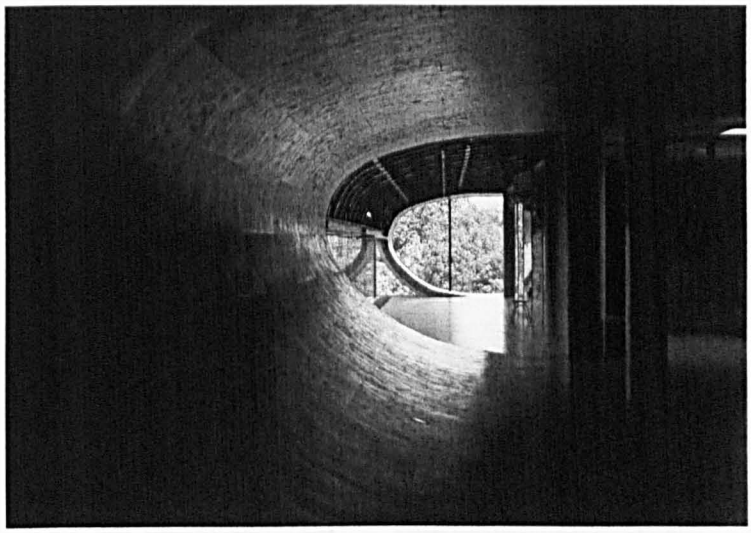


Figure 2.10
Educatorium in
University of Utrecht,
Netherlands, 1993-97,
by OMA.

guided by the temporal, topological relation between body and the inflected surface, corresponding to the self-referential system of proprioception as Massumi referred. In this instance, the folded surface induces an inclusion of movement and an inflection of bodily space. This surface-space formation thus differs from Semperian *enclosure*, which is firstly perceived and confirmed by the eyes.

Figure 2.11
Azadi Cineplex at Tehran (project), Iran, 1996,
by FOA.

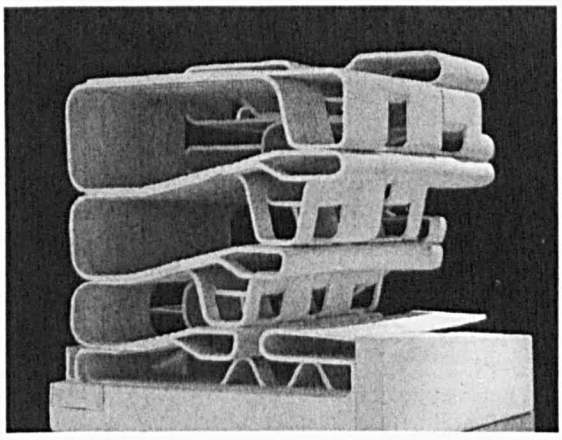
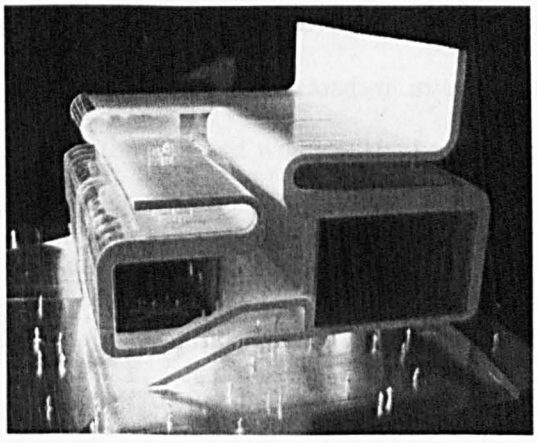


Figure 2.12
BBC Music Centre at London (project), UK,
2003, by FOA.



Some other design proposals explore more complex systems of folded surface; for example, the design project for the Azadi Cineplex at Tehran proposed by Foreign Office Architects (FOA) in 1996 (Figure 2.11), and their later project for the BBC Music Centre in London (Figure 2.12), winner of an international competition in 2003. The periphery of the folded surface in these

designs is generally shown on the side of building as a kind of section-elevation. The multiple folds which are revealed visually on the exterior in turn become the basis for a complex spatiality on the interior, where overlapping of visual fields and bodily experience within the building induces a complex and inclusive spatiality.

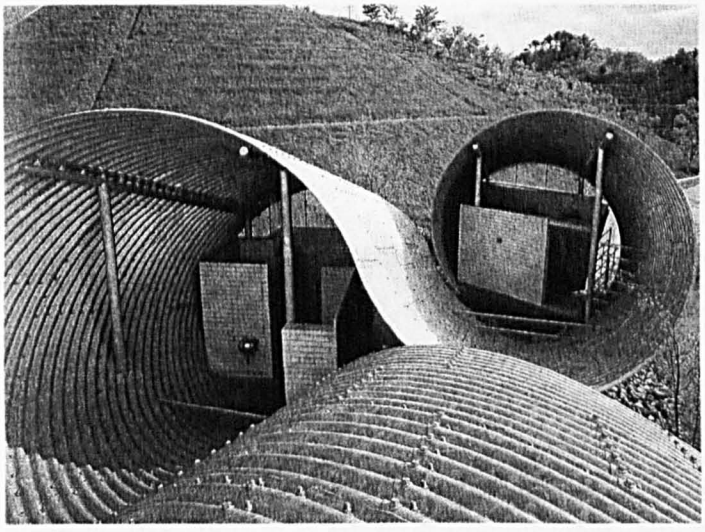


Figure 2.13
Public lavatory at Hyogo, Japan, 1998, by Shuhei Endo.

Inclusion of hyperspace

A still more complex form of folded surface is demonstrated in a very modest building, a public lavatory in Hyogo, Japan, designed by Shuhei Endo and built in 1998 (Figure 2.13). This was achieved by forming the folds in all three directions, not just up and over, but also from side-to-side in a three-dimensional morphology. This toilet facility is located in a small mountain park. It consists of a janitor's room and toilets for men and women. The building is mainly formed out of an uninterrupted folded surface of corrugated, 3.2 mm thick steel sheet, which is supported by a light-steel structure; it also employs brick walls and glass walls to enclose private spaces.[124] To allow visitors access from different directions, the design aims to create a tension between openness and closure through a flexible spatial arrangement. "Apparently a simple assemblage of parts, it is described as 'Halftecture', since it is characterized simultaneously by the open and the close", argues the architect Shuhei Endo, "openness is provided by the possibility of passage in three directions, with no clearly defined

[124] Hiroyuki Suzuki (ed.) (2002), *Shuhei Endo: paramodern architecture*, (Milan: Electa Architecture), 56.

entrance."[125] The flexibility of access is not directly given by the inflections of surface, but by this openness, with the multiple possibilities for movement induced by the folded surface. The paths do not follow the folding path of surface; rather, they are cross over each other in a complex mixture. As a consequence, this toilet facility induces two kinds of space-time. One is a space-time of bodily movement; the other is a space-time of visual perception. Each has its own spatial orientation and dimension, but they are interconnected to form a smooth mix. In addition, there is also tension in the relation between inside and outside spaces. In this sense, this building creates also a simple model of hyperspace, as defined by Massumi.

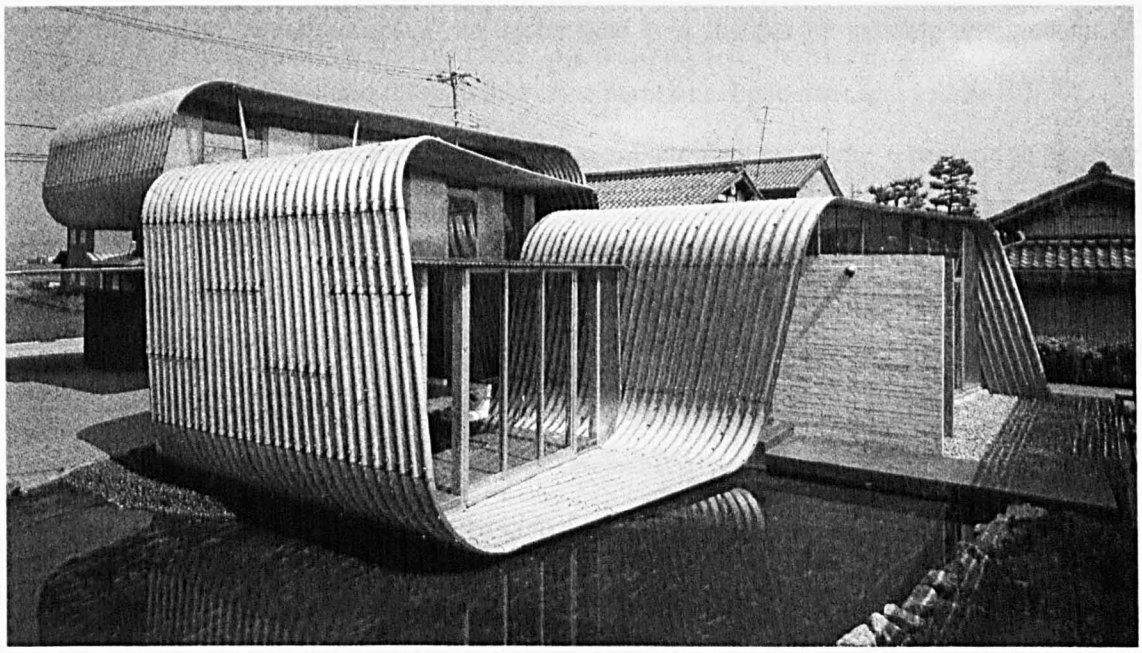


Figure 2.14
Atelier and House building at Biwa-cho, Japan, 2002, by Shuhei Endo.

Another example of Shuhei Endo's folded surface, again using thin steel sheet, is an atelier and house building in Biwa-cho in the Shiga Prefecture of Japan, completed in 2002 (Figure 2.14). This building is located in a suburb, surrounded by other houses, and separated from countryside by a road. It has a multi-folded surface, folding up from covering the garage and entrance, to create the floor of a semi-open terrace, and then smoothly turning up and down to form bedrooms, kitchen, dinner and living room, and shared spaces between them. Transparent glass panels are used to enclose interior spaces but leave the folding form visible. The steel

[125] Shuhei Endo (1999), "Public Lavatories", in *SCI-FI Architecture*, *Architectural Design* Vol. 69 No 3/4 1999, 83.

sheet rises up between the interior and surrounding houses to maintain privacy, but leaves a spatial tension between openness and closeness.[126] As commented by Hiroyuki Suzuki, "Spaces are cut out inside these membranes; their arrangement is free from the constraints entailed by the traditional structure of horizontals and verticals."[127]

For Endo, the spatial tension between openness and closeness presents the idea of "sharing", as a mode of spatial configuration and architecture. In his paper *Paramodern Architecture*, he argued that in traditional Japanese architecture there was a particular kind of spatiality of "sharing by parts" or "partial sharing", according to what he terms a "weak construct" of spatial arrangement. The "weak construct" of space here is a flexible or variable arrangement of continuity and division realised through moveable partitions. Endo noticed:

Traditional Japanese architecture is based on a standardization of the features and parts of each room. Spaces separated by sliding doors can merge to form a continuous space when the doors are removed. The spaces are intrinsically "weak." An arrangement of this kind lends itself to continual manipulation, which can alter the structure of the complex and modify its spatial continuity. .....Another way of defining a spatial hierarchy is to transform spaces by using folding screens or other equally "weak" elements of separation. Moving a folding screen changes the significance and the hierarchical layout of a space, but its value – a flexible continuity – remains unchanged. This idea of a variable continuum is a "weak construct."[128]

According to this idea, Endo argued that the spatiality of such a "weak construct" could express the essential meaning of "symbiosis," as the embodiment of "sharing" in the natural world. Further, he argued the idea of "sharing" or "symbiosis" not only belonged to traditional Japanese cultural heritage, but is also appropriate for the contemporary social configuration. In this context, the idea of spatial "sharing", as given by a folded surface, has been adopted by Endo in his quest for a continuous but heterogeneous set of spatial relationships which can provide a "flexibility of indetermination":

---

[126] Veronica Pease (2004), "Curvaceous corrugated", *Architectural Review*, August 2004, 77-78.
[127] Hiroyuki Suzuki (2002), "The Architecture of Shuhei Endo and the Essence of Japan", in Hiroyuki Suzuki (ed.) (2002), *Shuhei Endo: paramodern architecture*, (Milan: Electa Architecture), 11.
[128] Shuhei Endo (2002), "Paramodern Architecture", in Hiroyuki Suzuki (ed.) (2002), *Shuhei Endo: paramodern architecture*, (Milan: Electa Architecture), 16.

...continuous surfaces or strips that form the outer shell, floors and roofing, in their continuity partly sharing (and shaping) the complete building they define. These strips shape weak "constructs" or "artifacts," and within the spaces they define they do not generate differences because no single element dominates the others. Partial sharing means there are no boundaries between the parts, nor symmetries of point and line, since a continuously generative form never achieves a settled configuration. Symmetry expresses a priori approach, a simulation produced by viewing the object from the outside. But the architecture of continuous forms, Renmentai, rejects the authority of a prior form and seeks the endlessly mutable and the indeterminate.[129]

Endo's notion of "sharing" is quite similar to Lynn's "smoothness". Endo intends to create a form of smooth organization through the use of folded surface; this is not merely representational of smoothness, but is clearly spatial. What is "shared" by these spaces is not only the inflected steel sheet, but more significantly the inclusion of the body and space-time. The "sharing" of domestic spaces within folded surface differs from Semperian *enclosure*. In contrast to the concentration of separation and protection of enclosure, folded surface evokes a tension between separation and connection, protection and communication, and between the inside and the outside.

Mobius strip

The ability of folded surface to create a spatiality of "hyperspace" might be most clearly found in the surface-space formation of the Mobius strip. The Mobius strip is a particular topological form based on self-reversal. When it is used as a model for a folded surface, the Mobius strip blurs the conventional division between inside and outside. In the view of Bernard Cache, this spatial effect is the most significant character of the Mobius strip. As he said:

The interest of this sort of figure lies rather in the fact that it offers us a set of images in which inside and outside are notions devoid of meaning. Perhaps it is the virtue of such paradoxes, whether spatial or logical, to allow us to see, if only for an instant, a universe with no top and bottom, right and left, inside or outside.....This paradoxical sign would then give us a pure

---

[129] Ibid., 19.

temporality: a form that would be prior to any interiority or exteriority.[130]

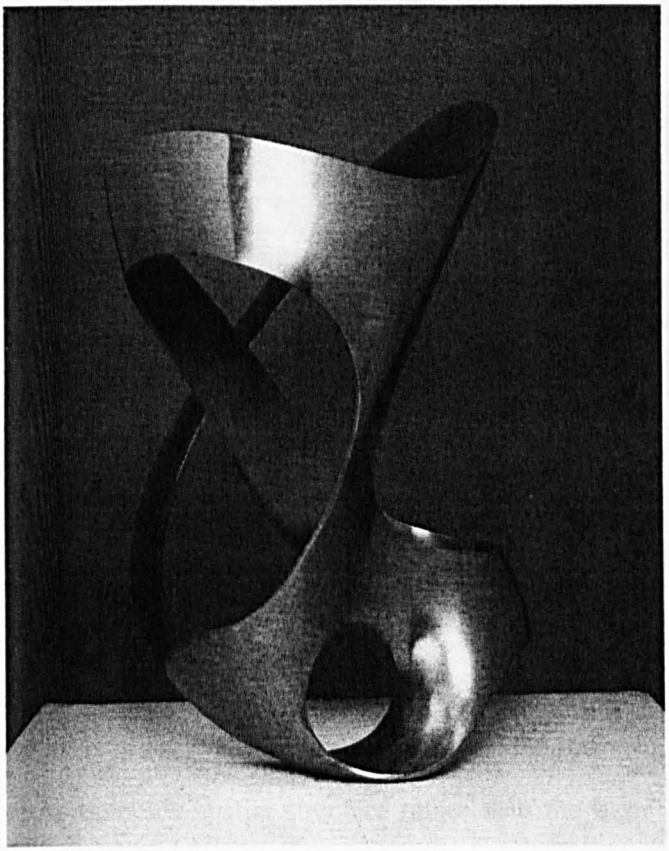


Figure 2.15
Tripartite Unity, 1948-49, by Max Bill.

The specificity of the surface-space formation of the Mobius strip was noticed long prior to its contemporary usage. For example, it can be seen in the sculptures made by the Swiss architect, artist and scholar Max Bill in the 1950s. Bill was the founder of the 'Concrete Art' movement in the 1930s-60s, which focussed on the expression of materials and the effects of space and movement on form. The surface form of "a-geometric, 'amorphous' elements" was an interest of Bill.[131] Due to the specific spatiality of the Mobius strip, it was used as a model by Bill in sculptures such as the steel *Tripartite Unity* of 1948-49 (Figure 2.15), and the later *Endless Ribbon*, made out of granite in 1953.

---

[130] Bernard Cache (1995), trans. by Anne Boyman, *Earth Moves: The Furnishing of Territories*, (Cambridge, Mass.: The MIT Press), 37.
[131] Valerie L. Hillings (2004), "Concrete territory: Geometric Art, Group Formation, and Self-Definition", in Lynn Aelevansky (2004), *Beyond Geometry: Experiments in Form, 1940s-70s*, (Cambridge, Mass. and London: The MIT Press), 50-56.

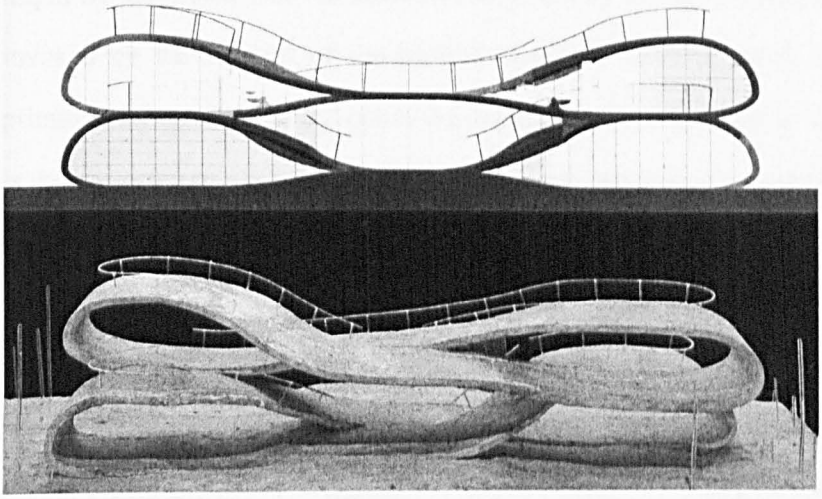


Figure 2.16
Virtual House (project),
1997,
by FOA.

In contemporary architecture, maybe because of the difficulty of actually transferring the principles to a spatial, and useable, environment, the Mobius strip form can only be found in a few built examples, but it occurs more frequently in theoretical discussion and conceptual design proposals. UN Studio's Mobius House in Het-Gooi in the Netherlands, completed in 1998, is probably the clearest example of the idea of a Mobius strip, even if its final form is a more complex spatial structure rather than the basic Mobius strip form. In comparison, the conceptual design for a "Virtual House" proposed by FOA in 1997 is a more direct example of the use of a Mobius strip to form a folded surface (Figure 2.16). FOA argued that the blurring relations of inside/outside, front/back, up/down of a Mobius strip, in contrast to a normal enveloping surface, could be seen as a challenge to the conventional arrangement of domestic space and also the cultural meaning of its inhabitation.[132]

In order to explore the gradients of different conditions occurring on the folded surface, preceding the coding of inhabitation, the different areas were classified into three possible qualities of surface: wrapping/lining, inside/outside, and gravity in/gravity out. .....The Virtual House is not an organic, finished body, but a proliferating structure where the rooms are not functionally determined, and yet are specific.[133]

FOA did not explain exactly why and how the Mobius form brought about this challenge. It

[132] Foreign Office Architects (1999), "Virtual House: Potential beyond the Future", in *SCI-FI Architecture*, *AD* Vol. 69 No 3/4 1999, 79.
[133] Ibid., 79.

might be suggested that the challenge is precisely due to the spatiality of hyperspace that is invoked by the concept of the Mobius strip. As we have seen, for Semper there are two primitive forms of dwelling: one is the enclosure of an open space, of which the essential motif is the enclosing of wall; the other is a hut defined by the basic form of the roof.[134] Both of them have a common character: they create or depend on a particular definition of a divided space or place. This definition brings a certain separation between the inside and outside, and with it relevant cultural meanings, such as the difference between private and public. In addition, the idea of the *hearth* at the centre of dwelling and domestic life implies a primitive centrality to the spatial organization. As Wolfgang Herrmann argues, according to Semper the form of dwelling implies a specific primitive symbolic-functional meaning for human beings.[135] In contrast, the Mobius House breaks such a paradigm, breaking the conventional stability of the correspondence between order and form. On one hand, due to the self-reversal of its folded surface, the definition of inside/outside is blurred. On the other hand, the topological relation of its spaces denies the condition of centrality. What the Mobius House brings is an interactive and indeterminate formation of surface-space. The spatial relation is not one of division, but rather forms a tension between connection and separation, not just at the level of the relation between 'rooms', but also in the relation between the 'units.'

Summary

The significance of contemporary folded surface can be summarized in three points. Firstly, it produces a deformation and reconfiguration of architectural form through topological inflections between wall, floor and ceiling or roof, in comparison with the paradigms of elementary composition. With a challenge to the conventional duality of vertical and horizontal, folded surface might initiate a rethinking of the conventional division in architecture between plan, elevation and section. Secondly, in addition to its visual representation, the inflection between vertical and horizontal allows the folded surface to intervene in movement and bodily space. It is with a particular view to the body and space-time, that a complex folded surface might be

---

[134] Wolfgang Herrmann (1984), *Gottfried Semper: In Search of Architecture*, (Cambridge Mss. & London: The MIT Press), 168.
[135] Ibid., 168-171.

read as a topological "hyperspace". Thirdly, it often induces a tension between openness and closeness, between inside and outside, thus differentiating itself from the Semperian notion of *enclosure* and from the *flowing space* of modern architecture.

2.2.3. Topographical Surface

The term *topographical surface* is here used to describe a specific architectural type of folding surface. It is topographical because the form of the surface has a very particular character of horizontal extension, giving it on strong relationship with the ground on one hand, and with this smooth and multiple connections between inside and outside spaces. Its definition is based on two references: Bernard Cache's idea of "topographical or architectural image" and David Leatherbarrow's notion of the "topographical arts".

Topographical frame, interval and inflection

According to Bernard Cache, topography shows a kind of 'framed' image of the formation of territory, and thus presents a "frame" of people's life and society. For Cache, architecture is an instrument to produce such a topographical "frame". Architecture can thus be understood as the formation of "frames", generally as a form of "interlocking of frames", and so clearly has the potential to affect people's activity. As Cache argues: "architecture would be the art of introducing intervals in a territory in order to construct frames of probability."[136] The term "interval" here denotes the accommodation of the "space-time of event." For Cache, there are basically three functions of the architectural frame, namely separation, selection and arrangement. Separation is the first step in the formation of architectural space, with the wall as the basic form of separation. Selection is used to rebuild the connection between separated conditions, in the way that a window connects inside and outside. As Cache argues, "the first function of the frame removed us from the territory; the second function reestablishes connections, selectively."[137] After separation and selection, comes the "arrangement" of events. Conventionally, the floor is the grounding element for such functions. However, besides the

---

[136] Bernard Cache (1995), trans. by Anne Boyman, *Earth moves: the furnishing of territories*, (Mass. Cambridge and London: The MIT Press), 22-23.
[137] Ibid., 24.

conventional architectural elements of floor, wall, and window, Cache argued that the roof also became an element for separation and selection in the 'box' architecture of Modernism, because it had been reduced to a homogeneous form treated as a flat surface in the same way as the wall. In this context, Cache criticized the box architecture of Modernism as offering only very limited and fixed "intervals" due to its regular and reductive setting of separation, selection and arrangement. He argued the "interval" is at its core "a factor of absolute uncertainty", and architecture should create "smooth intervals that increase the probability of emergence of new forms of life."[138] For Cache, the treatment of the roof might provide one such opportunity to induce "smooth intervals". In comparison with the Modernist roof, which is reduced to a flat slab over the walls, Cache argued that forms such as the traditional sloping roof could play a role in the arrangement of different events, as it not only covers interior space but can also define semi-open living space in which the roof extends beyond the boundary of walls.

According to Cache, there is the potential for an alternative architectural frame in contrast to the normative composition of separation, selection and arrangement. He argues that architectural form could be used to induce a kind of topographical image whose primary formal characteristic is that of inflection. This idea is explained by Cache again through the example of the traditional sloping roof. He notes that people sometimes construct a building on a hilltop which has the representation of "eminence", evoked through the "gesture of rising." The inflection of the natural topography – the hill – is intensified by the inflection of architectural form – the rise formed by sloping roof. Such a topographical image reinforces the identity of a place. For Cache, the creation of identity is motivated by the quest for a kind of "singularity", i.e. the particularity or specificity of a place or space.[139] In the case of the topographical image, it is created out of the particular topographical character which is intensified and visualized by the transaction of architecture. For Cache, topographical image thus differs from Modernist approach, which is created on the ground but as an autonomous icon.

In Cache's theory, the topographical image is built on three factors: namely inflection, vector

[138] Ibid., 25.
[139] Ibid., 15-16.

and the geometrical figure of identity.[140] First, the particularity or "singularity" of topography and territory is formalised and presented by means of inflection. The ground is seen as a continual surface, which is then treated through various inflections, such as rise or fall, flat or corrugated, and so on. This inflection has qualities of both continuity but also singularity, or in other words, heterogeneity. This approach to topography is dynamic and temporal. As Anne Boyman comments:

In the unstable dynamic world in which they figure, images are therefore no longer defined by fixed divisions between inside and outside. Rather this division itself comes to shift or move as outside forces cause internal variations or as internal variations create new connections with the outside. In this way we see the images belong to a dynamic rather a static geography.[141]

Second, the inflection of topography shows a spatiality of vectors which is "a conjunction between two sorts of images: concrete gravitational vectors and abstract vectorial space."[142] The former refers to the geometrical character of the form; the latter to the spatial formation given or represented by the form. These vectors imply the influences of forces which intervene in the process of inflection, as either natural forces or social forces of urban development. In this context, the inflections of topography relate not just to a geometrical character of multiplicity, but also to a surface-space formation full of cultural and social potential. Lastly, the form of inflections and vectors might be inspired and intensified by the "geometrical figure of identity", for example the form of a sloping roof, and then transformed to a specific topographical image. Through these three steps, Cache propose an alternative approach to the creation of a topographical "frame" which is based on inflections and has the potential of spatial multiplicity, in comparison with the paradigm, and associated reductive effect, of the 'elementary composition' of separation, selection and arrangement.

Because of its continuity and heterogeneity, the topographical form of inflections also has the potential to accommodate what Cache terms "smooth intervals" for multiple events. This means

---

[140] Ibid., 17-18.
[141] Anne Boyman (1995), "Translator's Preface", in Bernard Cache (1995), trans. by Anne Boyman, *Earth moves: the furnishing of territories*, (Mass. Cambridge and London: The MIT Press), ix.
[142] Bernard Cache (1995), trans. by Anne Boyman, *Earth moves: the furnishing of territories*, (Mass. Cambridge and London: The MIT Press), 12.

that inflected form can create a flexible "frame" for indeterminate action. Such topographical surface could bring the effects of separation, selection and arrangement together. In contrast to separation, it might induce a smooth relationship between inside and outside spaces. As Paul A. Harris comments, it aims to "to transform the rigid function of the frame as a 'separation' from the outside into a permeable membrane where inside and outside become sides of a surface."[143] In addition, topographical surface does not produce fixed selection and arrangement; rather, it introduces multiple "vectors" to match various spatial and social relations.

Topographical arts

In a critique of the dominance of pictorial representation in post-modern architecture, David Leatherbarrow, in his book *Topographical Stories,* used the notion of topography to emphasize the significance of the interaction between construction and site, i.e. specific terrain and landscape. In contrast to pictorial representation, Leatherbarrow relates topography to three key aspects: materiality, spatiality and temporality. For him, it is the "transaction of terrain", on which "practical affairs leave their traces", that elevates topography beyond primitive concepts of land. In this context, landscape and architecture are regarded together as "topographical arts". Leatherbarrow summarises six characteristics of topography:

(1) its extensity or horizontal character; (2) its mosaic heterogeneity, that movement within it continually confronts contrary conditions; (3) that it cannot be equated with land or materials as physical substances; (4) that it is not form either, when that is taken to be immaterial volume or profile; (5) that its manner of presenting itself is paradoxical: manifestly latent, or given not shown; and (6) that its temporality allows it to serve as both record of and invitation to human praxis, a chronicle and condition of human freedom.[144]

According to Leatherbarrow, topography not only gives a material and visual context for architecture, but also has specific cultural resonances. With its precise materiality, spatiality and temporality, "topography is not only expressive or indicative but also relational, a mosaic

[143] Paul A. Harris (2005), "To See with the Mind and Think through the Eye: Deleuze, Folding Architecture, and Simon Rodia's Watts Towers", in Ian Buchanan and Gregg Lambert (eds.) (2005), *Deleuze and Space*, (Edinburgh: Edinburgh University Press), 43.

[144] David Leatherbarrow (2004), *Topographical stories: studies in landscape and architecture*, (Philadelphia: University of Pennsylvania Press), 248.

integration of the contrasting settings that give life its texture, richness, and spontaneity."[145] His notion of "topographical arts" aims to find the interconnection between architecture and topography and thus rethink the relationship between construction, site and people. The horizontal character of topography means that topographical arts cannot be separated from matters of living and activities on the ground. As Leatherbarrow notes, the word *terrain* is synonymous with 'terrace', both deriving from the Latin *terra* which is related to *tersa*, meaning 'dry ground' in Latin, and also to the Greek word *tersesthai*, meaning 'dried', or 'to dry up'.[146] Originally the notion of 'dry' is related to bounded shape or form, in comparison with 'wet' ground which is edgeless, formless and dynamic. In this context, the description of terrain shows a "desire for form, a desire consummated in the marriage between substance and shape", because "when the stuff of the world was without shape, matter was not only undefined and amorphous, but *unknowable*, for it was only through edges that all things were defined."[147] For Leatherbarrow, in contrast to the symbolic meaning of geometry and 'form', the primitive topographical arts – for example, ancient patterned textiles – show a desire for a 'form' (i.e. formation) of unity between shape and living, 'dry' and 'wet', and thus indicate a kind of primitive "constructive thing."[148] The symbolic use of geometry is regarded by Leatherbarrow as the origin of the paradigm of pictorial representation of architecture, which depends on a 'form' of figure-background. In contrast, a topographical 'form' is superior to the figure, because that 'form' is not only given by living matters and natural forces, but also relate to "the unity of all forms", because "All things in nature are interconnected."[149] As a living matter and a record of natural forces, as well as of artificial and social practice, topographical arts thus differ from pictorial representation. Topography thus refers to constructions "which include not only landscapes and buildings, but the situations they accommodate and represent."[150]

Leatherbarrow does not actually give a clear direction as how to design topographical arts. However, clues can be found in his arguments. For example, he proposes a kind of *free surface*

---

[145] Ibid., 13.
[146] Ibid., 115.
[147] Ibid., 116.
[148] Ibid., 119-120.
[149] Ibid., 165.
[150] Ibid., 255.

in comparison with the Corbusian 'free façade'. Such a "free surface" has three primary characteristics:

(1) explicit iconography is rejected, (2) the spatial depth to which the surface "refer" is not only behind but in front or ahead of it, and (3) the finishing of materials sacrifice the demonstration of weight for the disclosure of unforeseen aspect of their "nature." Such a surface is less a tableau, in the traditional sense of a façade, than another modulation of the terrain, this time in its material makeup.[151]

Leatherbarrow then offers further suggestions about the formation of "free surface": firstly, to let the materials and surfaces of inside and outside have a relation of both continuity and variation; to blur the spatial division between front/back, inside/outside and thus abolish the representation of frontality; to create a connection with local material and landscape; or in sum, to create "another kind of harmony, not through repetition or sameness but variation and difference, not concordance but discordance – or better, concordant discordance."[152]

The concept of "topographical arts" is not applied to the architecture of contemporary topographical surface by Leatherbarrow; indeed his phenomenologically and hermeneutic approach may be seen at odds with some of the more formalist and 'avant-garde' concerns of the majority of architects who are preoccupied with contemporary surface. However, the architecture of contemporary surface, in terms of its 'form', usefully be informed by the qualities that Leathebarrow discusses, in particular the specific relationship to place and landscape, and the development of form in relation to the conditions of living. The effect of contemporary topographical surface comes from the inflections of surface-space formation and the creation of "smooth intervals" in the terms of Cache. It induces a specific connection between landscape and architecture, owns a form in response to living forces and activities, brings a tension between inside and outside, and thus corresponds to the spatiality of smoothness and multiplicity.

---

[151] Ibid., 41.
[152] Ibid., 44-48.

Based on Cache and Leatherbarrow's readings, contemporary topographical surface might be summarised in three ways. Firstly, it transfers the figure-ground relationship between the building and its site or ground into a smooth mixture of interconnection. As a consequence, it brings with it the opportunity to rethink the relation between form, gravity and volume. Secondly, architecture gains a new relationship with landscape through the exchange between building and topography. Lastly, the tension between enclosure and disclosure, openness and closeness, is related back to the site through the inflection of topographical surface and the accommodation of various bodily activities, evoking a smooth relation between architecture and context. Some recent buildings can be said to show some of these qualities, even if their background motivations may be very different from Cache and Leatherbarrow. An early example is Zaha Hadid's LFone building at Weil am Rhein, completed in 1999; here, the roof is composed of several sections of sloping surface which extend down to, and arise out of, the ground (Figure 2.17).

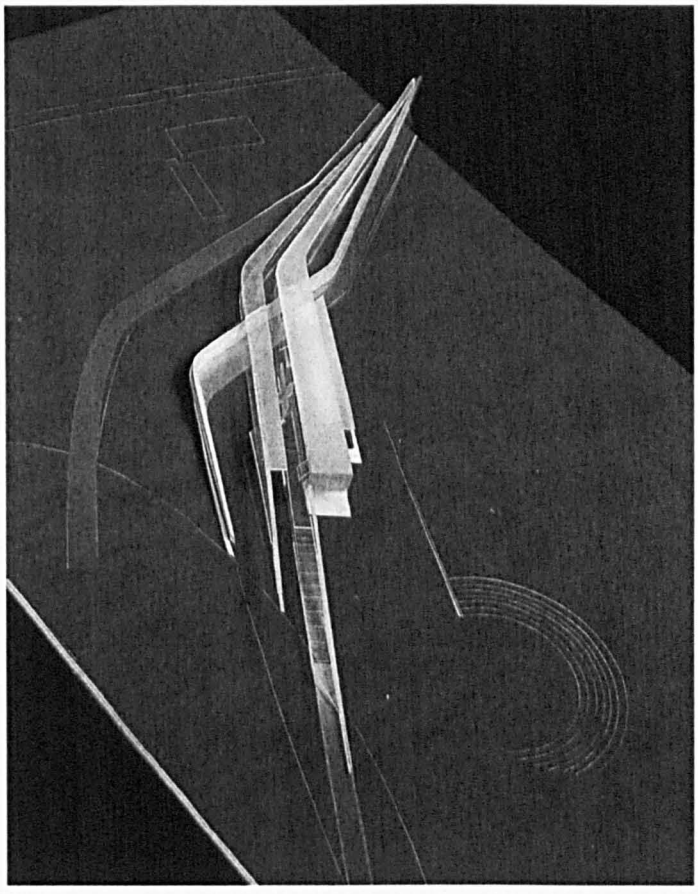


Figure 2.17
LFone building at Weil am Rhein, Germany, 1999, by Zaha Hadid.

The walkable roof surface creates a new relation between building, movement, site and surrounding landscape. However, though it shows some of the quality of topographical surface, the design of this building is more based on elementary composition rather than the smooth inflection of surfaces, and thus it might be seen to miss out on a developed sense of smoothness. Discussed below are two cases that present a more precise quality of topographical surface: the International Port Terminal in Yokohama, designed by FOA and opened in 2002, and the Maritime Youth House, Copenhagen, designed by the Danish firm PLOT and completed in 2004.

Inflection and ground

For the term *ground*, John Rajchman goes back to Heinrich Wölfflin's idea of "formlessness", arguing that it is the task of architecture to use its formation to overcome such formlessness. As Rajchman notes in his book *Constructions*:

Wölfflin combines Kant's idea of the schematism and of the architectonic whole with Schopenhauer's notion that architecture is the art of overcoming heaviness or gravity and the resistance of matter. Thus for Wölfflin, the ground has to do with a basic Formlosigkeit (formlessness) that the will, as a vital force immanent in things, must overcome; the Formkraft (force of form) is to pull us up from this formless state, against which all of life struggles. The principles of regularity, symmetry, proportion, and harmony all derive from this idea. Heaviness or gravity is thus a vital matter.[153]

In this context, architecture fights with the ground in two ways: firstly, architecture creates a form which is divided from the formlessness of the ground through elementary composition; and secondly, it is a representation against heaviness or gravity.

In Modernism, the instrument for fighting against the ground shifts from classical aesthetics and the representation of 'form' to the concept of 'space', or in other words, the desire to oppose the formlessness and heaviness is manifested by architects with the geometrical 'form' of space. For

---

[153] John Rajchman (1997), *Constructions*, (Mass. Cambridge and London: The MIT Press), 78.

example, in *A Manifesto* of 1912, Rudolf Schindler announced that the primitive desire to defeat gravity and cohesion through the use of proportion should be displaced in modern architecture by seeking for "the new monumentality of space".[154] In correspondence with this proposition, surface had been identified as a spatial transaction in terms of enclosure and envelope which created the geometrical 'form' of volume.

The idea of topography brings an opportunity for contemporary architecture to reconstitute the relationship between built form and the ground. If architecture is considered as Leatherbarrow's topographical arts or Cache's topographical frame, it is no longer necessary for the task of architecture to create a form separate from formless ground, but rather to transform ground from its formlessness to a precise formalisation. At the same time, gravity can be challenged not through the establishment of verticality, but rather through the use of the inflection of topographical surface in order to present multiple vectors and forces. Correspondingly, topographical surface does not aim to create a 'form' of divided space, but rather a smoothness between inside and outside. As Leatherbarrow notes: "how settings that are distant and distinct from one another can also be interconnected, how they can remain apart and be joined."[155]

As a condition that acts against heaviness and gravity, topographical surface works through the inflection of its surface-space formation. According to Cache, this effect refers back to the Baroque, where the experience of weightlessness was primarily an aesthetic matter.[156] As noted by Wölfflin, in the Baroque the aspiration of weightlessness is seen in relation to the liberation of 'mind' and 'body'. An awareness of gravity is often obtained through a sense of mass; in contrast, Wölfflin and others show that a sense of movement also showed the presence of gravity and the weight of body.[157] Because gravity is often seen as an invariable vector, the sense of weightlessness and the 'form' against gravity could then be found in the presentation of different vectors; for example, the vectors shown by the muscular force of the body, or in the

---

[154] R. E. Schindler (1912), "A Manifesto", in Tim and Charlotte Benton (eds.) (1975), *Form and Function*, (London: Crosby Lockwood Staples), 113-114.
[155] David Leatherbarrow (2000), *Uncommon Ground: Architecture, Technology, and Topography*, (Mass. Cambridge and London: The MIT Press), 183.
[156] Bernard Cache (1995), trans. by Anne Boyman, *Earth moves: the furnishing of territories*, (Mass. Cambridge and London: The MIT Press), 44-49.
[157] Ibid., 48.

multiple changes of rhythm in a surface. As Cache comments, Wölfflin's idea of weightlessness is predicated on the forms of various vectors opposed to that of the singular vector of gravity. The search for weightlessness is thus founded in the presentation of formal variations of geometrical vectors, which is achieved by the form of inflection or curvature of Baroque architecture. In comparison with Baroque, contemporary topographical surface does not produce an inflected form separated from the ground as a representation of weightlessness; rather, it tries to create an inflected topography.

The inflection of topographical surface also brings a tension between form and formlessness. According to Rajchman, the form of architecture could be used to show an intent to be "ungrounded", as opposite to the ground. In contrast to the conventional opposition between architecture and ground, it offers an alternative for architecture to "move away from 'proper' visual form, geometric or rectilinear, horizontal and vertical." In this case, being "ungrounded" no longer has to be off the ground, "but rather has to do with a kind of form-giving movement prior to the ground as understood in autonomous up-down structures."[158] In the process of this formalisation, both architecture and ground are topologically transformed. On one hand, to become a variation of the ground, the form of architecture is released from its conventional association with 'form' and is conceived of in terms of topographical 'formlessness'. On the other hand, because of the transfer from the natural ground to an artificial ground, the ground then is removed from its original state of formlessness and involved in the formation of topography. Consequently, both architecture and the ground are seen in a smooth and blurring condition in-between form and formlessness. In this situation, the surface-space formation can have a flexibility to accommodate various events or, in Cache's terms, the "smooth intervals" of space-time.

[158] John Rajchman (1997), *Constructions*, (Mass. Cambridge and London: The MIT Press), 80.

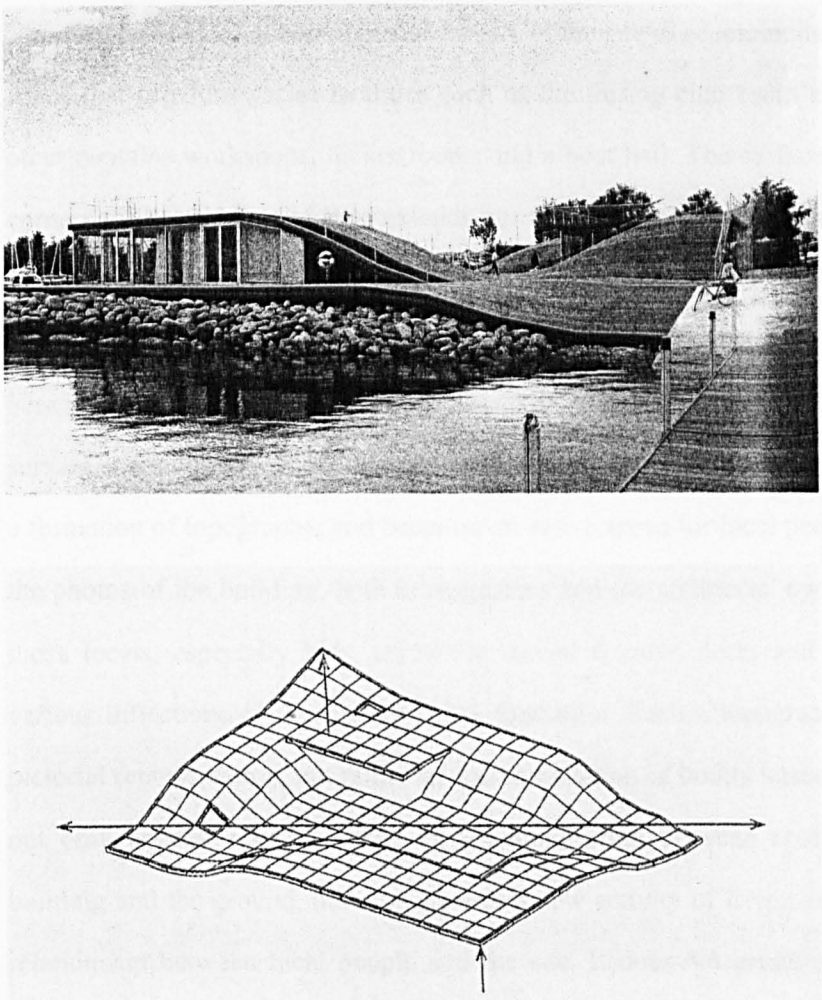


Figure 2.18-19
Maritime Youth House at Amager island of Copenhagen, Denmark, 2004, by PLOT.

An example of this is the Maritime Youth House, Copenhagen, as designed by the Danish firm, PLOT (Figure 2.18). The building is located on the waterfront of Sundby harbour and was completed in 2004 as an urban renewal project for the Danish government. The site is located in an area set between run-down industry and thriving sailing clubs. In comparison to the chaotic context of random sheds and abandoned industrial buildings, the Maritime Youth House is envisaged as a fresh "oasis", a wooden landscape that undulates between harbour and water.[159] It is made up of a topographical surface – here a wooden deck – that covers the site area of about 2000 square metres. The design has an economic rationale because the ground is heavily polluted with heavy metals, but the budget did not run to cleansing the site completely. Instead, an artificial ground is therefore used to cover the toxic ground and provide a better environment.

[159] See the introduction in "PLOT in the landscape", *Architectural Review*, December 2004, 39-40.

The surface rises up at two opposite corners of the site to accommodate two rooms: an L-shaped space that provides social facilities such as the sailing club room and eating place, while the other contains workshops, locker rooms and a boat hall. The surface drops down from the two corners to the middle and then extends out to the other corners, in a continuous sweep motion from the roofing of the internal spaces to the flooring of the exterior deck (Figure 2.19). The rooms have transparent glass walls that infill between the curved surface, forming partitions between interior and exterior spaces, and which therefore display the continuality of surface-space formation. Through the inflections of surface, the whole site has been turned into a formation of topography, and becomes an active space for local people. This can be seen from the photos of the building, both in magazines and the architects' own website[160], showing how those locals, especially kids, enjoy the waved wooden deck, and play games matching the various inflections of the surface-space formation. Such a topographical surface is thus not a pictorial representation, but rather an accommodation of bodily space and events. The inflection not only creates a smooth form of interconnection between roof, wall and floor, between building and the ground, but also inspires a new activity of living and thus evokes an effective relationship between local people and the site. It does not create a new icon for the chaotic context, but rather a renewal of topography, public space and urban landscape.

Another example is the International Port Terminal, Yokohama, designed by FOA and opened in 2002 (Figure 2.20). The long, multi-storey building extends from the coastline out into the sea. What is particularly notable about this building is the form of its topographical surface, which has a steel framework as the main structure and is covered with an inflected wooden deck. The top surface of the building connects with the solid ground along the bank, forming a public open space, and organising the paths and entrances into the interior of the building. The form and spatial arrangement of the Yokohama Terminal are thus mainly established by the formation of this topographical surface. The inflections of surface in this project create two smooth joins: first between the ground and roof; and then between roof and the interior. As the Terminal is a building protruding from the coastline, its roof is conceived literally as an extension of the

[160] See the website http://www.jdsarchitects.com/

ground. Through its connection with the coast, the topographical surface gives a continuity which is not only a visual perception of extended surface, but also a continuity of movement and urban life. At the same time, the inflections of surface bring about varied internal and external spaces, and thus accommodate different events and experience. In this context, it not only presents a smooth form but constructs a spatial and social relationship of smoothness. Moreover, with the transformation between topography and architecture, a tension occurs between ground and 'ungrounded', between form and formlessness (Figure 2.21). Architecture here is not vertically dominated but emerges as a dynamic horizontal extension, in which the formlessness of the ground – its indeterminacy and flexibility – is absorbed into the formation of the topographical surface. In this sense, the resulting "smooth intervals" allow indeterminate and flexible events to occur within the regular usage of the Yokohama Terminal building.

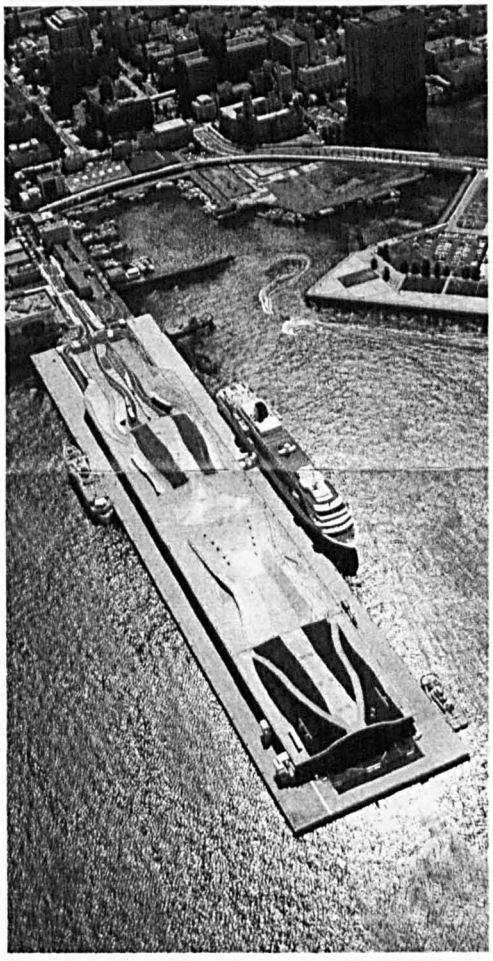
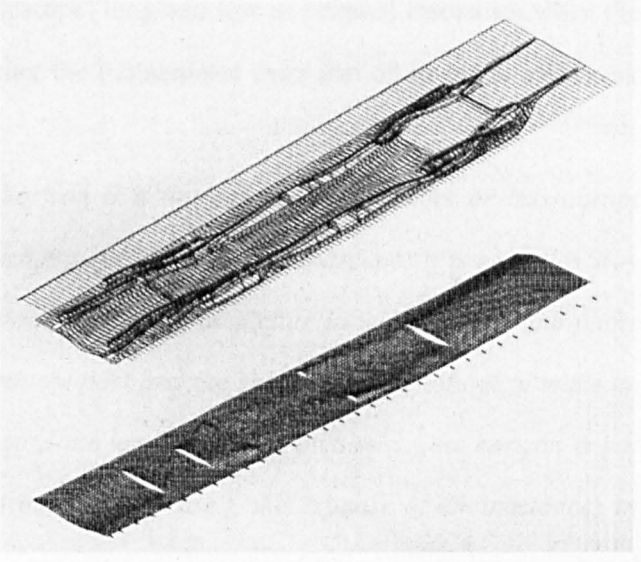


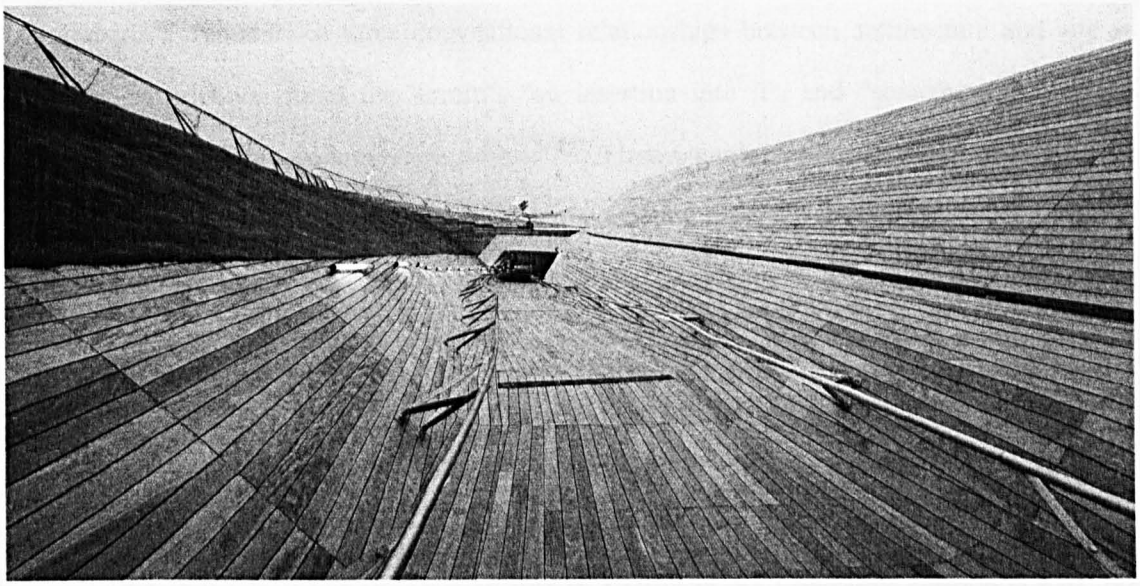
Figure 2.20-21
International Port Terminal of
Yokohama, Japan, 2002, by FOA.



The second join, between the exterior and interior, is inconnected with the first one due to the way that the surface is conceived in a continuous manner, with the ground folding into roof which in turn folds into interior floors and walls (Figure 2.22). The entrances and paths leading

into the interior of the building all follow this set of folds, with the transparent glass doors and partitions intensifying the spatiality of extension. The visitor thus has a continuous spatial experience, guided by the roof, resting on the wooden deck, possibly running over the waving surfaces and then is guided into the interior, in an active topography that connects land to sea.

Figure 2.22
International Port Terminal of Yokohama, Japan, 2002, by FOA.



Topographical surface and Landscape

As Leatherbarrow argues, the idea of 'landscape' long ago lost its original resonance when the meaning of the term was transformed during the Renaissance from that of an actual earthwork to a visual horizon. He said:

In the customary sense of the term, the horizon is a line formed by the more or less abrupt meeting of the sky and the earth, a line exactly eye high on the landscape. It is seen this way because the landscape is normally understood as a scene or picture in which the ground plane has tipped itself up to form the picture's bottom part and the sky flattened itself out to make its top. Yet, when one choose no longer to regard the landscape as a picture……the horizon is not only a line at the edge of the visual field but the field itself, the expanse of circumstances in which I find myself. ……Circumstances ... are not only matters of terrain but also of cultural practice, earthly elements with equipmental and narrative sense.[161]

---

[161] David Leatherbarrow (2000), *Uncommon Ground: Architecture, Technology, and Topography*, (Mass. Cambridge

For Leatherbarrow, 'landscape' is not a pictorial representation of nature but should be understood as a temporal experience of constructed earthworks. In this sense, architecture and landscape are not necessary opposites but might share a common outcome with the transaction of topography.

Using the examples of garden buildings, the terrace house and the 'primitive hut' as his cases, Leatherbarrow summarises three conventional relationships between architecture and site in terms of "an elaboration of the terrain", "an insertion into it", and "something that works (toward social ends) in collaboration with it".[162] Firstly, garden buildings are often treated as extensions, developments, and elaborations of the existing garden terrain, often being placed at the end of a vista; as such, they are often considered by landscape theorists as "ornaments of the land". In contrast, in modern architecture, such buildings are seen as being placed on the land and as such as a removable setting that could be placed anywhere. Secondly, the terrace house as developed in Britain does not, for Leatherbarrow, "elaborate" the ideas of earthwork. By clearing a horizontal surface for the erection of vertical walls, the house is seen as not an "outgrowth" of the land but an insertion into it. Lastly, in the Semperian 'primitive hut', the mound, roof and enclosure whilst being separated from the hearth, are actually conceived out of it. The composition of these four elements suggests a "collaboration" between land, territory and architectural form. All three prototypes show degrees of a relationship between earthwork and framework, landscape and architecture. Leatherbarrow argues that more recently there has been a tendency towards more precise interconnections between building, site and landscape, in which the site could be used to "structure" the whole project of construction:

Under this new dispensation, site – or, more broadly, ambient landscape – is not what surrounds and supplements the building, but what enters into, continues through, emanates from, and enlivens it – rather like fire taking hold of a piece of wood. In other words, landscape, or simply land (environment, climate, region), has reclaimed all that was once taken from it: materials, spatial extent, lighting effects, "atmosphere," and so on.[163]

---

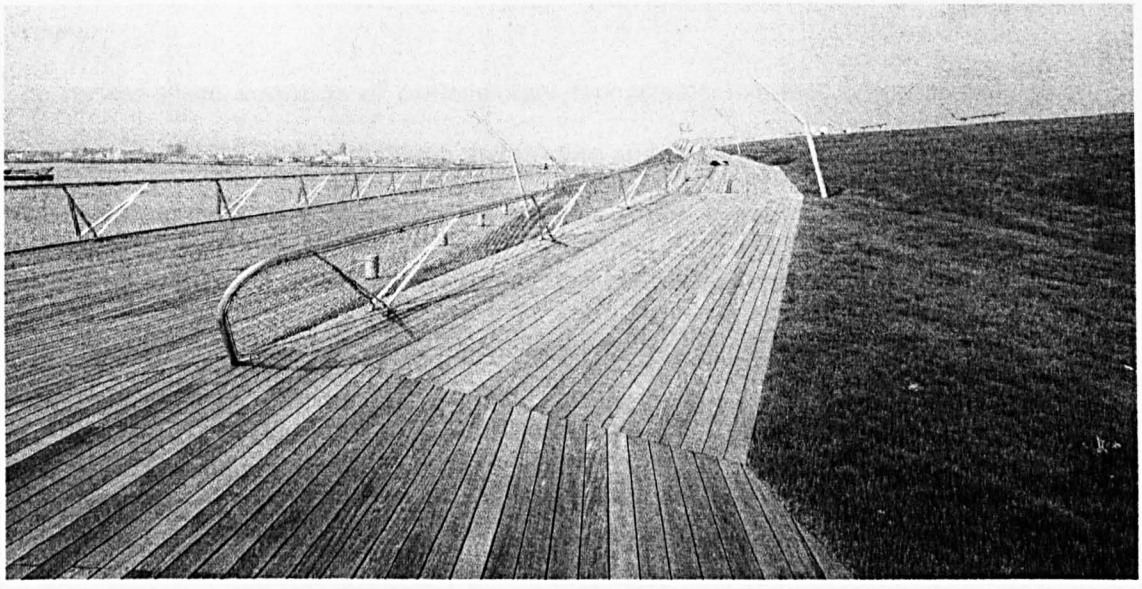
and London: The MIT Press), 172-173.

[162] David Leatherbarrow (2004), *Topographical stories: studies in landscape and architecture*, (Philadelphia: University of Pennsylvania Press), 20.

[163] Ibid., 21.

It is not argued here that contemporary topographical surface exactly matches Leatherbarrow's approach, but nonetheless topographical surface can be regarded as such an interconnection between building, site and landscape. Through its multiple inflections, topographical surface creates a smooth combination between architecture and landscape. It does not offer a pictorial landscape, as in a Modernist picture frame, but rather a practical one concerned with actual experience and with social practice. When combined with natural landscape, it presents not only a temporality of bodily experience, but also that of growth, of nature. If compared to conventional relations between architecture and site, some examples of contemporary surface show an "elaboration" of terrain "inserting" into site, but smoothly. Furthermore, as often used for the construction of public buildings, it also has a "collaboration" with social matters, but generally not in terms of ownership, protection and privacy; rather, it is about circulation, communication and public life.

Figure 2.23
International Port Terminal of Yokohama, Japan, 2002, by FOA.



At the Yokohama Port Terminal, it can be observed that the topographical surface interconnects architecture with an artificial, or at least semi-natural, landscape. The landscape is formed by the construction of inflected terrain and the growth of plants (Figure 2.23). The whole top surface is thus seen as an undulating landscape, with several protruding sections filled with lawns. If, as Stuart Wrede has argued, the landscape for Modernist architecture is often treated

as a pure natural thing, then it loses the connection between architecture and landscape that is given by the traditional park or garden, in which nature is treated artificially but still relates to its origins.[164] The topographical interconnection today between landscape and architecture might be regarded as an active renewal of that missing content. Stan Allen and James Corner term this as "synthetic landscape", which is seen as a form of innovative landscape-based urban practice drawing on geography, politics, ecology, architecture, and engineering in working towards the production of new urban "natures". As they note:

The radical claim of the 1980s was for extending architecture and urbanism into the territory of landscape – in other words, promoting culture over nature and making landscape artificial. More recently, a new information – based model of nature has emerged and, with it, a notion of landscape as synthetic nature. ..... Synthetic landscapes make use of the logics of natural systems and the dynamics of ecological feedback without the romantic attachment to a pastoral idea of nature.[165]

Summary

The surface-space formation of contemporary topographical surface brings an opportunity to reconfigure the relationships between architecture and the ground, architecture and landscape. In comparison with conventional forms of 'standing-up vertically', topographical surface is based on the inflection of the ground. Through the geometrical formation of multiple 'vectors' it induces an alternative experience of 'weightlessness' and 'formlessness'. When these 'vectors' are related to social and cultural forces, the inflection of topographical surface further aims to offer a smooth relationship between architecture and its context. In contrast to the regular composition of architectural 'frames' of separation, selection and arrangement, topographical surface conceives 'smooth intervals' for multiple and potential events, because it creates a flexible and indeterminate 'frame' for everyday life. At the same time, it brings a smooth relationship between inside and outside, often interconnecting architecture and landscape. It constructs a practical and active landscape in response to the temporal experience of bodily

[164] Stuart Wrede (1983), "Landscape and Architecture: The work of Erik Gunner Asplund", in *Perspecta* Vol.20 1983, 195.

[165] Stan Allen and James Corner (2003), "Urban nature", in Bernard Tschumi and Irene Cheng (eds.), *The State of Architecture at the Beginning of the 21st Century*, (New York: The Monacelli Press), 17.

space and movement, in contrast to static pictorial representation.

2.3. Translucency of surfaces

The term translucency here is used to describe a phenomenal quality of the relationship between spaces, generally between inside and outside. It is firstly an initial, even vaguely sensed, perception of spatial depth or distance corresponding to the visual effect of being semi-transparent or semi-hidden. In addition, it can, as we shall discuss, induce a perceivable tension between volume and evanescence, enclosure and disclosure, and so might create multiple connections between inside and outside, architecture and context, architecture and landscape etc. In this sense, it relates to an experience of ambiguity. Translucency is different from transparency. Technically, both transparency and translucency of surfaces are concerned with the ability to transmit light. Because no substance is perfectly transmitting, but only tends to perfect transmission,[166] the difference between transparent and translucent might be seen as a matter of degree. However, when the term translucency is adopted within the context of contemporary surface architecture it assumes a specific meaning which is different that of transparency, as used in Modernist architecture. As Terence Riley notes:

One has to consider the transparent / opaque, figure / ground dualities that are very much a part of this discussion about architecture. Most people who are interested in visual phenomena do not use the word translucency, in part because transparent is not an absolute term for them. But architects frequently use the word translucency to mean that sort of intermediate zone between the dualities.[167]

According to Riley, the difference between translucency and transparency relates to three factors. Firstly, contemporary translucent surface represents a departure from the "frame", which is a motif of modern transparent surface.[168] Because the transparent surface itself tends towards a quality of disappearance – of not being seen in itself – what remains is only the frame of that surface and the framed images. In contrast, contemporary translucent surface often hides its

---

[166] James J. Gibson (1979), *The Ecological Approach to Visual Perception*, (Boston: Houghton Mifflin Company), 30.

[167] Cynthia Davidson (1994), "Reflections on Transparency: An interview with Terence Riley", in Todd Gammon (ed.) (2002), *The Light Construction Reader*, (New York: The Monacelli Press), 47.

[168] Ibid., 47.

material frames behind or within it. Due to the effect of translucency, the frames only appear as vague outlines, blurred with the actual surface. Images captured in translucent surface are thus "generated" rather than framed, with the surface acting as a screen. Secondly, contemporary translucent surface often has a spatiality of light and shadow in comparison with the modernist desire for a "room of shadowless light".[169] Lit from the interior, internal objects and presences often leave their vague shadows on the translucent surface. It is thus different with transparent surface which clearly transmits the outside in by day, or the inside out by night. Lastly, translucency can has a kind of ambiguity caused by the effect of "delay", because there is "something inserted *between*" which creates a distance between observer and the presences behind the surface, between outside and inside.[170] For Riley, what is inserted could be either cavities between the two layers of surface, which delay the transmission of light, and thus varies the brightness, or images linking to the outside, which thus "delay" the rush of visual perception into the interior.

Based on these three points, further arguments about translucency can be developed. Firstly, without the outline of a frame, translucent surface might present a kind of formlessness. The geometrical form of architecture, for example a volume, is usually defined by its edges. By blurring the outlines of the frame, translucent surface can evoke a kind of evanescence of the volume, and thus a gradual move towards formlessness. Secondly, through displaying shadow and light, there is a shift from the viewing of actual spatial relations as in the transparent surface to a variation of images on the surface. On translucent surfaces, images change in their degrees of darkness and vagueness in correspondence with the distances between objects and the surface. In this sense, a translucent surface shows a spatiality of "depth". Due to the ambiguous presentation of interiority, translucency induces a tension between enclosure and disclosure.

---

[169] Terence Riley (1995), "Light construction", in Todd Gammon (ed.) (2002), *The Light Construction Reader*, (New York: The Monacelli Press), 23.
[170] Ibid., 27.

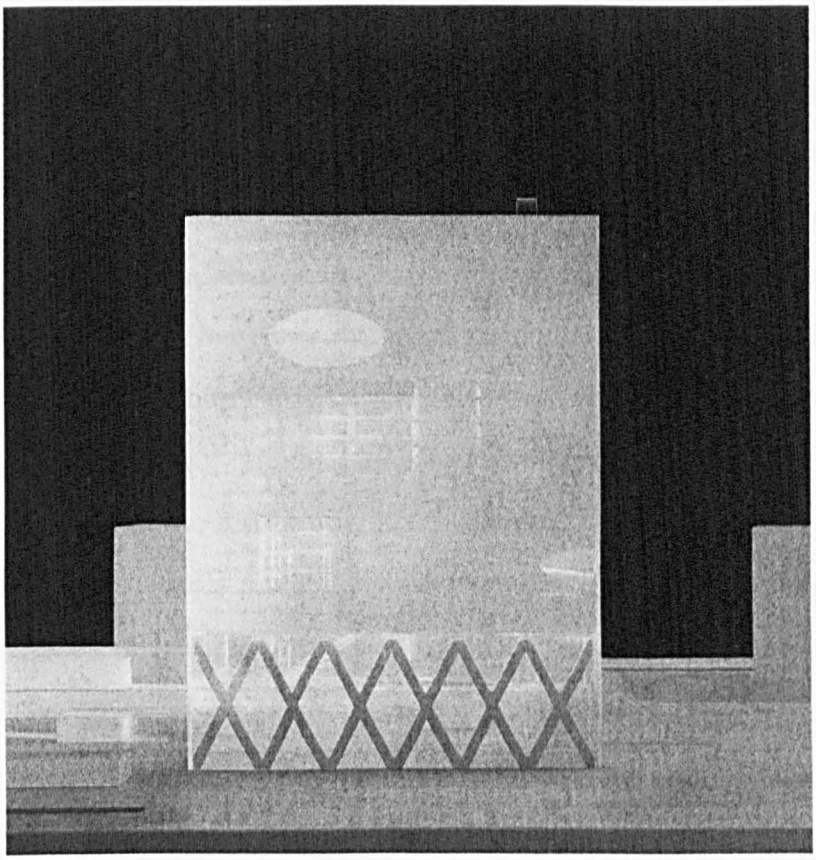


Figure 2.24
the competition project for the French national library, 1989, by OMA.

For Anthony Vidler, the ambiguity of translucent surface might bring the subject back to a similar experience to that of the space of the "stage" in terms of a set of social relations, and in this it differs from the transparency and reflectivity found in Modernism, which draws the subject to look for oneself as if in the space of a "mirror".[171] Using the example of OMA's 1989 competition project for the French National Library (Figure 2.24), Vidler found a particular spatiality arising out of the translucency. The whole building is conceived of as a cubic 'solid' rather than a 'void,' from which the interior volumes are "carved out."[172] What is perceived is an ambiguity in the tension between opacity/solidity and transparency, which differs from the Modernist presentation of volume and transparent surface. The interior spatial formation is projected onto the exterior translucent surface "as shadowy presences, their three-dimensionality displayed ambiguously and flattened, superimposed on one another, in a

---

[171] Anthony Vidler (1992), "Transparency", in Todd Gammon (ed.) (2002), *The Light Construction Reader*, (New York: The Monacelli Press), 269.
[172] R Koolhaas and Bruce Mau (1997), *Small, medium, large, extra-large: Office for Metropolitan Architecture* (new edition), (Köln: Benedikt Taschen Verlag), 616.

play of amorphous densities."[173] Such a visual effect is what Vidler terms "obscurity". At the same time, the translucent surface of the library project has a partial effect of reflection; however, it can never be read as a 'mirror' because the images of the interior always remain as an "obscure existence" of the building's interiority in contrast to the external reflections. For the viewer, the translucent surface thus never provides a mirror space of 'myself' as a virtual copy of 'my world', but rather always suggests 'something' hidden in front of oneself. As Vidler notes: "The architect allows us neither to stop at the surface nor to penetrate it, arresting us in a stage of anxiety.[174] He compares the effect of translucent surface to an experience of anxiety in front of a curtained stage where the audiences desire to see what is happening behind the curtain. Based on Lacan's psychoanalystic interpretation of the theatre stage, Vidler argued that the creation of such "anxious space" could evoke a participation in social relations through the common desire and gaze.[175] If participation in front of the dramatic stage relates to the actors, actresses and the play implied behind the curtain, then the participation evoked by architectural translucency depends on the events of everyday life behind the translucent surface, and the tension between interiority and exteriority. For a fully transparent surface, the difference between inside and outside disappears; for the mirrored or reflective surface, everything is a reflection of the outside. Both of them imply an absence of interiority. In contrast, translucent surface always portrays the existence of interiority through the projection of "obscure" images.

The quality of ambiguity is not an exclusive property of translucency; as we have seen, it is also associated with the transparency and reflection of modern surface. However, the ambiguity of translucency is about something that is 'between', about the tension between inside and outside, and the indeterminacy of people's activity and events. In contrast, the ambiguity induced by transparency and reflection relates to the display of 'phantasmagoria', to the confusing of inside/outside, and to the dominance of visual space. The latter might also induce an experience of anxiety. As Walter Benjamin argued, the anxiety of "the flâneur" of late-nineteenth century

---

[173] Anthony Vidler (1992), "Transparency", in Todd Gammon (ed.) (2002), *The Light Construction Reader*, (New York: The Monacelli Press), 269.
[174] Ibid., 271.
[175] Ibid., 271.

Paris arose from the experience of phantasmagoria of urban scenes.[176] This anxiety could only be appeased through joining the crowd on the streets, where "the familiar city is transformed for the flâneur into phantasmagoria."[177] However, the anxiety is never completely overcome because the phantasmagoria of urban space is always ambiguous and chaotic. For Benjamin, the experience of phantasmagoria, especially in the Parisian arcades, is mainly produced by displaying and reflecting images. Transparent glass windows and doors cancel the division between interior and exterior, and create a 'common' space full of images of commodities. The multiple reflections in the glass surfaces make this space more complex and ambiguous:

A look at the ambiguity of the arcades: their abundance of mirrors, which fabulously amplifies the spaces and makes orientation more difficult. For although this mirror world may have many aspects, indeed infinitely many, it remains ambiguous, double-edged. It blinks: it is always this one – and never nothing – out of which another immediately arises. The space that transforms itself does so in the bosom of nothingness.[178]

Transparency, in the context of contemporary theory, is not only a visual effect of surface but also a metaphor of the situation of contemporary urban environment and society. For example, Gianni Vattimo relates the concept of transparency to the urban and social situation of the saturated communication of mass media in which information flows uninterruptedly and goes everywhere.[179] For Lefebvre, there is a kind of "illusory transparency" of urban space, which is induced by the legibility of functionalist space, in the sense of a particular kind of "abstract space" being made manifest in a "visual-spatial realm".[180] What Lefebvre argued is that, when urban space is reduced to an arrangement of functionalist usage – for example, streets reduced just to a form of passage – then urban experience becomes no more than the technical cognition of visual signals, symbols and routes given by either the constructed environment (read as a surface) or by a map, a representation of space. Lefebvre's key identification is that space is reduced to a reading of surface: "*volume* leaves the field to *surface*". Lefebvre criticised such

---

[176] Walter Benjamin (1999), trans. by Howard Eiland and Kevin Mclaughlin, *The Arcades Project*, (Mass. Cambridge and London: The Belknap Press of Harvard University Press), 14.
[177] Ibid., 21.
[178] Ibid., 542.
[179] Gianni Vattimo (1992), trans. by David Webb, *The Transparent Society*, (Cambridge: Polity Press).
[180] Henri Lefebvre (1991), trans. by Donald Nicholson-Smith, *The production of space*, (Oxford and Cambridge Mass.: Blackwell Publishers), 312-313.

functionalist surface-space as "spatial abstraction"; for him, it was "a half-imaginary, half-real physical existence" by which "abstract space eventually becomes the simulacrum of a full space", and correspondingly walking in a street becomes "an actually experienced, gestural simulation of the formerly urban activity of encounter, of movement amongst concrete existences."[181] In this sense, the subject is also reduced to a situation of "abstract subject" who only conceives and obeys functionalist intent.

For Paul Virilio, the contemporary urban environment has a quality of transparency because it is "overexposed" due to the intense development of transportation, communication and telecommunication. In his 1984 essay, *The Overexposed City*, Virilio argued that the contemporary urban environment was determined by a kind of electronic or "technological space-time" made up of various networks.[182] On the one hand, access to the city is controlled by technical networks – highway systems, airports, or electronic communication and telecommunication. On the other hand, the experience of 'distance' is given a new sense by the space-time of the screen interfaces of the computer, television and teleconferencing, and in contrast to the visibility of direct confrontation within constructed spaces, such as streets and avenues. "Physical obstacles", "time distances" and the difference between "elsewhere" and "here" are largely weakened.[183] In this context, Virilio argued that people are no longer ever "in front of the city", but "always inside it," and correspondingly, the creation of space is realized more by "interface" rather than "boundary-surface".[184] In an environment dominated by "technological space-time", how architecture could join in the system of communication and configure the experience of actual space-time in the urban condition is thus a critical question. As Virilio notes:

Along with the technique of construction, there is, one must not forget, the construction of technique, the ensemble of spatial and temporal mutations which continually reorganize on an everyday basis the aesthetic representations of contemporary territory. Constructed space is thus not simply the result of the concrete and material effect of its structure, its permanence and

[181] Ibid., 313.
[182] Paul Virilio (1984), "The Overexposed City", in K. Michael Hays (ed.) (2000), *Architecture Theory since 1968 (paperback edition)*, (London, Cambridge Mass.: MIT Press), 544.
[183] Ibid., 544.
[184] Ibid., 543.

its architectonic or urbanistic references, but also the result of a sudden proliferation, an incessant multiplying of special effects, which, with consciousness of time and distance, affects perception of the environment.[185]

The architecture of contemporary translucent surface enables just such a possibility of 'interface' in the creation of actual urban space. The idea of "interface", or more precisely "interfacing", is proposed by Mark Taylor as a design strategy in response to the epoch of transparency.[186] According to Taylor, when surface is not seen as the opposite of depth and interiority, it gains an opportunity to become an interface which "must be read in terms of information processes".[187] These "information processes" are phenomena in which material matters appear as immaterial effects, and depth and interiority appear as part of the surface-space formation. Due its property of ambiguity, the contemporary translucent surface invokes a particular perception of "information processes". On one hand, the quality of translucency might resist the reductive form of Lefebvre's "abstract space" – i.e. resist the dominance of the functionalist proposition. As discussed above, the ambiguity of contemporary translucent surface gives multiple readings of the activity and indeterminacy of actual, dynamic events. The experience of translucency thus cannot be reduced to either an abstraction of "visual-spatial realm" or a simulacrum of urban activity. Rather, it recalls an experience of actual urban space and a 'spatiality of situation' related to social life. On the other hand, because the "information processes" of translucent surface consist of events in actual space-time, but subjected to the "delay" described by Riley, the ambiguity of translucency might resist the dominance of Virilio's "technological space-time".

The ambiguity of translucent surface is a result of the conditions of blurring, hiding and mixing. The double-layer surfaces normally associated with translucency superimpose images, in contrast to the pictorial effect of collage. The various effects can be categorised under three terms: *translucent skin*, *veil* and *imaging surface* respectively. *Translucent skin* refers to those

---

[185] Ibid., 547.
[186] Todd Gammon (ed.) (2002), *The Light Construction Reader*, (New York: The Monacelli Press), 58.
[187] Ibid., 58.

translucent surfaces in which the quality of translucency mainly comes from the optical character of the materials, such as translucent glass and polycarbonate panels. The visual effect is determined by the distance between the surface and the observed object behind it. The term *veil* is used to describe those translucent surfaces which employ a form of textile or weaving, such as metal mesh, perforated panel or window blind. Because its degree of translucency depends on the size of the interstices and the distance between the eye and the surface, the effect of the *veil* changes according to the position of the subject. The *imaging surface* refers to translucent surfaces which are overlaid or embedded with printed images, usually as photographic pictures. This kind of surface has its special dimension in imaginary and virtual spaces. While there may be other categories of translucent surface, these three are useful to understand some contemporary issues, theoretical and practical, of surface.

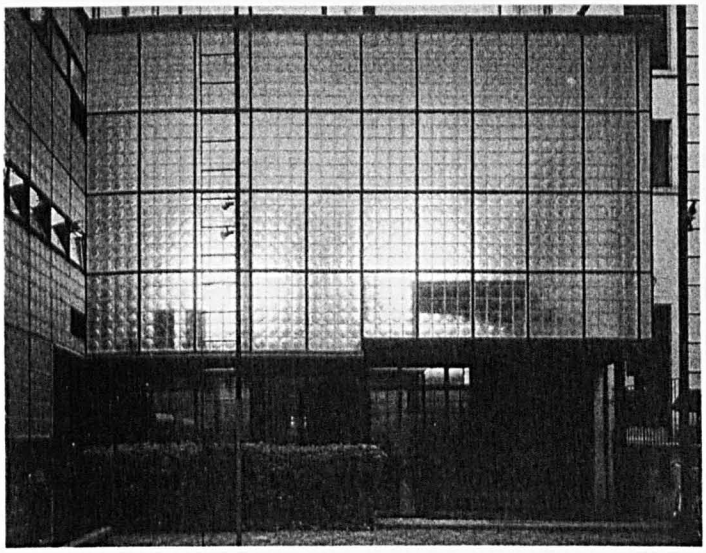


Figure 2.25
Maison de Verre at Paris, France, 1931,
by Pierre Chareau.

2.3.1. Translucent Skin

Translucent skin is usually a curtain wall constructed out of semi-transparent panels such as glass or polycarbonate. Though it is proposed as a prototype of contemporary surface architecture in this thesis, translucent skin can also be found in early-Modernism. One such example is the Maison de Verre, a private house for Dr. Dalsace which contained his domestic living quarters and medical practice in Paris, designed by French architect Pierre Chareau and finished in 1931 (Figure 2.25), or the Clarté Apartments, Geneva, of 1932 as designed by Le Corbusier. These early cases are often residential buildings and the use of translucent glass is

mainly a consequence of the consideration of both illumination and privacy. In comparison to a pure transparent glass wall, these walls of translucent glass allow sunlight to illuminate the interior while at the same time maintaining privacy. In the case of the Maison de Verre, Chareau chose translucent glass blocks as the walling material for the first and second floors in order to get the maximum amount of light on a restricted urban site.[188] In the glass-block curtain wall to the rear, there are some transparent glass strip windows which can be opened out to the garden. Though the functional consideration of protecting domestic privacy might be the first and main motive of this design, the adoption of translucent and transparent glass bring about particular phenomenal effects. The translucent glass blocks not only generate blurry images in contrast to framed picture of a transparent window, but also transform the house at night into to a light-box like a Chinese lantern. In Frampton's view, the differences of translucent/transparent glass and natural/artificial light present "paired oppositions and reciprocal relations", which join in the creation of a "poetry of equipment".[189]

In contrast, the contemporary translucent skin is often used in public buildings. Firstly, the translucent skin is considered as an effective agent in the creation of active urban space, due to the way that it mediates between inside and outside spaces, acting as an 'interface' in the urban environment rather than for the protection of private life. As we have seen, translucent skin often keeps the character of reflection, which contributes to the negotiation between building and context, people and architecture, but it does not make the building 'disappear' through total reflectivity as in the Modernist glass building. The ambiguity of translucent skin can set up a particular relation between building and landscape, with reflections often appearing as vague images. The blurring images of the surrounding context creates an image of artificial nature. Lastly, the contemporary translucent skin is often made up of a double-layer, or in some cases multiple-layers, of material. While this may be primarily for energy-saving reasons, the construction brings with it the additional spatial effect of bringing a quality of depth to the surface, producing the result of something which one initially reads as a thin surface having a

---

[188] David Leatherbarrow and Mohsen Mostafavi (2002), *Surface architecture*, (London, Cambridge Mass.: The MIT Press), 71-76.
[189] Kenneth Frampton (1985), "Pierre Chareau: An eclectic architect", in Todd Gannon (ed.) (2002), *The light construction reader*, (New York: The Monacelli Press), 380.

substance. The double-layer or multiple-layer structure of translucent skin thus produces a different relation between skin and skeleton to that of Modernism. As opposed to the Miesian *skin*, the structural frame or tectonic skeleton is mostly hidden behind or within translucent skin. It is an ambiguous image of the interior volumes, rather than a regular geometry of the grid that dominates the surface image; and, correspondingly, the effect is more determined by the spatial formation of light-shadow rather than a two-dimensional composition of lines and planes. Sometimes the corner of building is further disjoined from the structural frame, formed not by the line of structure or glass frame, but out of the junction of translucent surfaces; with a blurred cavity rather than linear edges at its limit, the volume of building 'evanesces'. The tension between volume and evanescence means that translucent skin is seen in distinction to the Corbusierian *envelope*. As will be seen, contemporary translucent skin concerns not only visual perception but also more broadly social and cultural concerns. The discussion below concentrates on buildings by Wiel Arets, Peter Zumthor and Herzog & de Meuron, even though there is a very long list of contemporary buildings that use translucent skin.

Alabaster skin

The concept of *alabaster skin* was introduced by the Dutch architect Wiel Arets at the beginning of 1990s. It refers to translucent glass with an alabaster-like colour. For Arets, the alabaster skin aims to establish a relationship between building and context: he argues that it produces "multiplicity and complexity" in response to the "conflicting urban context."[190] His idea comes from the experience of the contemporary city and urban life, which for him are impacted by media technology. The city is described as "cinematic", and the task of architecture is to create a programmatic transformation which avoids the idea of a preconceived "film". In the context of the age of media, Arets argues that today's architecture should play a role of "interface" by which "it is architecture's task to mediate between man and everything that befalls him."[191] In Arets' view, alabaster skin could offer an approach to the idea of "interface" because it has a quality of "between" where people, architecture and urban space come together:

---

[190] Dominic Papa (1997), "In conservation with Wiel Arets", *EL croquis*, Vol. 85 1997, 15.
[191] Wiel Arets (1991), "An Alabaster Skin", in Xavier Costa (ed.) (2002), *Wiel Arets*, (Barcelona: Ediciones Poligrafa), 111.

Architecture is therefore a between, a membrane, an alabaster skin, at once opaque and transparent, meaningful and meaningless, real and unreal. .....It can only become part of the world by entering into marriage with its surroundings.[192]

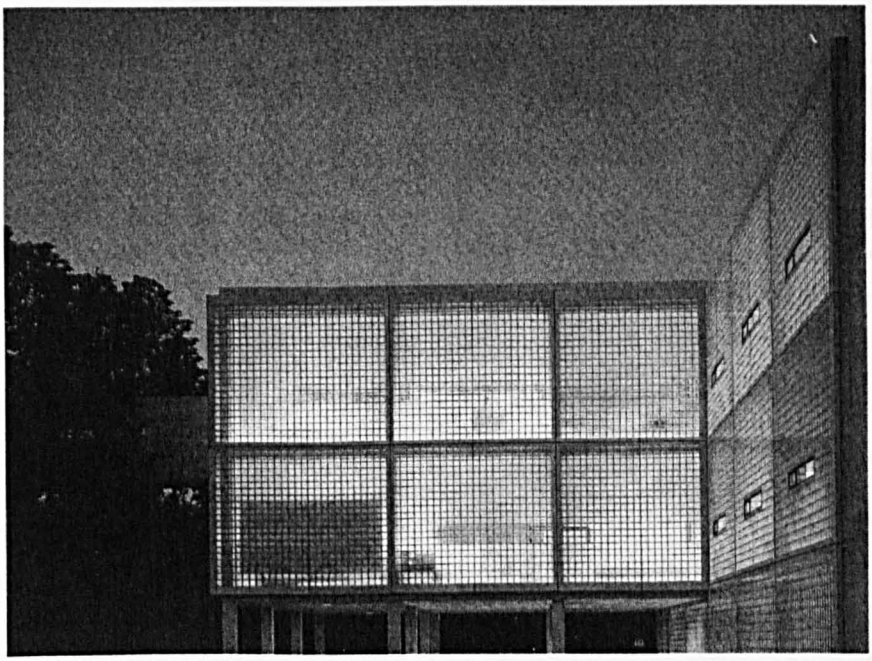


Figure 2.26
Academy for the Arts and Architecture at Maastricht, Netherlands, 1989-93, by Wiel Arets.

An early example of "alabaster skin" can be found in the Academy for the Arts and Architecture at Maastricht, which was built between 1989-1993 as an extension to the existing school. The new building intervenes in the existing context with a form made up of regular grids of glass bricks (Figure 2.26). The effect is twofold. On one hand, the pure geometry of the regular grid gives the architecture a character of autonomy, and thus separates the building from its surroundings. On the other hand, the translucent glass-brick wall brings about an ambiguous connection between the inside and outside spaces. The combination of light and shadow, blurred images of interior and various reflections, brings the quality of a cinematic installation into the existing context. As a result, the geometrical homogeneity of the regular surface grids is interrupted and transformed by heterogeneous images, so that the autonomy of form is blurred and displaced by a complex mixture of building, surroundings and the realities of everyday life. As the Spanish architect and theorist Xavier Costa commented, "the most important aspect of the various implications of this skin of alabaster is the diminishing sense of architectural

[192] Ibid., 110.

autonomy that is apparent here."[193] Further, as Josep Montaner notes, through "the materiality of skins that act like alabaster – half transparent, half translucent, like a chameleonic reflection of the surroundings", Arets goes beyond "literal contextualism" and explores a new connectivity with the context.[194] Vidler comments that such architecture acts "not as a replacement or substitute, as in the utopian urbanism of Modernism, but as material to be submitted to the life and consuming power of the context".[195] In Greg Lynn's view, Arets' alabaster skin might be seen as a form of "intensive disappearance" which displaces the conventional theory of contextualism. For Lynn, disappearance can be realised in one of two ways. The first is that of Post-modernism, in which the new architecture wears a "mask of mimesis", in order to pretend through stylistic harmony that it belongs to the existing context. The other way is what he calls "intensive disappearance," through which surface "represents disappearance through the partial, cunning reflection of contexts on a milky surface."[196] All of these comments can be summarised to make a single point: the construction of "alabaster skin" brings about an interrelationship between building and context, different from both Modernist autonomy or Post-modernist stylistic mimesis. With the effect of translucency, surface acts as a mediation between building and context, presenting a superimposition of ambiguous images and temporal events of inside and outside.

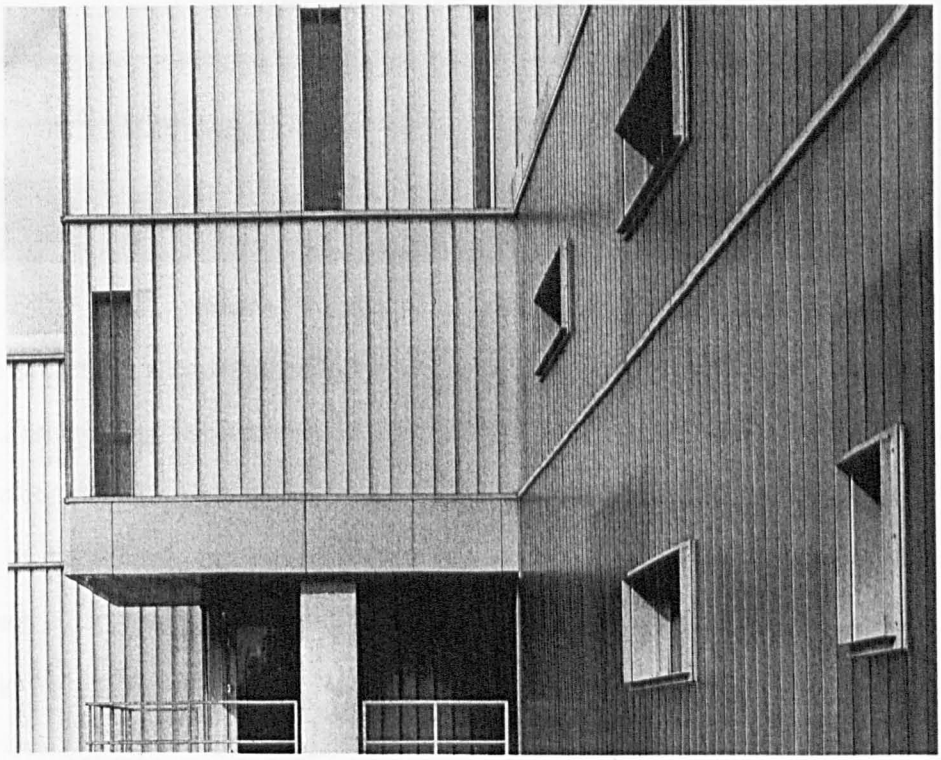
The translucent skin of the Maastricht Academy has a single layer of glass bricks, with the ambiguity of surface coming from the combination of regular geometry with blurred images. Arets' later projects using the idea of "alabaster skin" focus more on the perception of pure translucency. Two police stations, both built in 1994-97, serve as good examples (Figure 2.27). The two buildings, in Boxtel and Cuijk, shared the same design strategy: the client wanted the projects to represent a sense of openness, as an analogy of the Dutch police force's relationship to the public. However, this openness inherently conflicts with more pragmatic requirements for

---

[193] Xavier Costa (2002), "Towards an architecture of mediation", in Xavier Costa (ed.) (2002), *Wiel Arets*, (Barcelona: Ediciones Poligrafa), 9.
[194] Josep Mariá Montaner (1997), "Wiel Arets: European Architecture after postmodernism", in *EL croquis*, Vol. 85 1997, 30.
[195] Anthony Vidler (2002), "Oneirism", in Xavier Costa (ed.) (2002), *Wiel Arets*, (Barcelona: Ediciones Poligrafa), 15.
[196] Greg Lynn (2002), "Criticism: intensive disappearance", in Xavier Costa (ed.) (2002), *Wiel Arets*, (Barcelona: Ediciones Poligrafa), 18-20.

security and confidentiality.[197] The ambiguous spatiality of translucent skin is adopted as a solution to the presentation of this tension between openness and concealment. The surfaces consist of narrow, long, U-shaped panels of translucent glass fixed to the main structure with aluminium frames. The translucent skin has two layers. The outer layer is all translucent glass, but the inner layer is sometimes glass, and sometimes solid wall, according to the function of spaces behind. It is significant that the 330mm distance between the two layers creates a depth in which the division of inner layer into solid and transparent is blurred, and the internal lighting becomes diffused onto the whole external skin. The concealment and secrecy is thus transformed into an ambiguous image of openness. In this sense, translucent skin creates something "between" openness and hiddenness, disclosure and enclosure.

Figure 2.27
Police Station at Boxtel, Netherlands, 1994-97, by Wiel Arets.



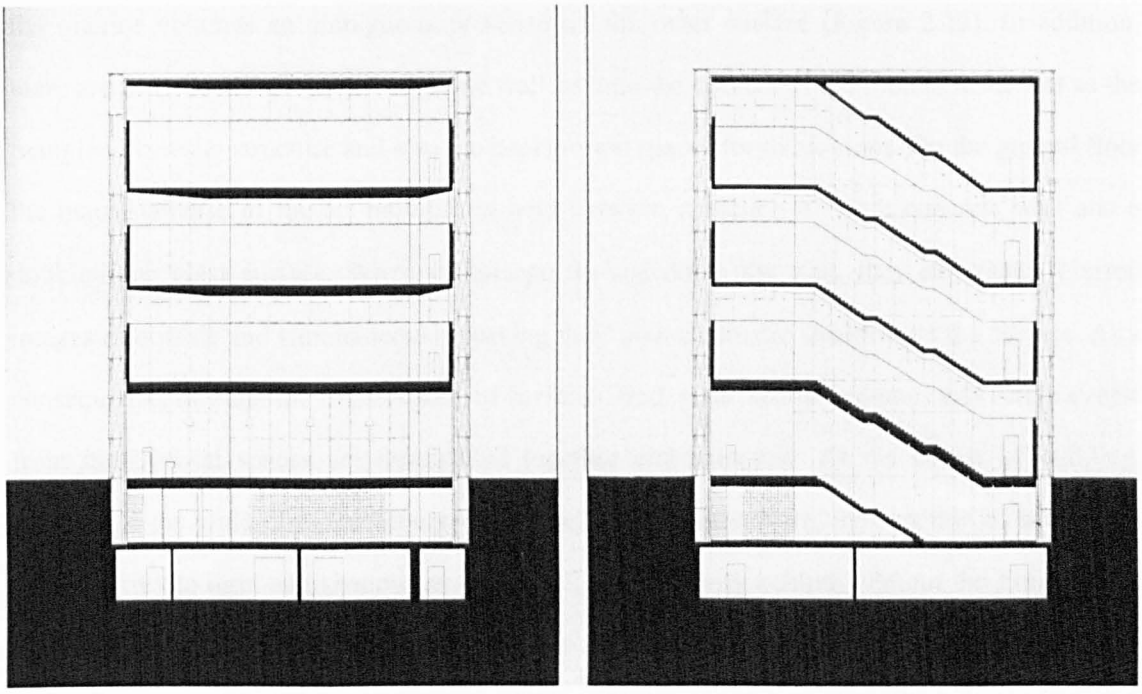
Translucency of volume

Volume in architecture is usually perceived through its geometrical definition – the edges of structure describing the volumetric space. However, the ambiguity of translucent skin can

[197] Wiel Arets (1997), "Police Station", in *EL croquis*, Vol. 85 1997, 128.

introduce a tension between volume and evanescence through not only the abandonment of a clear articulation of geometrical edges but also through the dematerialization of the envelope. This tension and its effect is explored in the next example.

Figure 2.28
Kunsthaus in Bregenz, Austria, 1990-97, by Peter Zumthor.



The Kunsthaus Bregenz is a museum facing on to Lake Constance. It is designed by the Swiss architect Peter Zumthor and was constructed between 1990 and 1997. The translucent skin of this art museum consists of double layers fixed with an inner light steel structure (Figure 2.28). The outer skin of the building is a curtain wall of etched glass. Regular rectangle glass panels are joined to each other without visible mullions or rails. Their edges are exposed, so the wind can pass through the open joints of the surface. The inner surface is half-concrete, half-glass. Zumthor describes the construction thus: "The multi-layered façade is an autonomous wall construction which harmonises with the interior and acts as a weather skin, daylight modulator, sun shade and thermal insulator."[198] The double-layer surface serves these functional purposes, but also evokes a very particular spatial effect. On the exhibition floors, the galleries are enclosed by cast concrete walls which in turn are covered by an outer layer of the translucent

[198] Peter Zumthor (1998), "Art Museum Bregenz", *a+u*, February 1998 Extra Edition, 174.

surface. The concrete walls connect to a ceiling of translucent glass, with a cavity between the glass ceiling and the slab of the floor above. This cavity, which is just less than half the storey height, allows sun light to come in from all sides of the building. These cavity spaces are described by Zumthor as "light collectors open to the sky".[199] Observed from the outside, the dark of the solid walls and the light of the cavities are transformed into blurred shadows, giving the interior volumes an ambiguous presence on the outer surface (Figure 2.29). In addition, there are three sections of thick concrete wall set into the corners of the rooms, which act as the main load-bearing structure and also the background spaces for exhibitions. On the ground floor, the main staircase of the art museum is held between a section of thick concrete wall and a double-layer glass surface. When visitors go up and down the stair, they experience blurred images of outside and simultaneously leaving their own cinematic shadows on the surface. As a consequence, through the translucency of surfaces, both static spatial volumes and active events from the internal spaces are transmitted together and smoothly. At the corner of building, because of the wide distance between outer skin and inner surface, the junction of surfaces is softened by the light and shadows emanating from the cavity behind; without the limitation of clear linear edges, the volume of building is dissolved from a rigid geometrical form into something less solid and more evanescent (Figure 2.30).

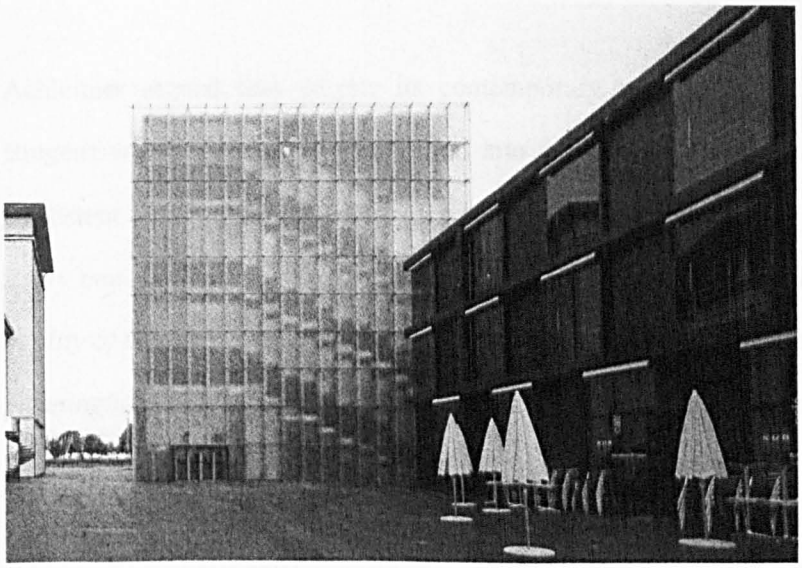


Figure 2.29
Kunsthaus in Bregenz, Austria, 1990-97, by Peter Zumthor.

[199] Peter Zumthor (1998), *Peter Zumthor Works: Buildings and Projects 1979-1997*, (Baden: Lars Müller Publishers), 214.

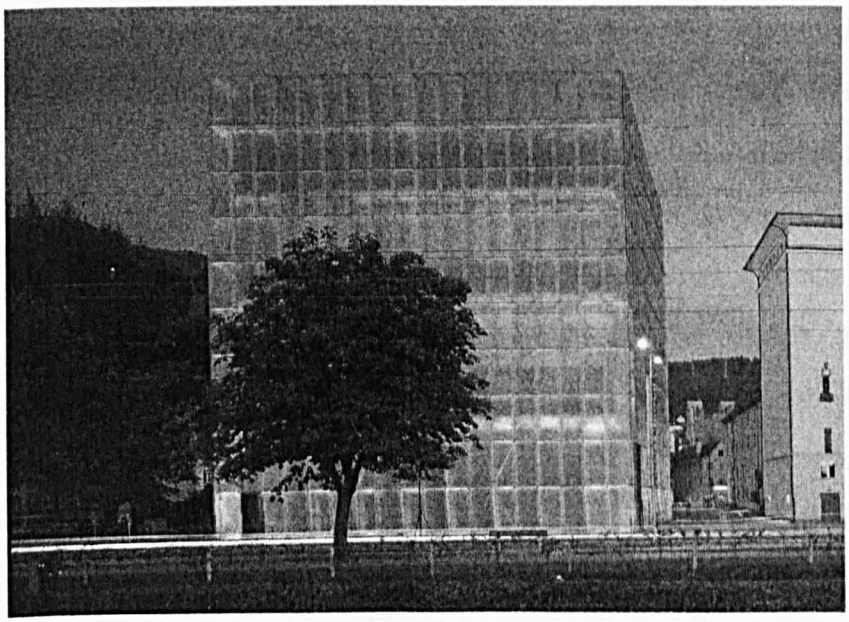


Figure 2.30
Kunsthaus in Bregenz,
Austria,
1990-97,
by Peter Zumthor.

The translucent skin thus not only transforms the volume of Kunsthaus Bregenz into a complex and evanescent spatial phenomenon, but also affects the relationship between the building and its context. As the Austrian scholar Friedrich Achleitner comments:

The competition project that indisputably came to the fore among other entries revealed two essential characteristics: first, it attempted to provide another independent and self-assured link amid the pre-existing chain of single buildings along the lake. Secondly, the art museum's very architecture took the theme of light, work both by and with light, as its content.[200]

Achleitner argued that despite its contemporary nature, the architecture of the Kunsthaus Bregenz works well as an intervention into the existing traditional urban context This idea is consistent with Zumthor's general design philosophy. He notes:

Every new work of architecture intervenes in a specific historical situation. It is essential to the quality of the intervention that the new building should embrace qualities which can enter into a meaningful dialogue with the existing situation.[201]

The dialogue with the existing context, for Zumthor, should be created not through signs or messages but through the "self-evident" nature of things themselves, because those signs

---

[200] Friedrich Achleitner (1998), "Questioning the Modern Movement", *a+u*, February 1998 Extra Edition, 210.
[201] Peter Zumthor (1998), "A Way of Looking at Things", *a+u*, February 1998 Extra Edition, 16.

imbued as he sees it with "Post-Modern life" render real things invisible.[202] He regards the exploration of this self-evidence as a political attitude, a form of "resistance" architecture, in which the virtues and communicative potential of tectonic making and phenomenal bodily space are situated against semiology, virtual images, etc. In the case of the Kunsthaus Bregenz, Zumthor's design strategy has its focus on the cooperation of surface and space. Through the phenomenal perception of the translucent double-layer surface, Zumthor establishes the self-evidence of the presence of materials and their spatiality, and, further, their meaningful dialogue with the existing context. The building is neither an autonomous object of geometry nor symbolic representation, but rather a place which is understood and engaged with through the experience of the body.

Zumthor describes two basic ways of spatial composition as first "the closed architectural body which isolates space within itself, and (second) the open body which embraces an area of space that is connected with the endless continuum."[203] The translucent skin of the Kunsthaus Bregenz creates a mixture of these two possibilities. The building is perceived as an ambiguous volume; observed from outside, reflected images of the surroundings are added into the blurred mixture of dark and light. It is in this manner that the architecture intervenes in, and for Zumthor, initiates a meaningful dialogue with existing context. As Hiroshi Nakao commented in *a+u*, Zumthor's work has its intrinsic "simplicity" – but this "simplicity" is not of the one severing for "a homogeneous unity" and "the formal beauty of the abstract", but rather "a heterogeneous totality".[204]

Multiple- translucency

In comparison with the previous examples, some buildings designed by Herzog & de Meuron show more complicated effects in terms of multiple-translucency. This multiple-translucency produces, besides vague images of inside events and outside reflections, an ambiguity in the reading of the interior spaces. It differs from the transparent windows that are simply installed in

---

[202] Ibid., 14.
[203] Ibid., 20.
[204] Hiroshi Nakao (1998), "No Ideas But in Things", *a+u*, February 1998 Extra Edition, 220.

a translucent skin, such used by Arets. Rather, the composition of transparent and translucent panels has a specific correspondence with the interior spatial arrangement. As a consequence, it creates a tension between internality and externality. In addition, the external skin sometimes has a blurred image of the structural frame, which is hidden in the middle of the double-layer construction. In the case of Zumthor, the frame is almost invisible. In the case of Arets, the regular grid of glass bricks is clearly visualized, and thus contrasts to the amorphous images on translucent skin. In the case of multiple-translucency, however, the regular geometry of frame is blurred, seemingly dissolved into surface. The ambiguity of such a translucent skin is increased by inflection of the surface. Two buildings of Herzog and de Meuron, the Goetz Collection and the Laban Dance Centre, will be used as examples to discuss the effect of multiple-translucency.

In relation to the Goetz Collection in Munich, which opened in 1992, Rafael Moneo commented:

From the very start of their career, Herzog & de Meuron had diligently pursued the goal of transforming the abstract, generic solid into a building. Because of the eternal question of architecture, which leads one to think of interior and exterior at the same time, the minimal solids that Herzog & de Meuron work with are not impenetrable solid masses. Their masses rely on a system of voids inside them, in this case created by the superposition of two nearly identical floor levels, judging from the dimensions and positions of the windows, though they fragment differently to define the spaces occupied by the Goetz collection.[205]

The interior exhibition space of the Goetz Collection is arranged over two floors, but the external surface is divided into three levels (Figure 2.31). The lower floor is half-buried in the ground, the other half above it; and half of this above ground space is covered by a translucent skin which forms the bottom third of the exterior surface. The upper floor is likewise divided into two parts on the surface, half solid and half translucent. In the lowest third, a section of transparent glass is inserted into the translucent skin to indicate the position of the entrance and the interior space of the reception hall; remainder of this lower section, however, is fully

---

[205] Rafael Moneo (2004), *Theoretical anxiety and design strategies: in the work of eight contemporary architects*, (Cambridge, Mass. and London: The MIT Press), 388-389.

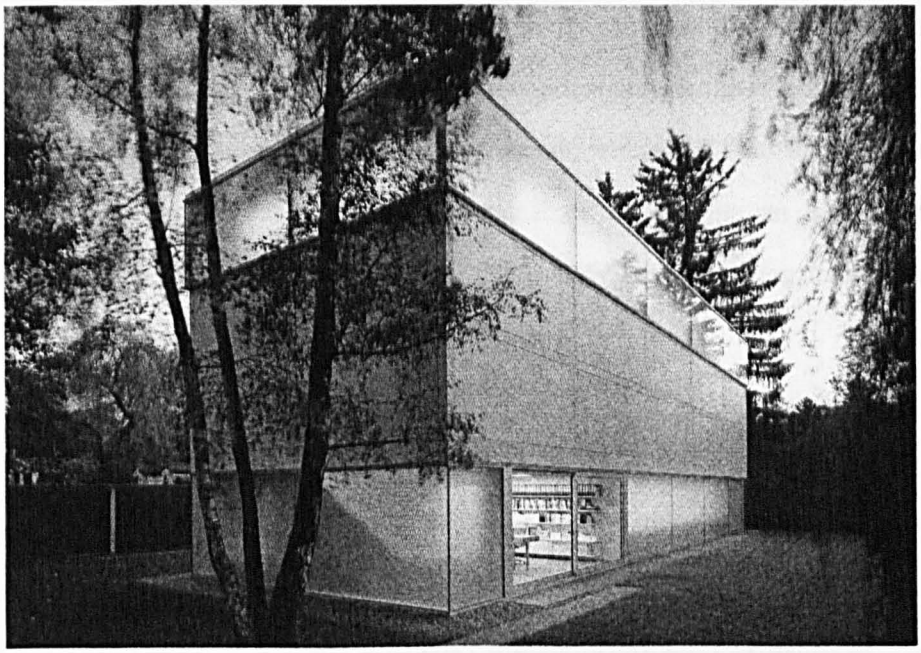


Figure 2.31
Goetz Collection in Munich, Germany, 1991-1992, by Herzog and de Meuron.

covered by seamless translucent glass panels. This skin conceals or obscures the complex spatial arrangement behind, leading to an ambiguity in the reading of the interior spaces, most obviously in the expectation of three storeys on the exterior being confounded when one enters. This ambiguity contrasts to the conventional model of surface-space relation in which, as we have seen, the arrangement of interior spaces is projected on transparent skin or signified by the fenestration on walls, giving a certain coherence to the internal-external relationship. In the Goetz Collection, such conventional certainty and coherency has been challenged by the translucency of surface. In this case, translucency is not only related to blurred images on surfaces but also the ambiguity in reading of the spatial arrangement, and thus has a quality of 'multiple'.

The multiple-translucency of surface is further developed in Herzog and de Meuron's design for the Laban Dance Centre in London, opened in 2002. The translucent skin of this building consists of a translucent glass lining and a cover of coloured translucent polycarbonate panel. Some transparent glass panels are installed in the surface, and kept on the same plane with polycarbonate panels, so that different visual characteristics are even more apparent, but they are contained within a continual and integrated skin. The sandwich structure of the double-layer skin serves an environmental purpose: the outer layer of polycarbonate panels act as a protective

shield against glare and heat, while the cavity between the panels is used for mechanical ventilation. However, the architects' main concern is with the effect that this surface produces. As they note: "The shadow images of dancers, which fall onto the mat glass surfaces of the interior walls and facades, have a magical effect, playing an active part in the Laban's architectural identity."[206] The actions of the body are thus being transmitted to create visual phenomena of surface-space.

Figure 2.32
Laban Dance at London, UK, 2002,
by Herzog and de Meuron.

The transparent glass panels look like they are arranged randomly on the surface, but in fact match the interior spatial organization (Figure 2.32). The public and open spaces, such as corridors and entrance hall, are all covered in a transparent skin, while the closed rooms, mainly dance studios, are covered by double-layer translucent skin, with just a narrow section of transparent panel at the corners. The separation between these rooms is undoubtedly blurred by the translucent skin. In this way, the arrangement of interior spaces is presented on the exterior surface as partly evident and partly enigmatic.

Besides the blurring of the interior, both the polycarbonate and glass panels capture reflections of the surroundings (Figure 2.33). The mixture of interior projection and exterior reflection

[206] Tim Ronalds (2003), "Cityscape of the surreal", *Architecture Today*, No.137 April 2003, 49.

brings a magical effect to the surface of the Laban. When the architect Tim Ronalds introduced this building in *Architecture Today*, he wrote:

The translucent polycarbonate envelope has a delicate and mysterious quality. It is completely flush, with no visible joints or fixings. The elevation of the building within is mistily visible and gives depth as it passes, unrelated, behind the coloured vertical bands. The colour is strangely within the polycarbonate and not on the surface. On this evanescent membrane skin large rectangles of reflective glass display bright images of the sky and the surroundings. This combination of delicate depth and sharp pictures of reality is magical.[207]

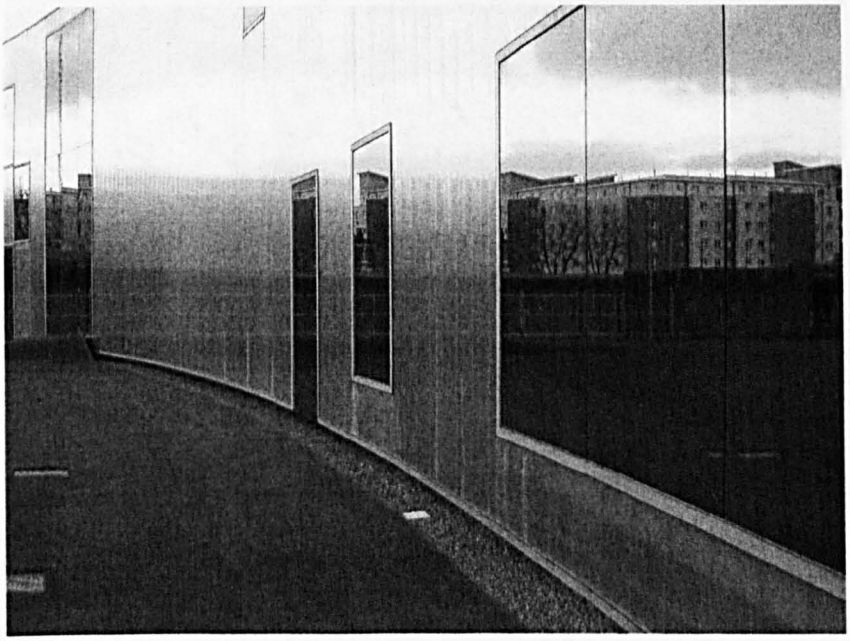


Figure 2.33
Laban Dance at London, UK, 2002,
by Herzog and de Meuron.

At night, lighting is diffused from inside to out, and the exterior surface becomes an out of focus presentation of inside spaces and activities. In contrast, during the day, the complex mixture of translucency and reflection produces a blurring between images of inside spaces and outside events, context, and landscape. While the transparent panels transmit the scene of interior spaces, and reflect clear images of the surrounding landscape and sky, the reflected images on the translucent polycarbonate panels are blurred due to the unpolished treatment of the material. Reflected images extending across panels thus are transformed from clarity into vagueness. There is thus a complex overlaying of imagery, not only are interior and exterior scenes

[207] Tim Ronalds (2003), "Cityscape of the surreal", *Architecture Today*, No.137 April 2003, 53.

intermingled, but each moves in and out of focus. As Ronalds notes, the Laban Dance Centre thus becomes a mediation between building and site; neither mimicking the context nor in conflict with it, the building acts as an interface between inside and outside, and creates new images of the surrounding environment.

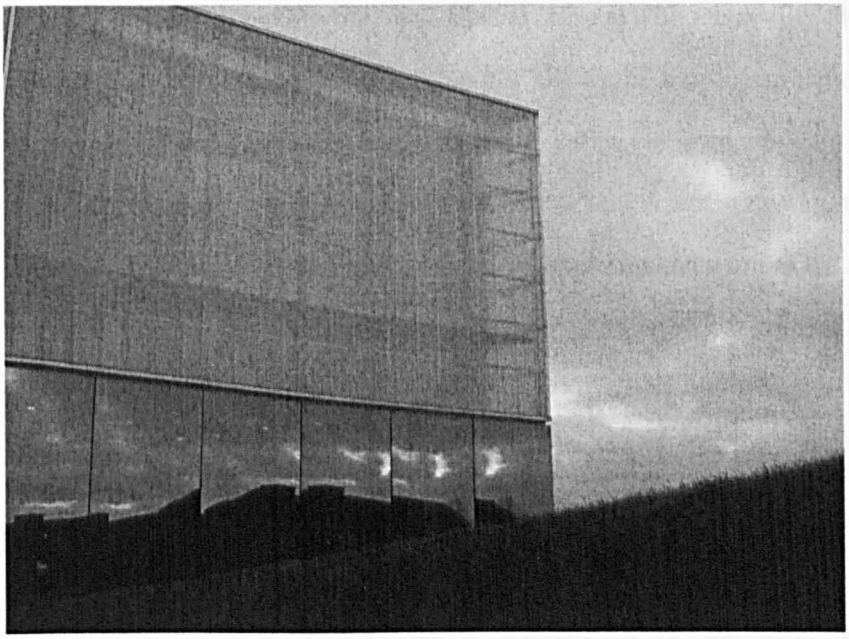


Figure 2.34
Laban Dance at London, UK, 2002, by Herzog and de Meuron.

The blurring of translucent surface endows the Laban Dance Centre with a quality of evanescence in comparison with a stable volume (Figure 2.34). The US academic, Vittoria Di Palma, who teaches at Columbia University, argued that this evanescence is produced in two ways: the blurring of the regular geometry of structure behind the surface; and the inflections of the surface which results in "a box that seems to bend and morph", rather than "a regular geometric solid".[208] As she notes:

Thus Laban's surface both delimits the boundaries of the building, defining it as a volume, and makes that volume appear insubstantial, mutable, almost ephemeral. The tension produced through this interplay between gridded structure and ephemeral surface is thus a tension between an impression of the building as a stable volume and as a mutable object; between a solid and a blur.[209]

---

[208] Vittoria Di Palma (2006), "Blur, Blots and Clouds: Architecture and the Dissolution of the Surface", *AA Files*, Vol. 54, 27.
[209] Ibid., 28.

Such argument can be extended further. The translucent skin blurs the images of mullions and rails, and thus turns the regular geometry of their structure into vague images, as if melting into the surface which creates a spatiality of depth. The ambiguity of the translucent skin thus transforms the actual shallowness of skin to a phenomenal "depthness" of surface. This surface-space effect is again in contrast to Miesian *skin-bone* architecture. Where Mies presents an image of certainty and order, the Laban is imbued with the quality of uncertainty, continually upsetting our perceptions, an effect due not just to the translucent panels but also the way that they gradually and continually curve away. As Palma commented:

Detracting from any sense of fixity or objectivity, they (Herzog de Meuron) draw the viewer into the work, directing attention to the instability of one's perception of the building, and thus to the subjectivity of perception itself.[210]

Summary

Translucent skins differ from either the Miesian skin or the Corbusierian envelope. On the one hand, it hides either the skeleton of building or the tectonic structure of the surface itself, and blurs their images to evoke a perception of depth; on the other hand, it produces an ambiguous presentation of interior volumetric organization and makes the overall volume evanesce. It is often double-layered, including an inner cavity. The space or distance between the two layers gives translucent skin an additional 'depthness'. It is precisely the mixture of vague images of the inside and reflected images of the outside that makes translucent skin intervene in the mediation between building, body and context.

2.3.2. Veiling Surface

In comparison with the prototype of translucent skin which is made up of translucent glass or other panels, the term 'veiling surface' here refers to a particular type in contemporary surface architecture that employs metal mesh, grids or other fabrics, as the outer layer of the building. Contemporary discussion about the veil concerns the obvious tension between hiding and revelation. For the literary critic Jean Starobinski, the particularity of the veil consists in the

---

[210] Ibid., 34.

fascination of "the hidden" behind it. He notes:

The hidden is the other side of a presence. The power of absence, if we attempt to describe it, leads us to the power possessed in varying degrees by certain real objects. These objects point beyond themselves toward a magical space. They are indices of something they are not. .....The fascination emanates from a real presence that obliges us to prefer what it hides, to prefer something remote, which it prevents us from attaining even as it offers itself. .....Rather than hold our fascination, it allows itself to be transcended in a perspective of the imagination, an obscure dimension.[211]

Starobinski's argument is based on the psychoanalysis of the gaze. For him, the gaze enables "consciousness to escape from the place occupied by the body", because the gaze never limits itself only to being satisfied with appearances alone. As Starobinski argues, the gaze therefore differs from the term *vision* which identifies the act of seeing:

If one looks at the etymology, one finds that to denote directed vision French resorts to the word regard (gaze), whose root originally referred not to the act of seeing but to expectation, concern, watchfulness, consideration, and safeguard, made emphatic by the addition of a prefix expressing a redoubling or return. Regarder (to look at, to gaze upon) is a movement that aims to recapture, reprendre sous garde (to place in safekeeping once again). The gaze does not exhaust itself immediately. It involves perseverance, doggedness, as if animated by the hope of adding to its discovery or reconquering what is about to escape.[212]

In this context, the veil prompts the anxiety of gazing, through which an impatient desire is developed towards "the hidden" behind – and thus creates a particular relation between subject and world.

In describing the idea of translucency in contemporary architecture, the MOMA architecture curator and critic Terence Riley brought the literary critique of the veil into the discussion of architecture. "The facade becomes an interposed veil," he said, "triggering a subjective

---

[211] Jean Starobinski (1989), "Poppaea's Veil", in Todd Gammon (ed.) (2002), *The Light Construction Reader*, (New York: The Monacelli Press), 231.
[212] Ibid., 232.

relationship by distancing the viewer of the building from the space or forms within and isolating the viewer within from the outside world."[213] A series of projects and buildings are used by Riley to support this argument. The Ghost House, designed and built by Philip Johnson back in 1985 at New Canaan, Connecticut, is an early example (Figure 2.35). This building is actually a house-shape enclosure made out of chain-link steel mesh, which is used to protect flowers from deer and strangers. The mesh surface permits the gaze to penetrate inside, but at the same time distances the viewer from the space within. What is interesting is how the effect of such a veil differs from that of transparent skin. When Colin Rowe and Robert Slutzky classified transparent glass and mesh within the same catalogue of literal transparency, they might have lost the specific distinction between these two sorts of architectural surface.

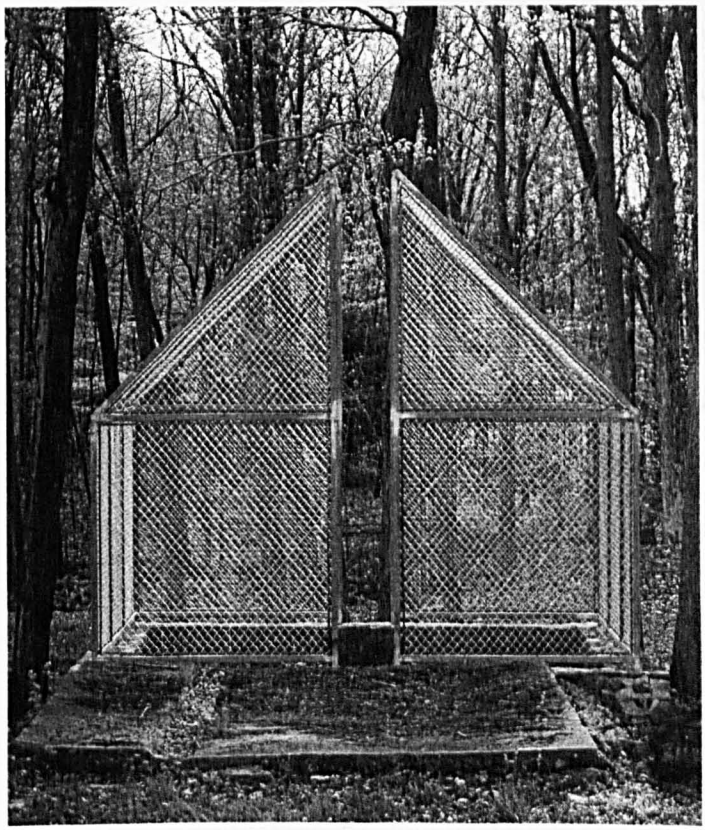


Figure 2.35
Ghost House at New Canaan of Connecticut, America, 1985, by Philip Johnson.

For Riley, contemporary veiling surface has its source in the idea of transparency, but is distinct from the modern transparent skin:

That all of the preceding projects might be referred to as "transparent" suggests a newfound

---

[213] Terence Riley (1995), *Light Construction*, (New York: The Museum of Modern Art), 10.

interest in a term long associated with the architecture of the modern movement. Yet the tension between viewer and object implied by the use of the architectural facade as a veiling membrane indicates a departure from past attitudes and a need to re-examine the word transparency as it relates to architecture.[214]

The key differences between the Modernist transparent skin and the contemporary veil, according to Riley, is firstly a difference between Miesian "nonmaterial", or the disappearance of the transparent skin, and the ambiguous presence of the surface-space of veil, which is both there in its materiality and not there in the gaps between.

The architect and scholar Eeva-Liisa Pelkonen argued that contemporary architecture has a "new sensibility" which "liberates architecture from its traditional modes of representation based on the interdependence of form and content."[215] The "traditional modes of representation" mean the form of mimesis or the means of metaphor, with a clear relationship between signifier and signified. In contrast, the "new sensibility" proposed by Pelkonen refers to "the transmission of a certain character and ambience" based on phenomenal perception of materials and spatial structures, which could be seen as similar to the presentation of "gesture" in the body.[216] The location of this presentation is the surface of architecture which acts as the boundary between inside and outside. It is this boundary which decides what becomes visible and what stays concealed. In this sense, surface plays a role of 'gesture' and 'attitude' rather than 'representation'. This ability to control the degree of revelation gives contemporary surface a specific social role – are in which, using Lefebvre's terms, the architectural surface as spatial boundary is also a social boundary and so joins in the production of social space.

The rejection of "traditional modes of representation" obviously is not a new issue in contemporary architecture, but Pelkonen makes the argument on the basis of the surface condition. To divide the contemporary "new sensibility" from previous modern types, she

---

[214] Terence Riley (1995), *Light Construction*, (New York: The Museum of Modern Art), 11.
[215] Eeva-Liisa Pelkonen (1996), "The veil: Architecture without organs", in Todd Gammon (ed.) (2002), *The Light Construction Reader*, (New York: The Monacelli Press), 281.
[216] Ibid., 281.

described them as different types of boundary, in terms of *veil* and *skin* respectively. In her point of view, veil and skin have different concerns:

They require two structural approaches as well as two strategies. The skin implies a boundary suspended between inside and outside; it requires a certain tension. The veil on the other hand implies wrapping that can be removed. It suggests secrecy yet promises revelation.[217]

The veil thus induces much more than merely a physical ambiguity: it also evokes a psychic tension.

Whilst such theories of the veil do not talk specifically of surfaces of metal meshes, grids or other fabrics, the architecture of 'contemporary veiling surface' has a similar impact in terms of degrees of revelation. On one hand, it is based on the condition of the object. The veiled surface is a semi-transparent boundary in which the degree of translucency is dependent on the density of the mesh or weaving. The translucency is further dependent on the angle of vision and the distance. The revelation of veiling surface is thus not just due to material properties, but is also based on the way people engage with that surface; the closer the observer is to the surface, the more they will see and so the more the 'hidden' is made visible. In this sense, the revelation of the veiling surface is more than just a visual condition; rather, it relates to the activity of people in actual space.

Veil and Privacy

Conventionally, residential buildings define ownership and create privacy by the separation of walls, with the connection to the outside controlled by the extent and type of windows and doors. In contrast, the architecture of the veiling surface brings about a spatial division which is less certain. An example of the use of a veiling surface in a residential building is the Schützenmattstrass Apartment, Basel, designed by Herzog & de Meuron and completed in 1993 (Figure 2.36). This seven-storey apartment building sits hard up to its neighbours, and thus immediately poses questions about privacy and spatial ownership. The side facing the public space of the street is covered by perforated steel panels, which are one-storey high and openable.

---

[217] Ibid., 283.

Behind these panels are balconies, and each balcony connects to the interior living space through a transparent glass partition. The surface of perforated steel panels blurs the vision, and plays the role of a veil, between hiding and revelation. This screen is obviously used as a means to maintain the privacy of the residents, allowing the transparent glass partitions to the living spaces be a full storey-in height, without any worry of visual intrusion from the street; but at the same time, in the nature of a veil, it teases the viewer with hints of the inner life of the apartments. With this veil, the balcony on each floor becomes a semi-closed space, somewhere in-between inside and outside. As a space between the veiling surface and the transparent partition, has the same qualities of 'depth' that we have seen in the double-layer surface structure. The translucency of the perforated steel panels lets suggestions of the interior scene through surface. In contrast to the display of illuminated rooms through translucent skin, this screen gives up fragmented images of light and shadow. This effect is not without a human edge, as the viewer has a desire to know more of what is being partially hidden.

Figure 2.36
Schützenmattstrass Apartment in Basel, Switzerland, 1993, by Herzog and de Meuron.

The tension induced by the veiling surface of the Schützenmattstrass Apartment is thus not only visual but also social. There is, first, an unequal visual relationship on either side of the screens. From the inside, the residents have a relatively clear view, because of their closeness to the

surface and the difference in light levels. Put simply, it is easier to see out than it is to see in, and in this the residents have the greater visual control; in the classic sense of surveillance, they are hidden but can see all, which is different from the Modernist proposition of open transparency. Moreover, because the veiling surface is openable, the resident has the option to open the screen and so to join in the public life of the street. This flexible situation intensifies their control over, and thus perceived ownership of, their private space. The veiling surface thus sets up a specific relation between public and private space with the variable appropriation of the inside space by the dweller on the one hand and the desire of the passerby towards the 'hidden' on the other side. In this sense the veil acts as interface in the production of social space, negotiating between private and public life, social space and bodies.

In addition veiling surface induces a questioning in our reading of depth behind the surface. As Bryan Lawson has argued, distance as a fundamental aspect of space is not a matter of purely geometrical factors, but rather is about "the way that geometry organizes our relationships."[218] For Lawson, spatial distance institutes and protects the consciousness of 'personal space' – a psychological space formed by people's behaviour and the habitual experience of bodily space – and thus defines and informs the situation of the relationship between people.[219] Through offering an interface between spaces, the veiling surface provides an alternative approach to the reading of 'distance' within 'personal space', determined not by the geometrical distance between bodies, but rather adjusted by the phenomenal translucency of surface.

Veil and Depth

Commenting on the architecture of Herzog and de Meuron, the Swiss architecture and art critic Gerhard Mack indicated that when the surface became a veil, it formed a particular spatiality that existed in tension between surface and depth, and this lead to a tension between presence and absence. He said:

The aim is to visually dissolve solid materiality into an almost textile fabric of shimmering colour, line and surface structures which gives space the illusion of endless depth, while it itself

---

[218] Bryan Lawson (2001), *The language of space*, (Oxford: Architectural Press), 100.
[219] Ibid., 100.

almost dispenses with a third dimension; conversely it also prevents a falling into this endless space. The surface becomes a veil, a mirage from Italo Calvino's "Le Città invisibili" which separates from the infinity it suggests. .....In both cases the flat plane becomes a membrane between formed space and amorphous expanse – it lends the invisible a perceivable face and becomes an emblem for an absentee.[220]

Two specific points can be picked up and developed from these comments by Mark. First, when the surface is treated as a veil, there is an important transformation from solidity of mass to spatiality of depth. The move from the perception of *mass* to *space* has been a continual theme in surface architecture since Modernism. In 1923, in *Towards a New Architecture*, Corbusier announced surface as being the envelope of mass, but this mass is already not a conventional massive solid but rather a simplified volume defined by the geometrical figures of surfaces. As he noted, "architects today are afraid of the geometrical constituents of surface".[221] Transparent skin, on the other way, uncovers the formed space of the inside through the disappearing of itself. The notion of envelope focuses on the externality of building, but the idea of skin suggests the internality of spatial structure. In contrast, contemporary veiling surface shows an equivocation of externality and internality. Through the presentation of ambiguous depth, veiling surface induces a spatiality of 'between', an oscillation between the enveloped volume and the displayed interior spatial structure. The second point to develop from Gerhard Mack is that veiling surface might create a surface-space 'between' imagined space and visible space. This space of the imagination is not an illusion but rather an expectation of disclosure of 'the hidden', something which is implied there but un-seeable, and therefore the imagination fills the gap. The expectation of disclosure could be encouraged by the process of uncovering in correspondence with the changing of the distance of observation, i.e. a distance between body and surface. However, the process of uncovering will never be completed due to the translucency of surface. It is thus always within a situation of 'between'.

---

[220] Gerhard Mack (1996), *Herzog & de Meuron: 1989-1991*, (Basel: Birkhäuser Verlag), 7.
[221] Le Corbusier (1989), trans. By Frederick Etchells, *Towards a New Architecture*, (London: Butterworth Architecture), 36

Figure 2.37
Signal Box Auf dem Wolf in Basel,
Switzerland, 1992-95,
by Herzog and de Meuron.

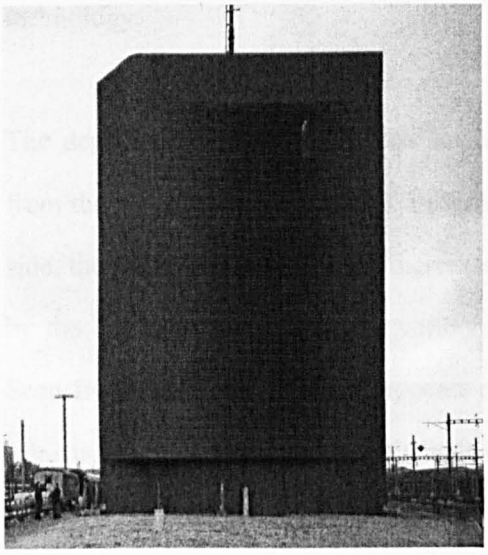
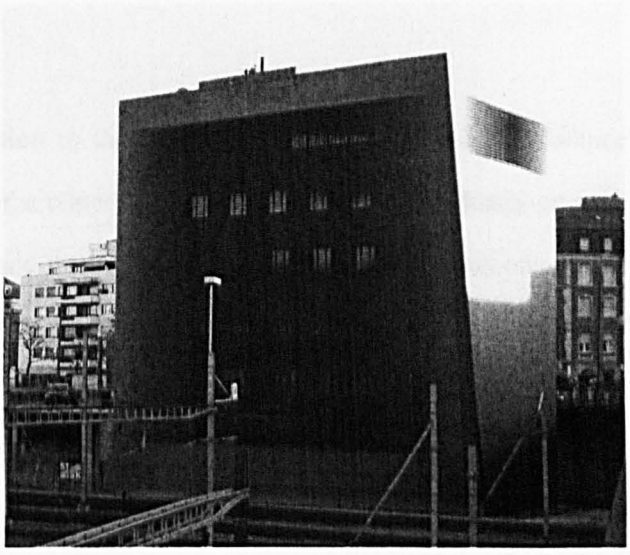


Figure 2.38
Central Signal Box in Basel,
Switzerland, 1999,
by Herzog and de Meuron.



Another building designed by Herzog & de Meuron can be used as an example here: the Signal Box at Auf dem Wolf, Basel, which had been constructed in 1992-95 (Figure 2.37). It also has a twin finished in 1999, known as the Central Signal Box (Figure 2.38). Auf dem Wolf is a six-storey concrete building wrapped by 200mm-wide copper bands which join each other tightly as a flat surface. The quality of veiling of this building is provided by the variation of the copper bands. On the short entrance side, the copper bands protrude from the concrete wall, pushed away by light steel brackets, to produce a triangular void behind. In the middle of each side of the building, over the position of the windows in the concrete wall, the copper bands are then turned up to generate a form of window blind which lets in daylight. Seen from the outside, the openings in the copper surface contrast with the darkness of the inner cavity and the lighting from the windows. The gradual rotation of the copper bands gives the surface multiple degrees of translucency. The copper banding also serves a functional purpose, acting as a 'Faraday cage' to protect the electronics of the signal box from the electromagnetic field on the site. Besides this functional role, Gerhard Mack argues that it also presents "a material imagery to the function of the building (modern monitoring techniques are carried out by computer and on the

computer screen)."[222] The effect of this "material imagery" is accentuated by the veiling surface, which because of its mysterious presence between the immaterial and material, evokes exactly the sense of the in-between of the virtual and the physical that is associated with modern technology.

The degree of translucency varies in relation to the position of observation and the distance from the copper banding surface. Because the copper bands turn up and back gradually on each side, the degree of translucency increases and then reduces smoothly step-by-step as one passes by the building. There is also a variety of spatiality dependent on distance from the building. Seen from afar, the signal box appears more like a massive solid because one cannot read the translucency. Only at night, with light spilling from the windows, is the veil even revealed. However, as one comes closer to the surface, the building appears lighter, less massive, due to a greater reading of translucency and the way in which the eye can begin to penetrate the surface (Figure 2.39). In this the veiling surface of Signal Box induces an oscillation between mass and depth that is exemplary of contemporary surface – an effect that is precisely a consequence of the active engagement of people and building, in which the depth of veiling surface becomes a phenomenal experience of bodily space.

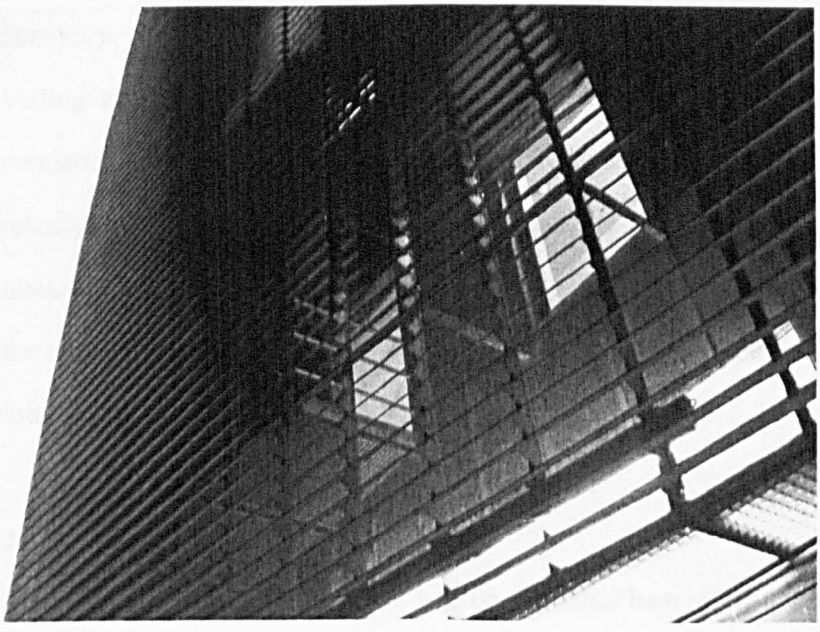


Figure 2.39
Signal Box Auf dem Wolf in Basel, Switzerland, 1992-95, by Herzog and de Meuron.

[222] Gerhard Mack (1996), *Herzog & de Meuron: 1989-1991*, (Basel: Birkhäuser Verlag), 29.

In this light, one cannot agree with Jeffrey Kipnis when he argues that the copper surface of the Signal Boxes is no more than a kind of "cosmetic" treatment relating "always and only to skin, particular regions of skin":

Its architecture is entirely a matter of cosmetics, a hypnotic web of visual seductions that emanate entirely from the copper band system, a system, it should be said, that is in fact not the building's actual skin, which lies just beneath; it only poses as the building's skin.[223]

The copper surface of the two Signal Boxes is very different from a cosmetics treatment. The idea of cosmetic is based on disguise, an artificial surface to cover up or enhance an existing one. A cosmetic is attached to the skin, whereas for a veil there is always 'something between'. Kipnis used the notion of "cosmetic" to distinguish the Signal Boxes from the readings of conventional means of ornament, but his term does not describe the phenomenal presence of the buildings. It is instead the phenomenal connection between externality and internality, and the way that the building responds to the body's action, that, makes the copper surface of the Signal Boxes different from both the autonomous form of Minimalist volume and the externality of ornamental surfaces; the buildings are not merely about a visual gesture, but rather are events in space-time.

Summary

Veiling surfaces endow an ambiguous depthness, and a specific tension between hiding and revelation. The most significant character of veiling surface is that it allows sets up a variable relationship between the action of people and the changing of translucency of surface. The distance between body and surface effects the perception of depth behind, and visibility through, the surface, creating a dynamic surface-space effect. This character turns 'spatiality of position' into 'spatiality of situation', from gesture to event.

2.3.3. Imaging Surface

The idea of 'imaging surface' that will be discussed here refers to neither a screen of electronic

---

[223] Jeffrey Kipnis (1997), "The cunning of cosmetics: a personal reflection on the architecture of Herzog and de Meuron", in Todd Gammon (ed.) (2002), *The Light Construction Reader*, (New York: The Monacelli Press), 431.

or digital projection, nor a general surface of printing, drawing, or painting, but to a special type of translucent surface. It is usually made of translucent panels onto which photographic images are printed. The translucency of this imaging surface takes it beyond mere presentation of images. Rather, the images become a source of ambiguity. The effect of the photographic images is twofold. On the one hand, images printed directly on to the surface break up the visual field, creating a complex translucency. On the other hand, the images introduce a challenge to the experience of realistic space, depending on the particular content of the photographic work. In this way, the imaging surface induces not only a phenomenal effect between interior and exterior, but also a tension between the actual space-time of 'now' and 'here' – a temporality of phenomenal space as it "arises from *my* relation to thing", as seen by Merleau-Ponty,[224] and an imaginary space-time of 'sometime' and 'somewhere' referred to by the photograph.

The combination of photography and translucency creates a particular spatial effect which can be explained in three ways. Firstly, it arises from the character of photography itself. The production of photography provides a different way for people to perceive the world. As Walter Benjamin indicated in his *Little History of Photography*, on one hand a photograph shows a presentation of real world, but on the other hand it informs "another nature which speaks to the camera rather than to the eye" – a world of "other", "in the sense that a space informed by human consciousness gives way to a space informed by the unconscious."[225] If, as Merleau-Ponty argues, phenomenal space is always inseparable from consciousness because it is always about the 'spatiality of situation' of the body, then photography informs an 'unconscious space' because a mechanical device interrupts the direct connection between body and the world. What a photograph presents is a world without the body of 'myself'. Although the photographer might have the intent to present a particular idea through the content and the framing of photo, the photographic object always has a character independent of the author's intent, since it addresses the unconscious space of the viewer – a space which is overlaid with

---

[224] M. Merleau-Ponty (1962), trans. by Colin Smith, *Phenomenology of Perception*, (London and Henley: Routledge & Kegan Paul Ltd), 412.

[225] Walter Benjamin (1931), "Little History of Photography", in Walter Benjamin (2005), ed. by Michael W. Jennings, Howard Eiland and, Gary Smith, trans. by Rodney Livingstone and Others, *Selected Writings/Walter Benjamin Volume 4: 1938-1940* (First paperback edition), (Mass. Cambridge and London: The Belknap Press of Harvard University Press), 510.

the qualities of contingency and indeterminacy. The photograph thus may induce a spatiality of indeterminate tensions. On one side, the photograph records a real matter at a given moment, and freezes the temporality of that moment forever. It always recalls a 'real' space-time out of the current moment. On the other side, the contingency of photographic space, in the way that the context and perception of the viewer is never fixed, brings an indeterminacy to the reception of photography. In order to mitigate this, Benjamin thought the title and description was important for the exact understanding of photograph.[226]

Secondly, in using not one photograph but a series of repetitive photographic images, imaging surface introduces a challenge to reality through the experience of viewing. In his famous essay, *The Work of Art in the Age of Mechanical Reproduction*, Walter Benjamin argues that following the shift to the paradigm of *reproduction*, especially with photographic images, the value of the artwork shifted from cult to exhibition, and as a consequence, the artwork lost its "authenticity".[227] The authenticity of the artwork, as in its unique relation with the original thing, is not reproducible. The reproduction of photographic images thus instantly abolishes the unique correspondence between photograph and the real origin through a displacement to an autonomous world. According to Jean Baudrillard, printed photographs without "authenticity" are no more than an industrial simulacrum, a category of the world of simulation which is "the generation by models of a real without origin or reality: a hyperreal."[228] The "hyperreal" described by Baudrillard is a space where images are reproduced self-referentially, devoid of their original context. With the reproduction of photographs, every image is the 'original' one. As a consequence, repetitive images, such sometimes as used on imaging surface, establish a realistic, autonomous world of simulation in contrast to the real world. The logic of reproduction is less obvious with only one image. For Baudrillard, the logic of reproduction and simulation is best perceived through the presentation of a "vertigo of reality", such as "the properly serial form" of Andy Warhol.[229] This can be found in many of Warhol's screen prints,

---

[226] Ibid., 527.
[227] Walter Benjamin (1936), "The Work of Art in the Age of Mechanical Reproduction", in Walter Benjamin (1970), ed. by Hannah Arendt, trans. by Harry Zohn, *Illuminations*, (London: Jonathan Cape Ltd), 223-227.
[228] Jean Baudrillard (1983), trans. by Paul Foss, Paul Patton and Philip Beitchman, *Simulations*, (New York: Semiotext (e), Inc.), 2.
[229] Ibid., 143-145.

for example, his *Marilyn Diptych* of 1962. The juxtaposition of repetitive icons of this famous female star presented a self-world of images themselves through the visualization of serial mechanical reproduction.

Lastly, when an image is adopted to cover the surface of an object, in general the visual perception of this object would be dominated by content of the covering image: just as in a photo, where the messages of the image cover and hide the original essence of the printing paper. However the material quality of the underlying surface affects the final perception of the photograph. In this manner, when images are printed on translucent materials and are in themselves are translucent, a complex effect is produced, which smoothly mixes the images with the effects of light and shadow transmitted from the interior and reflected from the exterior. This mixture is also a temporal one, with the time of the printed images melding with the real time displayed in the light and shadows, invoking a tension between another world (of the image) and the world of the here and now.

In the view of Philip Ursprung, many projects of Herzog and de Meuron show an effect of architectural spectacle which aims to "exhibit architecture in architecture".[230] Often, architecture joins the creation of spectacle, such as when it is used as the accommodation of the display and exhibition of commodities, as in the early case of the Crystal Palace of 1851. In this situation, architecture occurs as a symbol or sign which is part of the representation of the production and/or consumption inside the building. In contrast, what Ursprung argues is that the architecture of Herzog and de Meuron acts as a spectacle of architecture itself, rather than as the representation of interior things and events. Or in other words, the main object of consumption is not anything exhibited inside but rather the exhibition of architecture itself. For Ursprung, this transition informs a changing of mechanism of spectacle in response to contemporary society:
For Herzog & de Meuron are constantly trying out different registers of exhibiting: the architectural exhibition as a genre in which architecture is mediated to an interested public; the exhibition of architecture itself, as a means for the presentation of objects; and the question of

---

[230] Philip Ursprung (2002), "Exhibiting Herzog & de Meuron", in Philip Ursprung (ed.) (2002), *Herzog & de Meuron: Natural History*, (Baden: Lars Müller Publishers), 27.

exhibiting their buildings in mental and social spaces. Herzog & de Meuron's alternative to the representational system of the spectacle is therefore not about anti- or non-capitalist representation (whatever that might be), but rather a form of representation that can cope with the complexity and dynamism of the current situation and is thus, by definition, oriented towards the future.[231]

The notion of spectacle, as Guy Debord argued in *The Society of the Spectacle*, refers to a world of symbolic and 'signal' images which is distinct from real objects. In the world of spectacle, everything becomes no more than appearance; and the relationship between people and society is organised by representational images rather than original objects. As a system of images, spectacle "is not something added to the real world – not a decorative element, so to speak. On the contrary, it is the very heart of society's real unreality" because "SPECTACLE IS NOT a collection of images; rather, it is a social relationship between people that is mediated by images."[232] For Debord, spectacle always shows the "real unreality" of society because the real world of objects is obscured and even displaced by the signal system of "autonomous" images. However, Ursprung suggested that the architectural spectacle created by projects of Herzog and de Meuron has an alternative character. Through the exhibition of architecture itself, i.e. the materials and construction of the building itself, this kind of spectacle shows a kind of "new reality" in contrast to the "real unreality" referred by Debord, because the image architecture is inseparable from the transaction of its material and construction – i.e. between real objects and the real world. It thus shows a new logic of spectacle.

Following the Marxist ideas of fetishism and exchange value, the logic of spectacle is no more than the logic of capitalism, of its production and consumption. According to Lefebvre, the production and consumption 'of' space necessarily become a significant matter following the development of capitalism, in comparison with the production and consumption 'in' space.[233] The new mechanism of spectacle as Ursprung argued, i.e. the exhibition of architecture, can be

---

[231] Ibid., 33.
[232] Guy Debord (1994), trans. by Donald Nicholson-Smith, *The Society of the Spectacle*, (New York: Zone Books), 12-13.
[233] Henri Lefebvre (1991), trans. by Donald Nicholson-Smith, The production of space, (Oxford & Cambridge, Mass.: Blackwell), 352-353.

seen as a consequence of the production and consumption *of* space; in contrast, the conventional sense of spectacle is based on the concentration on the commodities *in* space. As an interface between people and space, the architectural surface of Herzog and de Meuron's projects creates architectural spectacle, and may obey the logic of consumption of space in the epoch of information.

The examples of imaging surface, as will be discussed in projects by Herzog and de Meuron, show a particular mode of the exhibition of architecture. As mentioned in the preceding paragraphs, the particularity of the combination of photography and translucency induces a specific perception of space. Moreover, the architecture of translucent imaging surface produces a kind of 'ambiguous reality' and particular spectacle because the 'materials' of its construction include the images of photography, which as a 'message' informs a kind of reality out of the world, of 'now-here', rather than an object. In this context, it could not only evoke a dialogue between the real and 'hyperreal', but also form a new representational model for architecture.

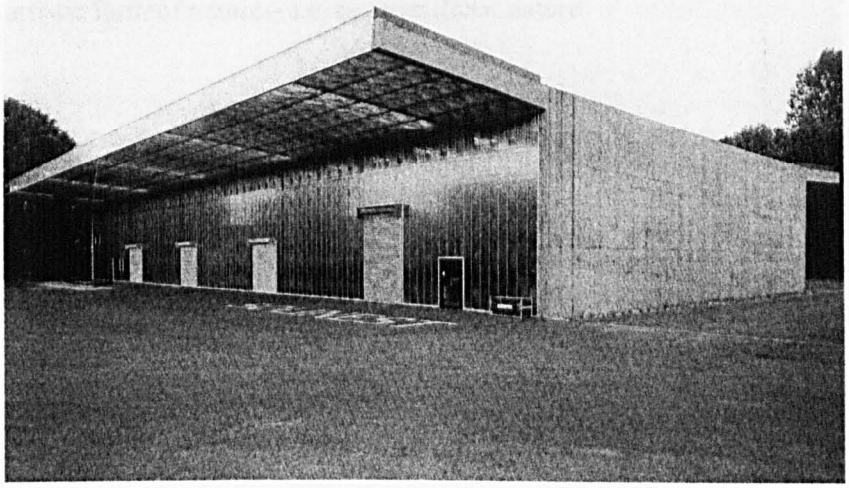


Figure 2.40
Ricola Europe Factory and Storage Building in Mulhouse-Brunnstatt, France, 1993, by Herzog and de Meuron.

Imaging Surface and Landscape

The Ricola Factory and Storage Building in Mulhouse-Brunnstatt, France, designed by Herzog and de Meuron and completed in 1993, is an example of translucent imaging surface (Figure 2.40). This one-storey building is located on an idyllic wooded site between two rivers on the

southern edge of the city of Mulhouse. The plan of building is a simple rectangle; the surfaces of the two short sides are made of black concrete, but on the two main sides, silkscreen images of a yarrow leaf are printed repetitively on the surface of translucent polycarbonate panels. These effects are continued on the underside of the projecting roof which cantilevers past the wall on a steel structure. The image for silkscreen comes from a photograph by the German artist Karl Blossfeldt: *Leaf of Achillea Umbellata, enlarged 30 times* of 1928.

The Swiss art historian Ulrike Meyer Stump argues that the abstraction of Blossfeldt's enlarged leaf revealed a "hidden geometry of nature", which matches Herzog and de Meuron's aspiration of a non-representational connection between architecture and the nature. As Meyer Stump notes, at the end of the 19th century, Blossfeldt followed his tutor, artist Moritz Meurer, in the study of the structure of plants, and his photographic enlargement of plants were used as part of their studies.[234] In correspondence with Meurer's motive to find a new resource for the German Arts and Crafts movement, Blossfeldt's photographs became the sources for Meurer's plant sculptures as abstract but crafted models of nature. In other words, Blossfeldt's photographs of an enlarged leaf could be understood as a presentation of a living model of plant life, as an artistic form of nature – i.e. as an artificial nature.

In their essay, *Hidden Geometry of Nature*, Herzog and de Meuron argue that in the current social and cultural situation the nature of materials, and even more of nature itself, lose their original visibility through the transfer to artificial production. Seeing architecture "as a thinking model for a critical perception of our whole culture,"[235] Herzog and de Meuron try to explore the complexity of relationships between architecture and nature. Such complexity is mainly produced by transferring the natural materials and phenomena to a novel form, which is different to our habitual experience. In this sense, their architecture is seen to evoke a kind of "critical perception" of the real world. As they said in a conversation with Theodora Vischer, "we are trying to expand the role assigned to materials in traditional usage by changing their

---

[234] Ulrike Meyer Stump (2002), "Models of a hidden geometry of nature: Karl Blossfeldt's 'Meurer Bronzes'", in Philip Ursprung (ed.) (2002), *Herzog & de Meuron: Natural History*, (Baden: Lars Müller Publishers), 303.
[235] Herzog and de Meuron (1988), "The Hidden Geometry of Nature", in Gerhard Mack (1997), *Herzog & de Meuron 1978-1988*, (Basel: Birkhauser), 210.

form and making them available to a new manner of perception, thus gaining a new sense of tension at the place."[236] The imaging surface of the Ricola Europe building is precisely such a case. The image of Blossfeldt's leaf photograph shows an unfamiliar form of natural leaf because it is enlarged to a size which clearly cannot be seen in normal way. It thus shows a kind of "hidden geometry of nature", i.e. a real but normally invisible geometrical structure and form of the natural leaf. In this sense, the leaf image of the Ricola Europe building informs a tension between the natural and the artificial world. As the architects note, "the picture of the leaf links an easily recognizable figure, namely the shape of a leaf, with something that is abstract, stylized, and ornament."[237]

If the choice of the natural image was the first step of the design of the imaging surface for the Ricola Europe building, for the specific perception of a different nature, the repetition of this motif could be considered as the second one. As Herzog explained in a conversation with Jeffrey Kipnis:

We wanted something that related to the garden outside, but that was not too naturalistic. .....The effect of the image in repetition was crucial; the one we chose was still recognizable as a plant, but the repetition also turned it into something different, something entirely new...This effect of repetition, its ability to transform the commonplace into something new, is an aspect you can also find in Andy Warhol's work.[238]

Through the serial reproduction of Blossfeldt's photographic leaf, it is the image of the leaf itself rather than the leaf in nature which becomes the reference point. This self-referential formation increases the independence of a world of 'another nature', in comparison with the original one. Moreover, because this reproduction is not a simple mechanical process of copying images but rather part of a process of industrial production of materials – the leaf images are not independent but bonded on to polycarbonate panels – the artificial character of the repetitive leaf images is also intensified. In his essay *Rhetoric of Image*, Barthes distinguished two

---

[236] Gerhard Mack (1997), *Herzog & de Meuron 1978-1988*, (Basel: Birkhauser), 215.
[237] Philip Ursprung (ed.) (2002), *Herzog & de Meuron: Natural History*, (Baden: Lars Müller Publishers), 244.
[238] Jeffrey Kipnis (1997), "A conversation with Jacques Herzog", *EL Croquis 84: Herzog & de Meuron 1993-1997*, 1997, 12.

contents of image in terms of *symbolic message* and *literal message*. The former is representational, coded and connoted, relevant to the knowledge of culture; the latter is phenomenal, un-coded and denoted directly based on the perception.[239] The repetitive leaf images do not add any representational content to the building, but rather present a literal message of phenomenal artificial nature.

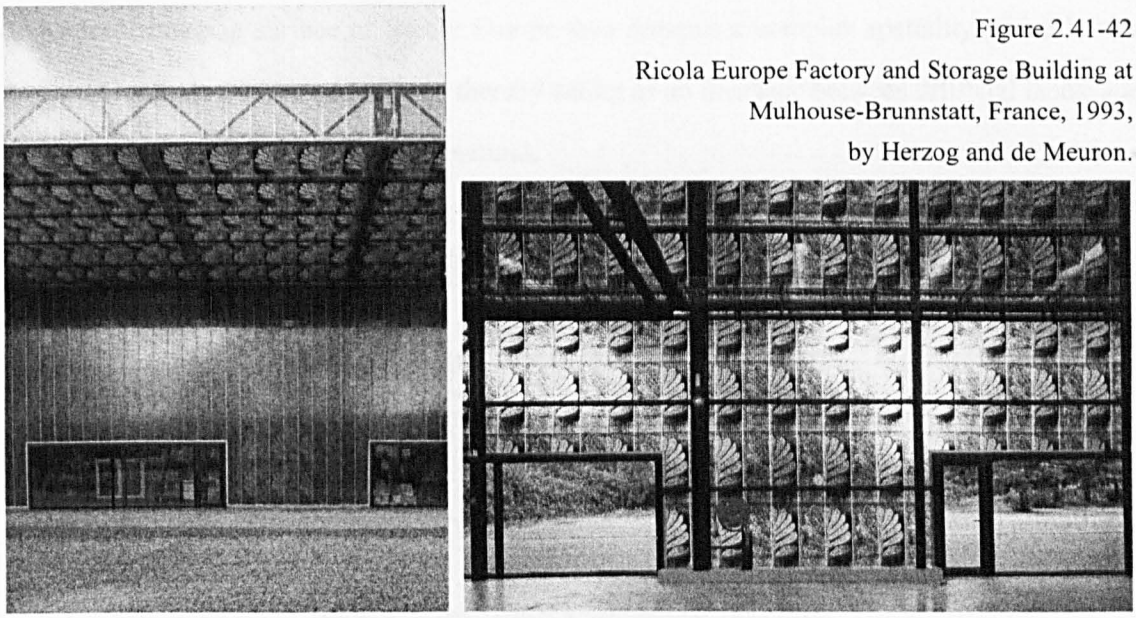


Figure 2.41-42
Ricola Europe Factory and Storage Building at Mulhouse-Brunnstatt, France, 1993, by Herzog and de Meuron.

In addition to this literal image of nature, the architects play on the relationship of this artificial nature with the surrounding nature. Due to the translucency of the surface, this dialogue is based on a phenomenal superimposition of artificial images of the leaf with blurred images of the surrounding environment. It is precisely because of such a phenomenal interrelationship that the imaging surface of Ricola building can be distinguished from both the pure artistic presentation of Andy Warhol and the convention of iconic ornament in architecture. The comparison between artificial nature and real nature is realized and visualized through two approaches. Viewed from outside, the overlapping mixture of shadowy repetitive leaf images, blurry shadows and reflections of the surrounding landscape form a complex spatial effect on the polycarbonate surface (Figure 2.41). From inside the building, the contrast of the real and artificial is presented in two ways. Firstly, the translucent leaf images and blurred images of the outside landscape

[239] Roland Barthes (1977), "Rhetoric of the image", in Nicholas Mirzoeff (ed.) (1998), *The Visual Cultural Reader*, (London and New York: Routledge), 70-73.

occur on the surface simultaneously. The superimposition of these two images provides an immediate tension between two different presentations of the natural world, as a combination of "artificial landscape" based on natural phenomena, as William Curtis notes.[240] Secondly, the transparent glass doors frame the outside landscape into pictures. These articulated pictures not only act as reminders of the real existence of natural landscape outside, but also, as a literal framed picture, form a comparison with the artificial photograph of plants (Figure 2.42). The translucent imaging surface of Ricola Europe thus presents a complex spatiality which brings together multiple themes and effects, thereby acting as an interface between artificial landscape and pictorial landscape, artificial and natural.

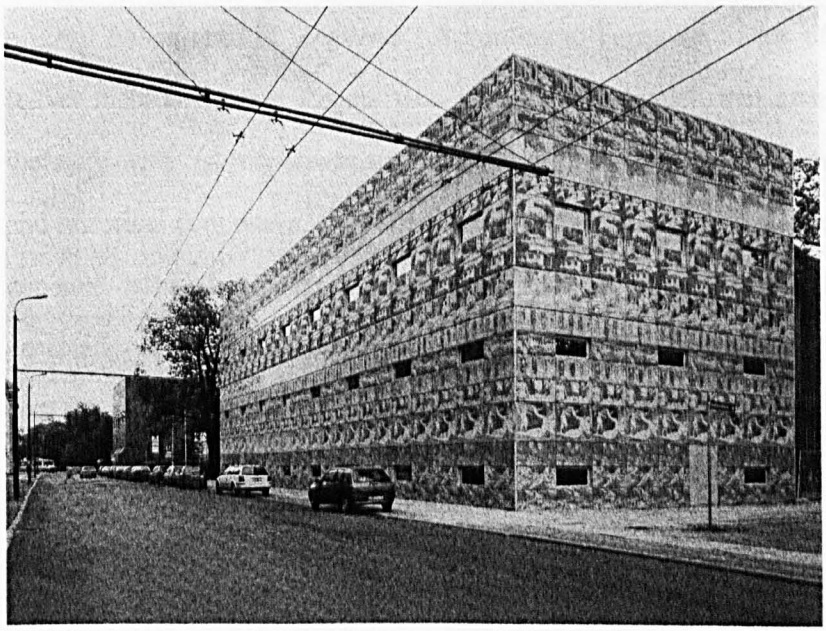


Figure 2.43
Eberswalde Library,
Germany, 1999,
by Herzog and de Meuron.

Imaging Surface and Context

The Eberswalde Library is a building for the Eberswalde Technical School, designed by Herzog and de Meuron and completed in 1999. Eberswalde, a town to the northeast of Berlin, was an industrial centre in the former East Germany. The building is located on a site between an overgrown park and a motley collection of small-town architecture. It is a three-storey building using a standard concrete structure with a regular box-shape, but covered with an imaging surface that consists of printed concrete and glass panels, arranged in alternating bands. The

[240] William J.R. Curtis (2002), "The Nature of Artifice: a conversation with Jacques Herzog", *EL Croquis 109/110: Herzog & de Meuron 1998-2002*, 2002.

concrete and glass panels are kept on the same plane to form an integrated smooth surface. In addition, there are small window panels, which regularly punctuate the concrete. These glass windows are set back a bit from the main imaging surface, making the thickness of concrete panels visible, giving a depth to the imaging surface, and thus saving it from being superficial as pure surface (Figure 2.43).

The imaging surface of the Eberswalde Library introduces a different approach to the idea of 'context' in comparison with conventional stylistic contextualism. As investigated by Adrian Forty, when the terms 'context', 'contextual' and 'contextualism' were imported into the architectural vocabulary in the 1960s, there was a slippage from the theoretical concerns of original Italian term of '*ambiente*'. According to Forty, the notion of 'context' comes from the Italian theorist Ernesto Rogers who in the 1950s argued that architecture should concern a dialogue with '*lepreesistenze ambientali*' (surrounding pre-existences) both in physical sense and historical continuum.[241] In Rogers' version, historical continuum is not solely a formal and concrete issue. Later, through the arguments of Aldo Rossi, Christopher Alexander and especially Colin Rowe, the idea of context is turned into an interest with concrete form. The concern of 'contextualism' becomes a matter of a formal match. In contrast to this stylistic contextualism, the imaging surface of the Eberswalde Library recalls a memory of history through the phenomenal perception of historical photographs. This historical presentation creates a dialogue between the new building and its existing, historical surroundings on one hand, and the specific historical context of the city on the other. The images used for the silkscreen of both the concrete and glass panels come from the series of *Newspaper Photographs* by the German artist Thomas Ruff. The selection and position of these newspaper photographs were decided not by the architects, but Ruff. The photographs repeat horizontally along each band, but change vertically. The sources of the photographs are varied, but each has a historical dimension. Most of them come from the photos of historical events, but there are also several images from Classical paintings. Some photographs also record everyday life from various years and situations. For example, a daily scene of 1920s Berlin, an advertising photo of

[241] Adrian Forty (2000), *Words and Buildings: A Vocabulary of Modern Architecture*, (New York: Thames & Hudson), 132.

a railway model of 1964, or a dramatic comparison between escapees on the Berlin Wall of 1961 and a crowded celebration of the toppling of that Wall. Some photos record special things, such as the Haus am Horn in Weimar designed in 1923 by Geory Muche and built by Walter Gropius's practice, as a Bauhaus icon; a Canadian aircraft prototype of the 1940s or 1950s; a dilapidated arch from the Renaissance palace of Colle Ameno in Bologna. Other images are reproduced from paintings, such as Lorenzo Lotto's *Venus and Cupid* of 1520s; a detail of Pieter Potter's *vanitas* from the 17th century and a portrait of the German scientist Humboldt painted by Eduard Ender in 1856.[242] As described by Gerhard Mack, the choice and arrangement of the images is for Ruff neither pseudo-aesthetic nor random, but rather conscious of the function of the library "'to store knowledge and make it accessible', and in doing so 'to develop historical and social awareness'".[243] Although, as Mack noted, the artist has his own reason and own interpretation for the choice and arrangement of these photographs, the viewer may not be aware of the specific rationale behind his choice. However, what could be perceived immediately are the 'literal message' and a common sense of the icons and their different ages in history. The complex mixture of different space-times creates a phenomenal experience of montage, a spatial tension between the current and history.

Besides the montage of multiple references of space-time, the effect of this imaging surface is reinforced by the treatment of the photographic images. Ruff's art work converts the newspaper photographs into indeterminacy, portraying them as the "Memorial to the Unknown Photographer." The original intention of photographer, namely the fixed correspondence between photograph and its narrative, is displaced into various interpretations according to each different viewer or audience. As the German art critic Valeria Liebermann has argued:

Ruff long ago abandoned the notion that a photographic image is by definition real or true to life, or that it has intrinsic documentary value or 'objectivity'. For him very photograph is, in the first instance, simply a surface that operates somewhat like a mirror – the viewer usually only sees that which corresponds to his or her own experiences and ideas, and often fails to

---

[242] Gerhard Mack (2000), "Building with Images: Herzog & de Meuron's Library at Eberswalde", in Gerhard Mack and Valeria Liebermann (2000), *Eberswalde Library: Herzog & de Meuron*, (London: AA Publications), 31-33.
[243] Ibid., 31.

recognize the photographer's contribution.[244]

The evocation of such fluid perception is realized by the emphasis on the immediacy of the images themselves without their original 'news value'. As Liebermann describes, there are two specific steps for Ruff to keep photographs as images in their own right. First, it depends on the separation between image and interpretative text. The specific content of the 'news value' of a newspaper photo is maintained by the accompanying, title and description. Divided from such text, a photograph becomes more like a presentation of 'somewhere' and 'sometime' in a sense of the unknowable or indeterminate, rather than a fixed reference pointing to a certain matter. Secondly, the means of technical reproduction distances the images from the pure, original photographs. Silkscreened onto the concrete and glass panels, the effect is to bring out the impact of the dot screen, which Liebermann notes "makes the newspaper photograph instantly recognizable as a reproduced image."[245] Because of this particular effect of the silkscreen, the surface of the underlying materials is not totally hidden by the printed images, which conjoin with the texture of the solid materials, and thus gain a type of physical 'reality' which contrasts with the original ephemerality of the image, but also somehow makes more real a representation that might otherwise be evocative of the imaginary. The tensions between the original and the reproduction, particularity and indeterminacy, reality and imagination emerge through the artistic treatment of the imaging surface. On one hand, the photographic images are referred to an indeterminate 'outside', on the other hand, as materially embodied on the surface they reveal the existence of the building itself.

The complexity evoked by the presentation of photographic images is heightened by the superimposition of interior and exterior spaces on the surfaces, through both the translucency of the glazed panels and the transparent windows. This effect of superimposition takes the relationship of inside-outside beyond a simple metaphorical reading of, in Liebermann's terms,

---

[244] Valeria Liebermann (2000), "'Reflections on a Photographic Medium', 'Memorial to the Unknown Photographer', or 'Visual Diary'?: Thomas Ruff's Newspaper Photos", in Gerhard Mack and Valeria Liebermann (2000), *Eberswalde Library: Herzog & de Meuron*, (London: AA Publications), 59.
[245] Ibid., 60.

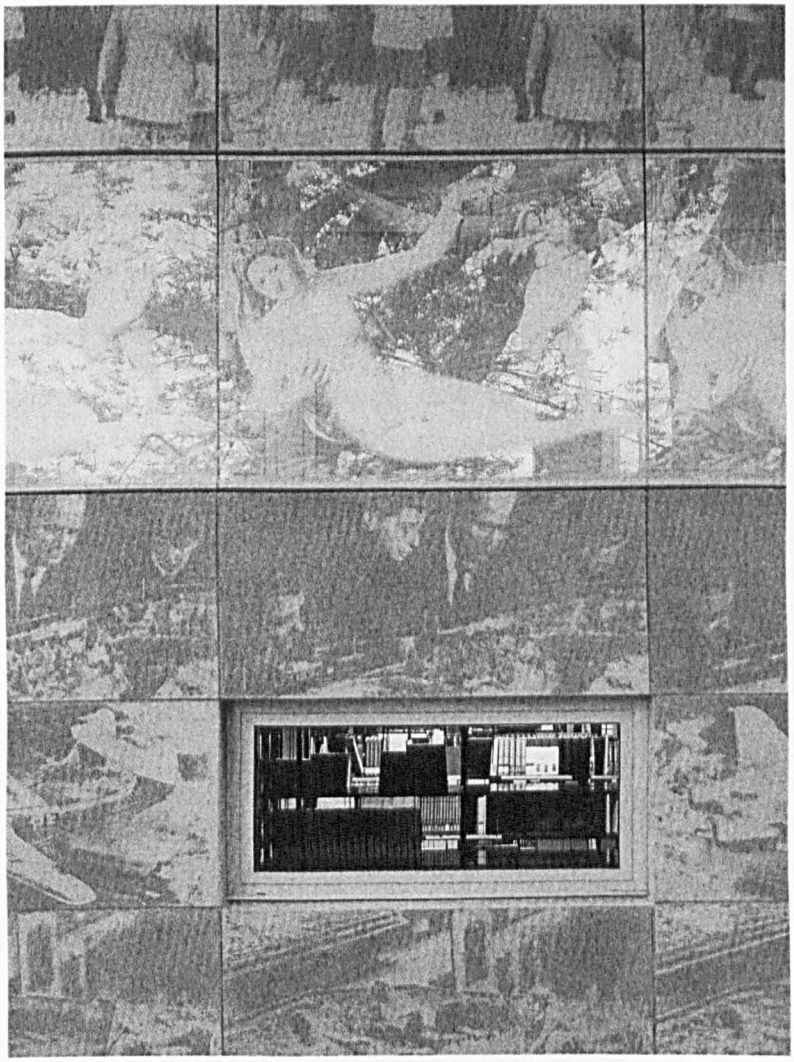


Figure 2.44
Eberswalde Library,
Germany, 1999,
by Herzog and de Meuron.

a conversation between external 'visual diary' as a picture store and internal library space as a storehouse for books.[246] It is not simply a poster-wall for the artist to show his pictures, as Ruff claimed.[247] Through the connection of translucent and transparent windows, the imaging surface brings the interior spaces into play. The three bands of printed glass panels give a reminder of the presence of interior spaces. In the daytime, the cavity between printed glass panel and the inner, translucent glass, window is visible but unclear, not only because of the overlay of images but also because of the reflections of the surrounding environment (Figure 2.44). The relationship of image and space behind it change, dependent on the observer's position. The horizontal repetition of images creates a form of a cinematic presentation, which is

[246] Ibid., 63.
[247] Philip Ursprung (ed.) (2002), *Herzog & de Meuron: Natural History*, (Baden: Lars Müller Publishers), 164.

animated by the movement of the observer's body to make what is like a silent movie, with real events as its narrative. At night, the light and shadows from the inside presents an un-seeable but perceivable interior space. At the same time, the array of small transparent windows offer a series of framed pictures of the interior space (Figure 2.45). Since these are the same size as the panels of photographic images, there is a resultant tension in the juxtaposition of the realistic framed picture showing a current and temporary spatiality of the now and here with the reproduced photographic image, evoking a memory or imagination of another space-time elsewhere, of the past and there.

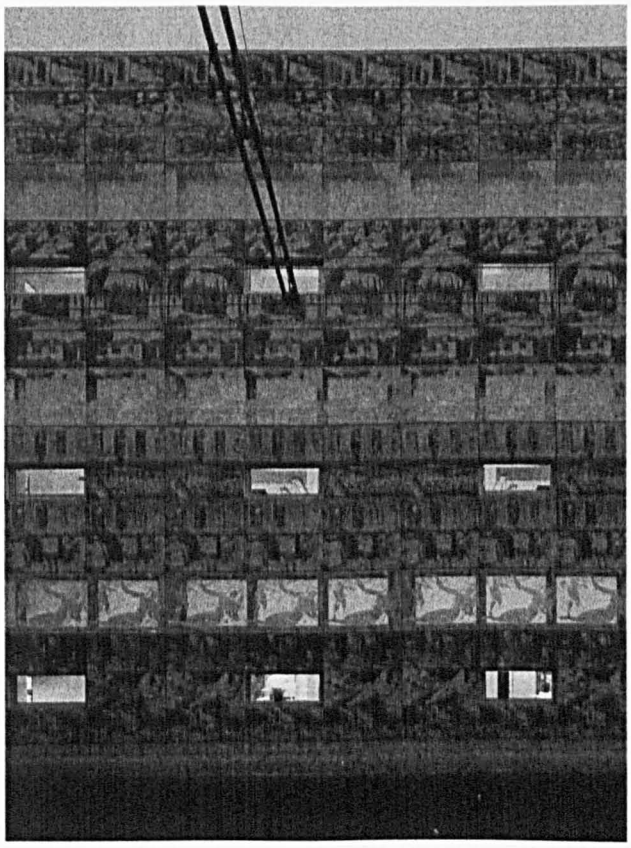


Figure 2.45
Eberswalde Library,
Germany, 1999,
by Herzog and de Meuron.

Summary

In relation to the evolution of the technical reproduction of images, Benjamin suggested a difference of perception in terms of "concentration" and "distraction": the former means that when a person concentrates before a work of art, he or she enters into the work; for the latter, in the contrast, the distracted masses absorb the work of art into themselves through its

collectivity.[248] For Benjamin, architecture is an original model of the latter condition of distraction. With its combination of cinematic repetition of photographic images and translucent and transparent surfaces, and sometimes with the engagement of reflection, the imaging surface forms a new prototype of "distraction" which is based on a complex effect of surface-space, in which the material presence of architecture is overlaid with a set of immaterial conditions. As, Kipnis notes of this juxtaposition:

.....HdM is able to insist on the reality of the building while never allowing it to settle as a reliable and persistent presence. In other words, they do not dematerialize a concrete form but by replacing the concrete; they dematerialize the concrete itself.[249]

Against this reading, Herzog and de Meuron do not fully dematerialize the building materials themselves, but create a tension between materials and their dematerialiity, i.e. a surface-space, a spatiality of surface architecture, which fuses the real and the imaginary, the present with the absent.

2.4. Key Terms of Contemporary Surface Architecture

Based on the discussion in this chapter, a list of key terms can be summarized here, which will then be used to configure the diagram of surface in the next chapter. Following the model developed in Chapter One, these key terms are also classified into three groups: namely *surface agents*, *design principles*, and *spatial contents*.

1). Surface agents

Blob: Blob is a prototype that relates to a form of inflected volume. Through the inflection of topological curvature, it aims to produce the spatiality of 'animation', for example a visual effect of fluidity. For Lynn, the Blob is seen as a design strategy which is expected to produce an active 'body' – envisioning building as an autonomous, living object – which could respond to the forces of environment. In this sense, the architecture of blob intends to create a

---

[248] Walter Benjamin (1936), "Work of Art in the Age of Mechanical Reproduction", in Walter Benjamin (1970), ed. by Hannah Arendt, trans. by Harry Zohn, *Illuminations*, (London: Jonathan Cape Ltd), 241.
[249] Jeffrey Kipnis (1997), "The Cunning of Cosmetics: a personal reflection on the architecture of Herzog and de Meuron", in Todd Gannon (ed.) (2002), *The Light Construction Reader*, (New York: The Monacelli Press), 433.

'smoothness' in the relationship between building and context, between inside and outside spaces. Though such 'smoothness' is suggested by its proponents to be reflected too in the social and political domains, blob architecture cannot achieve this aspiration just through its smooth shape.

Folded Surface: This prototype has a surface form that folds between wall, floor and ceiling or roof. It transforms these architectural elements into a formation of topological inflections. Due to the transition between vertical and horizontal, the folded surface is not only about the inflection of form but also the 'inclusion' of body and space-time. In other words, it is not merely a visual effect but rather an accommodation of movement and bodily space. According to this characteristic, a folded surface could transfer the topology of form to a quality of topological space, i.e. an indeterminate space of the multi-'inclusion' of space-time, as a kind of 'hyperspace'.

Topographical Surface: This formal prototype is based on the inflection of the ground surface, and thus creates an alternative relationship between architecture and the ground in comparison with the conventional mode of 'standing up vertically'. The topographical surface can thus create a situation of 'weightlessness' in contrast to the presentation of 'anti-gravity' of vertical form. When the inflection of a topographical surface includes the 'vectors' of social and cultural forces, it has the potential to produce 'smooth intervals' for various events, because it can create a flexible and indeterminate 'frame' for everyday life, which disrupts the division of architectural 'frames' of separation, selection and arrangement. In this instance, the topographical surface could create a dynamic relation between architecture and context. In addition, a topographical surface forms a particular interconnection between architecture and landscape. It constructs a practical and living landscape which responds to the actual and temporal experience of bodily space and movement in contrast to the visual representation of pictorial landscape.

Translucent Skin: This is a prototype made of translucent panels, often double-layered, including an inner cavity. The translucent skin induces the perception of depth through the

blurring of a number of normally separate condition – images of interior events, the tectonic material of surface, the skeleton of the building, and the volumetric organization of rooms and floors. In addition, when the corners of the building are blurred, a translucent skin makes the volume evanesce. The ambiguity of this prototype often includes the effect of reflection, in which reflected images are blurred to create a transformation of the surrounding context or landscape. The translucent skin is thus defined best by the mixing of vague images of the inside and reflected images of the outside.

Veil: The veiling surface relates to a form of open mesh or fabric, which has the quality of translucency. It implies a particular tension between hiding and revelation, between enclosure and disclosure. The translucency of a veiling surface changes depending on the distance and/or angle between viewer and surface. In this sense, it brings a potential opportunity for the establishing a relationship between the actions of people and the surface; it is thus not merely a visual matter, but can contribute as an event in bodily space.

Imaging Surface: This is a kind of translucent surface on which photographic images are printed. The particularity of an imaging surface is the mixture of translucent materials and printed images. The photographic image recalls a real space-time out of now-here. The effect is accentuated when the image is printed repetitively, with the collection of images producing a perception of a self-referential world in contrast to the real origin of the source photograph. In combination with the underlying translucent surface, which always reminds us of the temporality of lived space, the imaging surface evokes an ambiguous experience – it is an interface between different space-times, between real and 'hyperreal' worlds.

2). Design principles

Multiplication: This refers to the creation of 'smoothness', which not only means the smooth form of surface, but also a smooth relationship between different forms and spaces. It aims to produce formal and spatial relationships which have the characteristics of both continuity and heterogeneity. In this context, what contemporary surface architecture proposes is an effect of multiplication in contrast to the simplification of Modernism.

Inflection: This is a central method in surface-space formation in contemporary architecture, most commonly as a form of folding and curved surface. Through inflection, surface is given a geometrical character, and thus a form, which is both continuous but at the same time heterogeneous. It is thus a design method that serves the principle of multiplication. The inflection of the Blob form is realised as the topological inflection of the enveloping surface and, more relevantly, the resulting inflected volume. The inflection of the Folded Surface occurs at the connections between wall, floor and ceiling or roof. In case of the Topographical Surface, the inflection of form presents a smooth relationship between building and the ground.

Translucency: This is a specific principle of translucent surfaces relating to the terms Translucent Skin, Veil, and Imaging Surface. The translucent surface acts as an 'in-between' evoke the effect of ambiguity. This principle includes methods of blurring, hiding and mixing. The method of blurring aims to produce a vague image of things and events, both behind and/or outside. The condition of hiding is often associated with veiling surface. Hiding does not mean the impossibility of seeing. Rather, it evokes a tension between enclosure and disclosure or revelation due to the relation between the particular form of a veil and the action of the body. The principle of translucency is always affected by bodily experience in phenomenal space. It thus does not intend to create autonomous images, but is always related to the 'spatiality of situation', which is that of people, which experience it.

3). Spatial contents:

Animation: This does not mean real motion. Though it was argued by Lynn as a presentation of the active relationship between volume and its environment, the effect of animation is more commonly understood in terms of formal dynamics – in which, for example, the notion of fluidity is presented through topological inflection of curvature. The property of animation comes from the uncertainty and indeterminacy of topological geometry in distinction to Euclidean geometry. This property is shown in not only through the spatial form of surface but also the spatial relation between surface and surroundings, surface and body.

Inclusion: In the terms of Deleuze, this means an inclusion of bodily space-time. The body is

wrapped by folding surface, and the inflection of surface affects the spatial experience of the body. In the sense of inclusion, the topology of geometrical form can be transformed from the visual realm alone into a more complex overlapping of form with the dynamics of bodily space and movement.

Hyperspace: This is the term used to describe the effect of multi-inclusion, or the inclusion of multiple space-times. The term of Hyperspace is not here a mathematical or physical description, but refers to an experience of topological space, i.e. a spatiality of ambiguity and indeterminacy, full of potential possibilities. However, the effect of Hyperspace is based on the topological geometry of surface form and its intervention in the experience of bodily space.

Topography: This refers not to a natural feature of the land, but rather a surface-space formation of the accommodation of everyday life, of a situation of territory. Topography is seen by Bernard Cache as a 'frame' of life. In this sense, it is not like a frame of picture, but a 'frame' of forces, as a kind of mechanism serves living relations between people and spaces. When realised as an inflection of the ground's surface, topography implies a spatial tension with gravity, invoking a spatiality of 'weightlessness'. Moreover, it also relates to the idea of 'topographical arts' or practical landscapes due to its transaction with the land.

Depth: The perception of depth here is not caused by measurable distance but rather through a particular spatiality obtained through the experience of vague images of things behind translucent surface. The quantity of physical distance is transformed to a quality of the degree of ambiguity, in which depth is present but not fully apprehensible. In this instance, physical space shifts to a perception of phenomenal space and surface-space formation.

Evanescence: This is a visual perception of the gradual fading of lighting and shadows. This effect is caused by the transmission of light within translucent materials. Evanescence shows a situation of 'between', i.e. between presence and disappearance. This might create a vision of a blurred volume of the building, or a smooth transition from the building to its environment, or it could refer to a blurring of the edges of surface, i.e. a blurring of the form of Euclidean

geometry.

Interface: The idea of interface here mainly focuses on two points. Firstly, it suggests that in an age of information and communication the division between inside and outside is minimized and therefore people are assumed to be always 'in' an infinite space. In this sense, the surface acts more like an interface of 'between' rather than as a boundary. Secondly, it refers to a perceivable effect between spaces, and between bodies and those spaces, due to the mediation of translucent surface. It implies 'process', of a duration of space-time, in the sense of either the changing of images or the participation of subjects.

Revelation: This is a desire for the disclosure of the interior, which is evoked by the hiding of the veil or the ambiguity of translucent surface. Revelation should not be seen as a simple opposition to enclosure; rather it shows the actual, phenomenal character of *Enclosure*, and a tension between enclosure and disclosure. This spatiality has political resonances because it relates to the relation between social forces, space and body.

Spectacle: The term here relates to not a spectacle of things in buildings, but rather a spectacle of architectural surface itself. In this instance, it is specifically induced by an interface between the real world and artificial images. This effect reveals a tension, as something between phenomenal space and an artifical reality.

These terms, and those developed before to describe the Modernist surface, will now be incorporated into a diagram of surface-space in order that comparisons can be made for a new synthesis for the contemporary surface architecture.

Chapter Three:

Diagram of Surfacescape, Dialogue between Theory and Design

Diagram of Surfacescape

Based on the key terms summarised at the end of Chapter One and Chapter Two, a diagram of *Surfacescape* is created here as a theoretical and historical framework, which shows the specific relationships between surface forms and their spatial contents, and between Modernist architecture of surface and contemporary surface architecture. The diagram also aims to be the setting for a dialogue between theory and design. This diagram thus does not only attempt to suggest an approach towards structuring an the understanding of the knowledge of surface architecture, but also sets a new context within which surface in architecture might be rethought, both theoretically and as a praxis. In this chapter, the act of design will be used as a method to explore the potentials of the diagram.

The design project will be based on a series of transformations of Mies's Barcelona Pavilion. This 1929 building, rebuilt in 1986, is used as the starting for this design exercise for two reasons: on one hand, as an exemplar of the practice of modern surface it offers a specific site to compare the different surface-space forms of Modernism and the contemporary; on the other hand, as a case study it relates to many of the key terms of the diagram, and thus can be used as a conceptual site for historical and theoretical thought. Design will be explored through the transformation of the building's existing elements and contents, bringing some of the principles of contemporary surface to this modernist paradigm. In this context, the design exercise is entitled *Breeding Mies Pavilion* and includes three distinct experiments. Each experiment will focus on one of three themes in contemporary surface, namely blob form, translucent surface and topographical surface; these are named respectively *Breeding A, Breeding B* and *Breeding C.*

3.1 The Diagram of Surfacescape

The diagram consists of six 'catalogues' of surface: 1) *Modernist Design Principles*, 2) *Modernist Surface Agents*, 3) *Contemporary Design Principles*, 4) *Contemporary Surface Agents*, 5) *Modernist Spatial Contents*, and 6) *Contemporary Spatial Contents*. The first four catalogues separate and compare between the Modernist architecture of surface and contemporary surface architecture, which are arranged on two sides of the diagram respectively. It has been argued that surfaces in these two periods are formed conceptually and actually in

different ways, and the different terms and meanings are thus summarized on either side of the diagram. The catalogue of spatial contents are then set together in the middle of the diagram as an interface between Modernism and the contemporary. The contents of the modern and contemporary cannot be easily separated, because they obviously share some common themes. The argument that is visualised and emphasized through this diagram, based on the discussions of Chapter One and Chapter Two, is twofold: 1). There are multiple relationships between design principles, surface agents and spatial contents. Surface architecture is not simply a matter of form-making, but contains various phenomenal, cultural, and social transactions through the generation of different conditions. Surface is given different names according to different contexts and propositions, but these 'agents' are not unrelated to each other. Rather, the 'agents' can be relevant across a number of design 'principles' and 'concerns'. 2). Contemporary surface architecture does not emerge either as a linear evolution or a full displacement of modern issues, but rather, there is a complex multi-relationship between their forms, conceptualisation and effects.

In the diagram, the catalogues are set as below:

Design principles consist of those specific principles for the design of surface-space. On the Modernist side of the diagram, the principles consist of *Simplification & Composition* and *Transparency*. The former pair is primarily about morphology and geometry. Simplification is based around formal conditions of *Simpleness*, *Flatness*, and *Homogeneity*. Composition includes the modes of *Continuity*, *Fragmentation*, and *Overlapping*. The principle of transparency is attached to transparent materials, mainly through the conditions of *Framing* and *Reflection*. On the other side of the diagram, contemporary principles consist of *Multiplication & Inflection*, and *Translucency*. The first pair refers to the form of *Smoothness* (continual but heterogeneous) on one hand, and the approaches of *Inflecting, Folding, Interconnecting* on the other hand. The latter term is found through the approaches of *Blurring*, *Hiding* and *Mixing*.

Surface agents refer to the terms of the prototypes for surface architecture. These terms constitute the core of surface architecture, linking the transaction of surface form to precise meanings and theoretical propositions, and thus implement the connection between theory and

practice. Each agent follows one or more design principles, and leads to particular spatial content. On the Modernist side, there are the terms of *Enclosure*, *Cladding*, *Partition*, *Unbroken Plane*, *Envelope*, *Free Façade*, *Skin*, *Picture Window*, *Display Window* and *Reflection Surface*. On the other side, the contemporary surface agents include *Blob*, *Folded Surface*, *Topographical Surface*, *Translucent Skin*, *Veil*, and *Imaging Surface*. Specific design projects are grouped round each term as examples, following the order that they were introduced as case studies and points of reference in Chapter One and Chapter Two. This does not imply that these examples should only be related to one surface agent – in many cases they can be associated with other terms but for the purposes of the diagram they act as useful exemplars of a specific term. Each example is identified by the name of a building, architect, and date.

Spatial contents consist of those conceptions and descriptions about space or spatiality in correspondence with the prototypes of surface architecture. For the Modernist architecture of surface-space, there are the terms: *Enclosure*, *Dressing*, *Flowing Space*, *Volume*, *Shallow Space*, *Objective Body*, *Disappearing*, *Pictorial Landscape*, *Phantasmagoria* and *Mirror Space*. On the other side, the contemporary section consists of the terms: *Animation*, *Inclusion*, *Hypersurface*, *Topography*, *Depth*, *Evanescence*, *Interface*, *Revelation* and *Spectacle*. Under each term, related theories and ideas are briefly listed.

The inter-relationships between these catalogues are displayed by the linkages drawn in the diagram. For example, the surface agent of *Partition* is linked to *Flowing Space*, *Volume* and *Objective Body* on one side, and on the other side is linked to the principles of *Simplification*, and *Composition,* in the sense of *Continuity* or *Fragmentation*, dependent on the given situation. Through the network of *Flowing Space*, *Partition* can find its relation with *Unbroken Plane,* which is associated with the creation of flowing space. Through the network of *Volume*, *Partition* can find its comparison with *Envelope* because they refer to different meanings of volume. The former sees volume as an element of composition in the creation of space, but the latter is seen in relation to the spatial presentation of volume. Finally, through the linkages to *Objective Body*, a kind of hidden connection may be found between *Partition* and *Skin*. These two notions look unrelated, but both of them are connected to the notion that the body is treated

as no more than an 'objective thing'. For Moholy-Nagy, space is created by position relations of the 'bodies' (volumes) of *Partition*. For Mies, the idea of skin-bone refers to the revelation of a spatial structure. Other linkages can be found within the diagram that brings out conceptual and formal relationships.

The diagram not only gives a map to help understand the argument about surface architecture as developed in preceding chapters, but can also be used as an approach for the exploration of design. Here the diagram is used as a coordinate system for tracing a route for design work in relation to theoretical concerns. Guided by the diagram, design can then explore potential links beyond the existing, and in so doing is used as a catalyst for discovering new relationships between the terms and thus new surface-space conditions. In this context, the design project is not simply matter of a form generation, but rather a way of thinking and rethinking about surface architecture.

The design project is set out in three sections corresponding to three different motifs. Each of them will start with a view of relevant network on the diagram, and a brief description of a particular condition of Mies's Barcelona Pavilion. The short discussion will indicate the potential of the relations between the diagram's catalogues. Following this step, the design focuses on the formal transformation: an element, or a surface 'agent', in the Barcelona Pavilion will be transformed in relation to a specific contemporary issue. The observations on this process will be analyzed by reference to the diagram. Finally, the outcome – the potential of the new relation between catalogues – will be marked back onto the diagram, and thus indicate a proliferation of the theoretical framework. In this case, design begins from the diagram, and then goes back to the diagram, and contributes its conceptual development as a mapping of contemporary, and future, surfacescape.

The design project shows three examples which are indicative of the general use of the diagram, relating to the matters of partition wall, transparent surface and horizontal surface in the pavilion. These examples are chosen because they, with the creation of 'flowing space' as well, are the key factors of that pavilion; thus the design will be precise and effective.

3.2. Breeding A: The Transformation between Partition and Blob

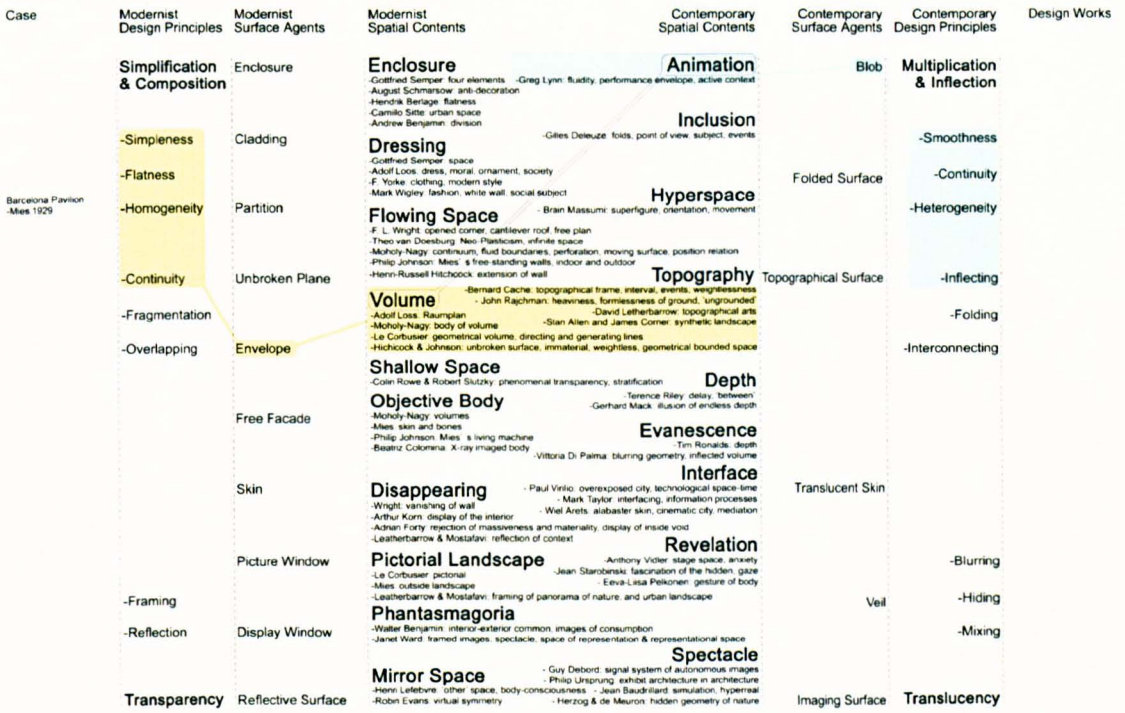


Diagram of Surfacescape, Breeding A.1

Envelope – Blob, Volume – Animation

As investigated in Chapter One and Chapter Two, the contemporary idea of *blob* is related to the modern surface agent of *envelope*, and correspondingly *animation* to *volume*. Such relations are shown by the diagram *Breeding A.1*. Both *blob* and *envelope* refer to a kind of geometrical form which introduces a particular spatiality to the enveloped volume. The difference is that *blob* evokes the idea of motion based on the perception of topological inflections, but *envelope* presents more a sense of static volume defined by regular lines of Euclidean geometry. Though Greg Lynn tries to argue that his ideas of *blob* and *animation* are specifically concerned with an active spatial relationship between the object and its environment or context, we have seen how the effect of *animation* is more focussed on autonomous form-generating once *blob* is conceived as no more than an inflected *envelope*, in which the topological geometry of *blob* form is treated simply as a representation of curvature. In this instance, the design principle of *smoothness* is reduced to a refinement of the smooth shape of surface in contrast to its potentially meaningful proposition of a continual and heterogeneous relationship in the sense of spatial (and hence social) conditions. However, can a form of *blob* mean more?

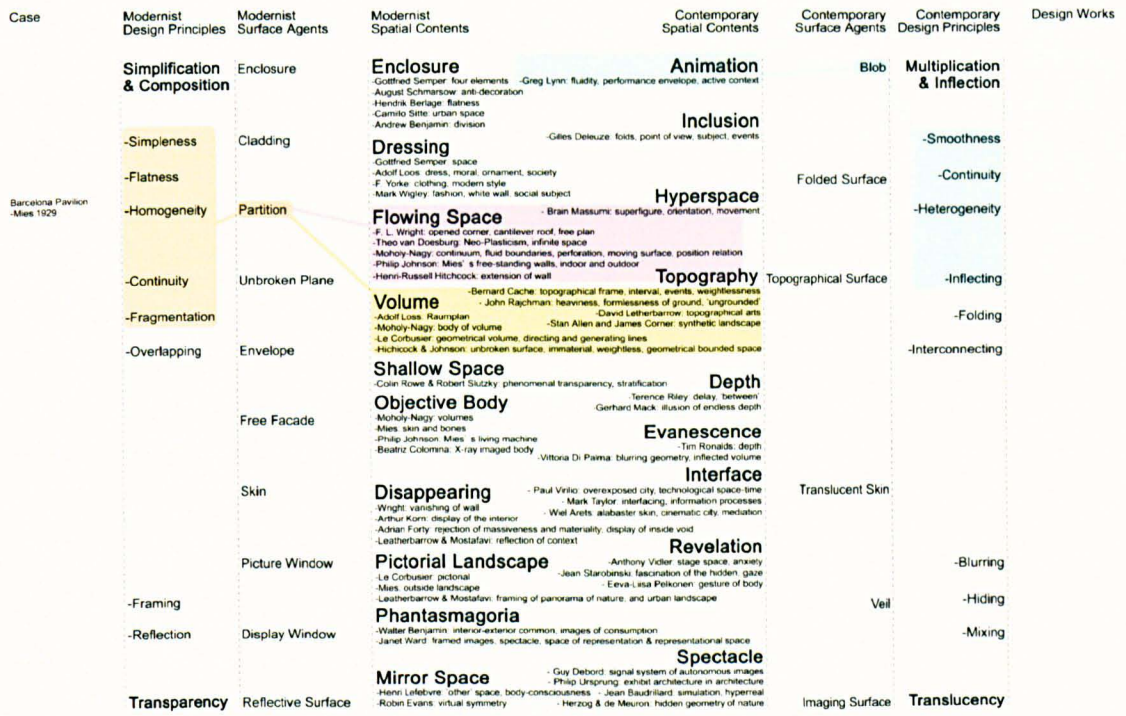


Diagram of Surfacescape, Breeding A.2

Partition - Volume

Volume is not necessarily about an autonomous object 'in' space. Instead, it can act as a spatial element to 'create' space through the composition of 'position relations' in the terms of Moholy-Nagy. This difference not only shows a different usage of vocabulary, but relates to different relationships between surface and space, and the use of geometry. In Moholy-Nagy's view, "spatial creation is the creation of relationships of position of bodies (volumes)."[1] According to him, the difference between the presentation of a volume and the relations of volumes is precisely the difference between sculpture or sculptural building and "modern architecture".[2] When volume is seen not as a sculptural object but rather as a constitutive element in spatial relations, e.g. a partition, architectural surface moves away from its association with envelope. As the diagram *Breeding A.2* shows, the composition of partitions is related to a condition of 'flowing space'. Following this transition, geometry can also change its role. As a kind of "alternative geometry", as argued by John Rajchman, it becomes a means to "organise visibility" rather than a description of isolated form.[3]

---

[1] László Moholy-Nagy (1947), *The new vision 1928 and abstract of an artist* (fourth edition), (New York: George Wittenborn, Inc.), 57.
[2] László Moholy-Nagy (1947), *The new vision 1928 and abstract of an artist* (fourth edition), 60-61.
[3] John Rajchman (1998), *Constructions*, (Cambridge Mass and London: The MIT Press), 104.

Diagram of Surfacescape, Breeding A.3

Partition – Blob, Flowing space – Animation

What are the effects of transforming a partition wall into a blob form? In comparison with the transition between envelope and blob, could the transformation from a partition wall to a blob form bring different conditions to surface architecture? If geometry is used in relation to the 'visibility' of spatial relations, following a shift in autonomous volumes to the relations of volumes, could the topological geometry of blob form evoke a different mode of spatial experience than the 'performance' of envelope which is associated with sculptural volume?

The diagram above relates this exercise to *flowing space,* which in the modern paradigm is associated with distributed partition walls. The effect of flowing space is based on both visual perception, i.e. an uninterrupted vision between inside and outside, or between here and there, and also on the phenomenal experience of space in terms of the free movement of body. Which kind of influence could the transformation bring to the spatiality of flowing space? Or, in other words, (again following the diagram) how could the effect of *animation* intervene within *flowing space*?

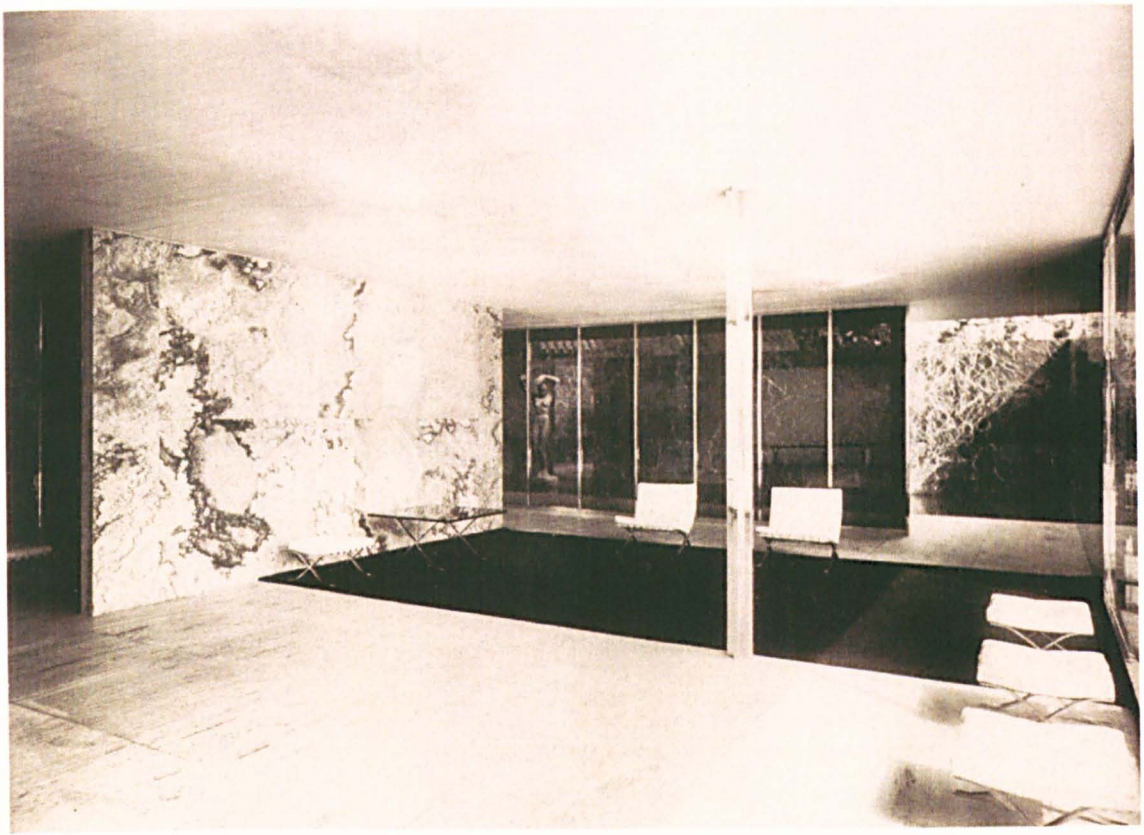


Figure 3.2.1
Photo of 1929 Mies's Barcelona Pavilion

A Partition wall in Barcelona Pavilion

A short partition wall, covered with gold-coloured onyx marble, stands independently in the centre of the interior of the Barcelona Pavilion. It is a key compositional element in the spatial formation of the pavilion. The independence of this partition wall, or the separation between it and other walls, contributes to the experience of flowing space. Its particular material makes it different from other elements in the visual sensation, but at the same time it is clearly tied into the overall geometry of the Pavilion. At the same time, the reflection of the polished surface of the marble brings it into a complex visual relation with other elements. For this partition wall, the relation with other elements is established through the combination of consistency and difference, physical separation and visual connection. This combination means that the partition wall acts as a central factor in the creation of the particular spatiality of the Barcelona Pavilion.

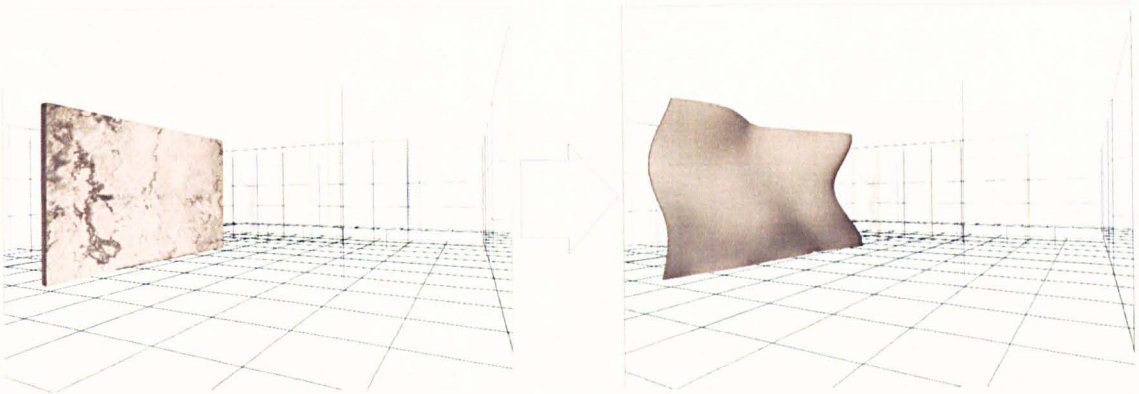


Figure 3.2.2
The illustration of transformation from *Partition* to *Blob*

The Transformation of Partition Wall

Breeding A is a transformation of this partition wall. The wall is transformed to an inflected surface as a blob form. Though the inflection of the new surface is partly conceived in relation to a dialogue with the sculpture in small water court, it is designed primarily on the basis of the generic discipline of blob form. The randomness of form-generation is accepted because what will be observed is the general comparison between regular Euclidean form and the topological inflection of surfaces. The thick partition wall, constructed out of a steel skeleton and marble covering, is displaced by an inflected, thin, smooth surface form. The new surface keeps the height and the position of the old wall, and is of a similar size. The new surface is given a single material and colour, because the design will concentrate on the effects of the inflection of form and geometry, rather than its material or properties. For this reason, all of the design drawings will be presented in black and white.

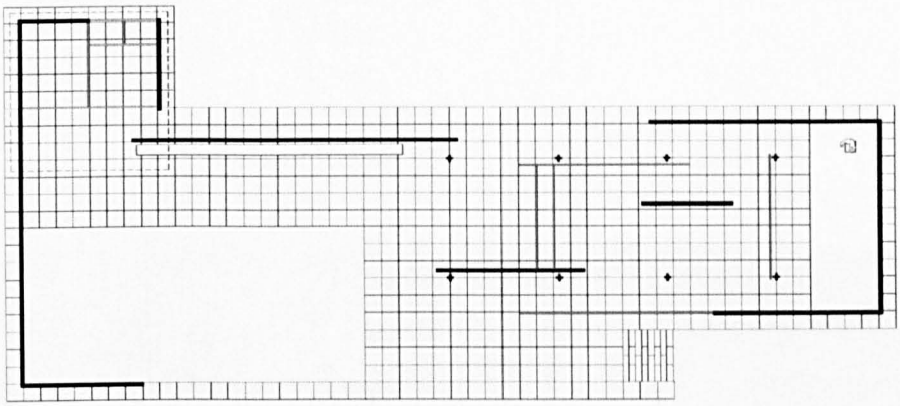
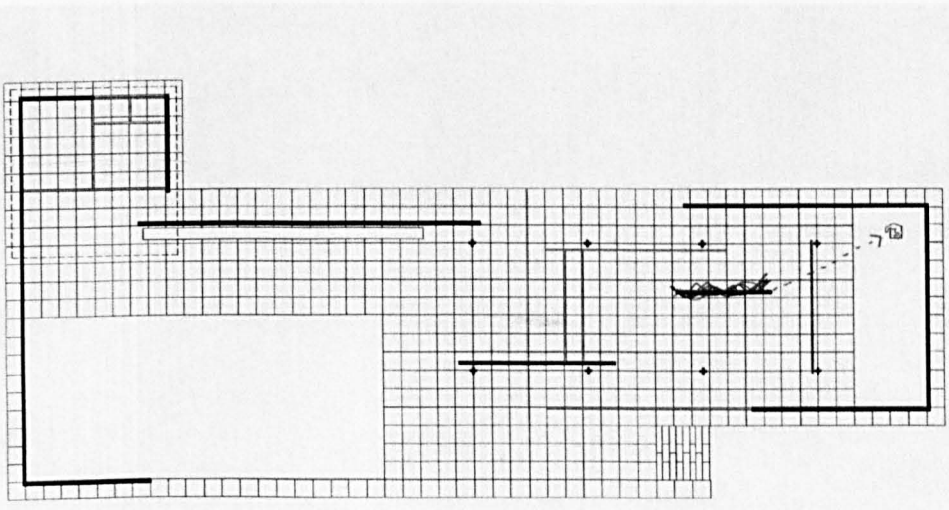


Figure 3.2.3
Original Plan of Barcelona Pavilion

Figure 3.2.4
Design sketch on Plan



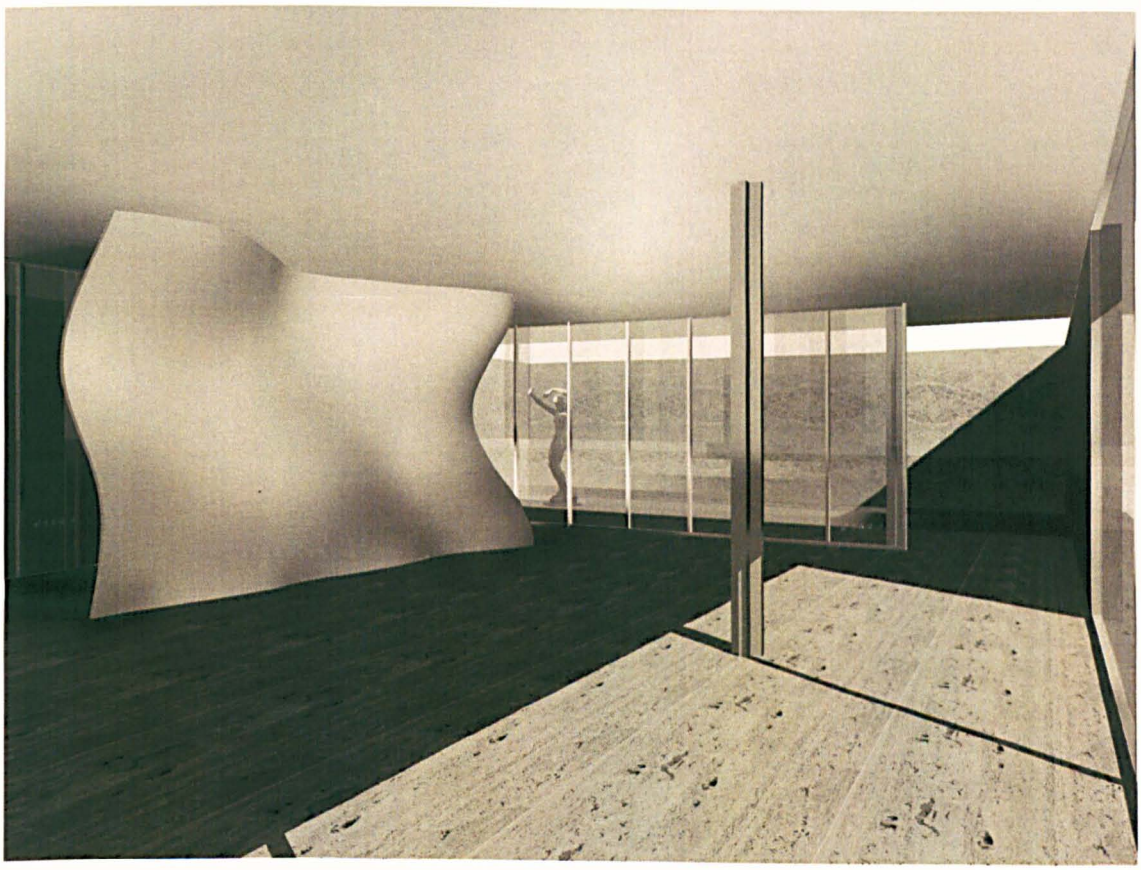


Figure 3.2.5
Render drawing of Breeding A

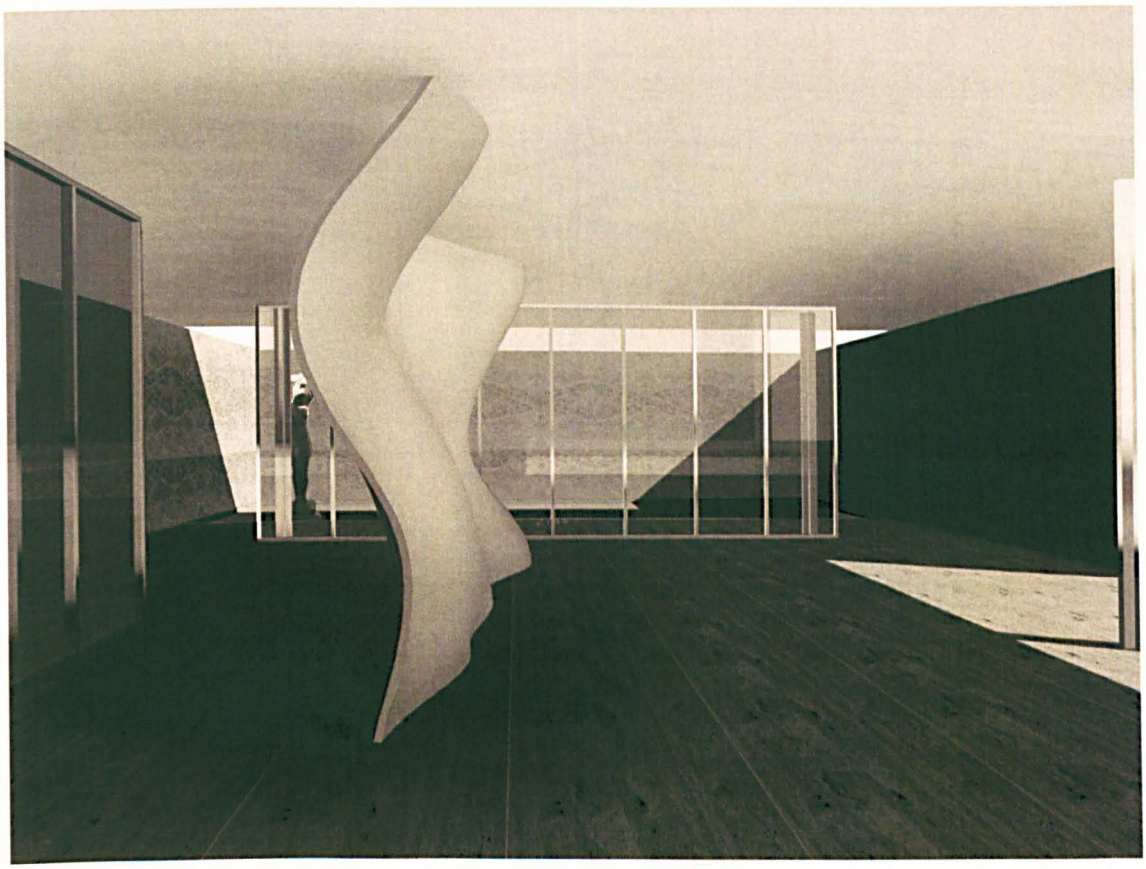


Figure 3.2.6
Render drawing of Breeding A

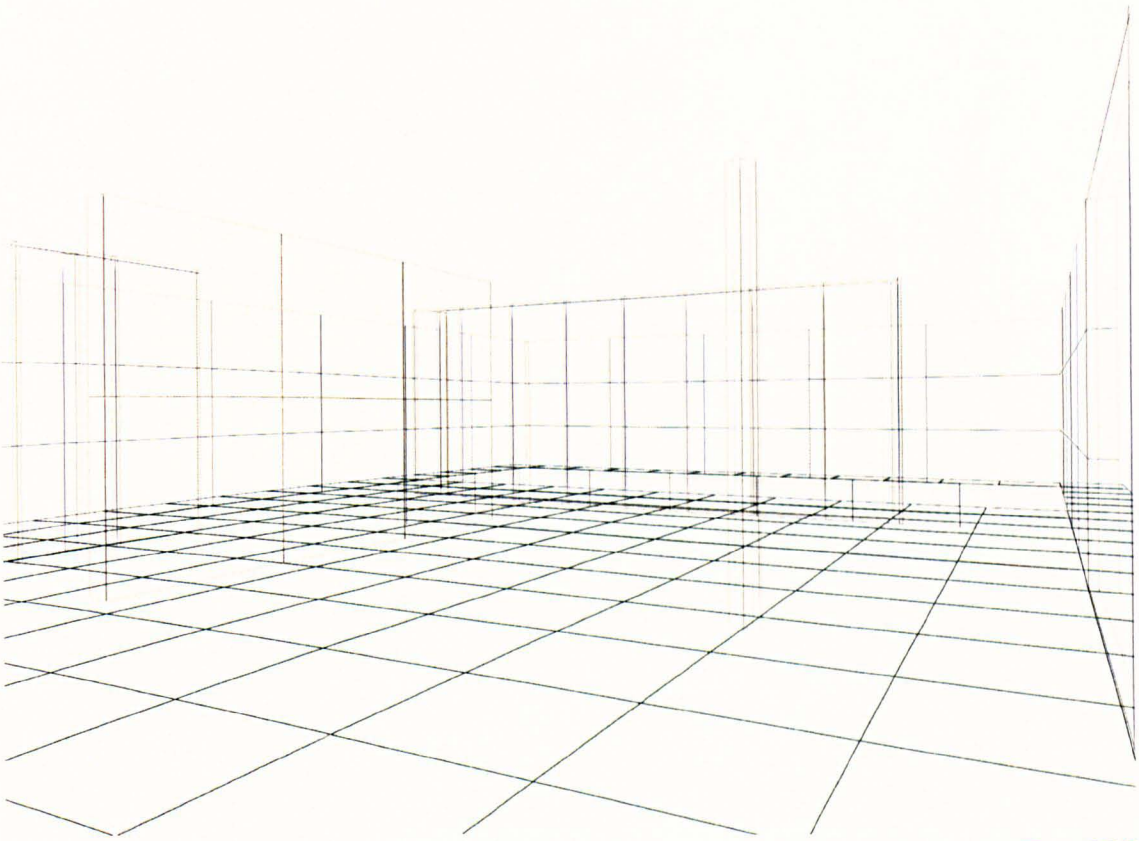


Figure 3.2.7
The composition of lines (before the transformation)

Points and Lines

The geometrical character of the modern, simplified, flat surface can usually be defined by the lines of the edges of the surface. The surface can thus be reduced to the shape of the defining lines, and the spatial relations of surfaces can be understood as being reliant on the composition of these lines. As can be seen from the Mies's own drawing (Figure 3.2.8), ignoring the texture and colour of materials, there is no more than a composition of lines.

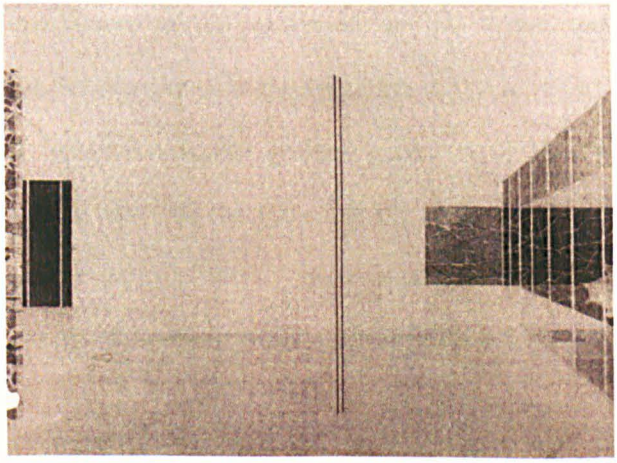


Figure 3.2.8
Interior perspective drawing by Mies

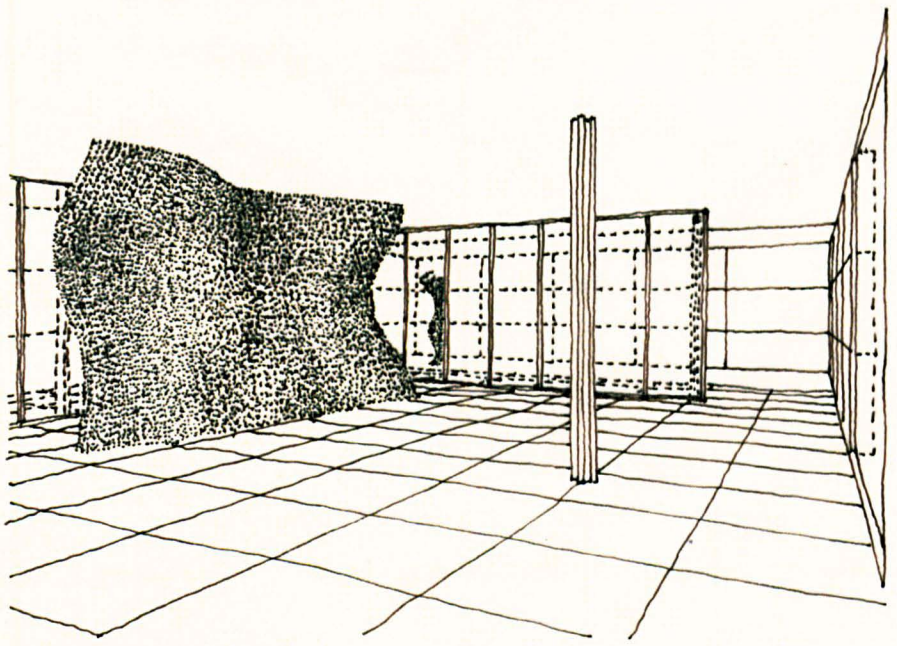


Figure 3.2.9
Points and Lines (with new surface)

In contrast to the reduction of linear geometry, the topological geometry of a blob form is difficult to reduce to simple compositional rules or understandings, because the form of such a surface is defined by a geometry of points rather than lines, and the relationship between these points is three-dimensional and complex. Thus in the case of *Breeding A*, the 'position relations' between the transformed partition and other elements is transferred into multiple interrelationships between topological points and regular geometrical forms. Because the number of points on such a surface tends towards infinity, the 'position relations' induced by an inflected partition becomes unmeasurable and therefore introduces an uncertainty in its perception. In this sense, the topological geometry of a blob form intervenes in the experience of the space, creating a topology of spatial relations. Moreover, in the view of Robin Evans, the gridded geometry of Mies's pavilion represents a "conceptual structure" which conceals the transmission of load and the expression of gravitation.[4] The new surface blurs the clarity of Mies's "conceptual structure", and at the same time, produces another kind of 'lightness' through its topological inflections.

[4] Robin Evans (1990), "Mies van der Rohe's Paradoxical Symmetries", in Robin Evans (1997), *Translations from Drawing to Building and Other Essays*, (London: Architectural Association Press), 245-247.

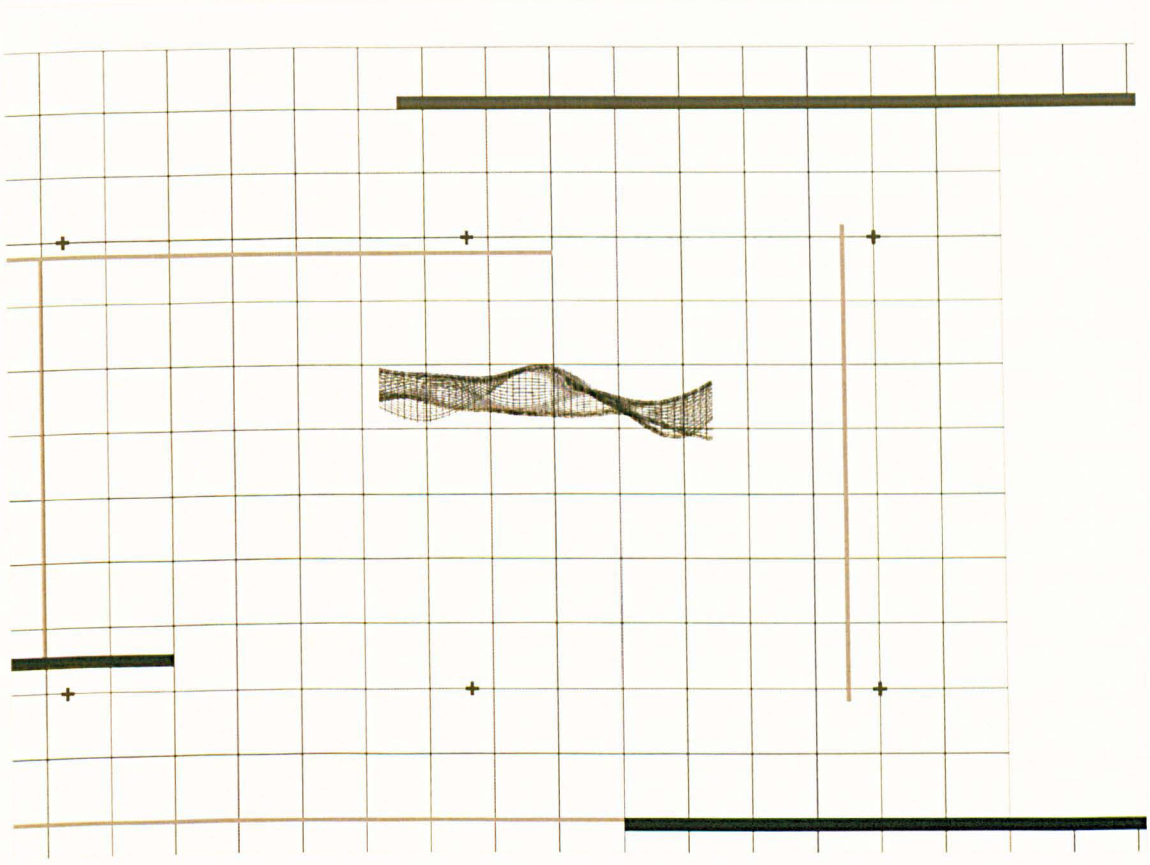


Figure 3.2.10
Rendering of partial plan drawing, grid geometry and inflection

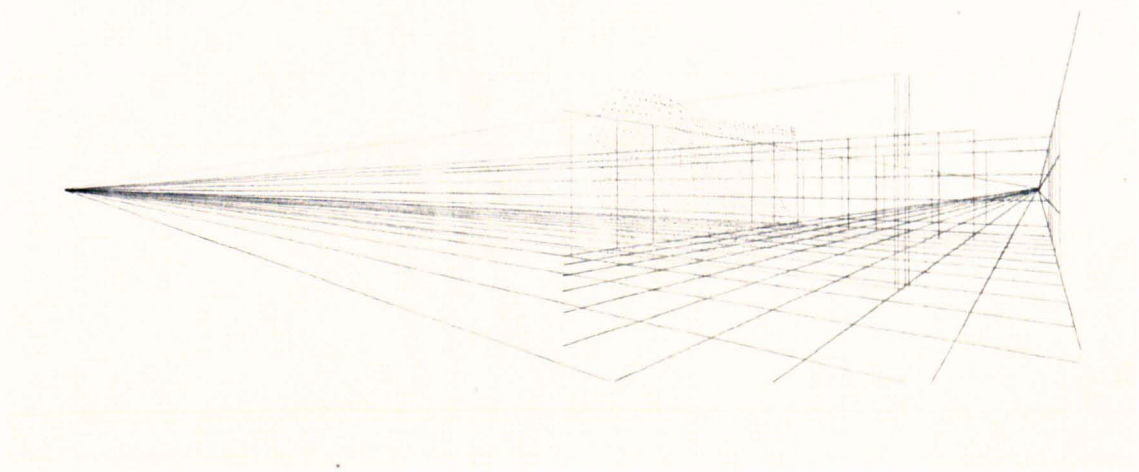


Figure 3.2.11
The comparison between linear Perspective and inflection

For Lefebvre, perspective drawing as developed in the Renaissance creates a particular kind of "representation of space" in which the vanishing line, the vanishing-point etc. "promoted the primacy of the gaze in a kind of 'logic of visualization'".[5] What Lefebvre criticized is that such an 'abstract space' of visual representation interrupts the connection between people and 'lived space' – i.e. the bodily space in everyday life. In the case of the Barcelona Pavilion, the representation of perspective space is produced by the regular geometry of its architecture. In a gaze, the controlling lines of surface disappear to two vanishing-points. Such vanishing-points are virtual points because they have not a material embodiment; they are a production of the 'visibility' of geometry – of the 'logic of visualization'. Such vanishing-points arrest people's concentration, and lead them towards 'somewhere' at the end of perspective. The visual perception of flowing space is precisely based on the inducement of going towards somewhere outside. In contrast, an inflected surface works against the dictates of linear perspective. It does not lead to elsewhere but only to visual points on its surface. Due to its visual immeasurability and uncertainty, it might raise people's anxiety, but at the same time by avoiding an extension to somewhere beyond, it induces a spatiality of here and now. Thus through the transformation, the inflected surface in *Breeding A* intervenes within the flowing space of the Barcelona Pavilion, and evokes a spatial tension between an abstract space of 'somewhere' and a bodily space of here and now.

[5] Henri Lefebvre (1991), trans. by Donald Nicholson-Smith, *The production of space*, (Oxford and Cambridge Mass.: Blackwell), 41.

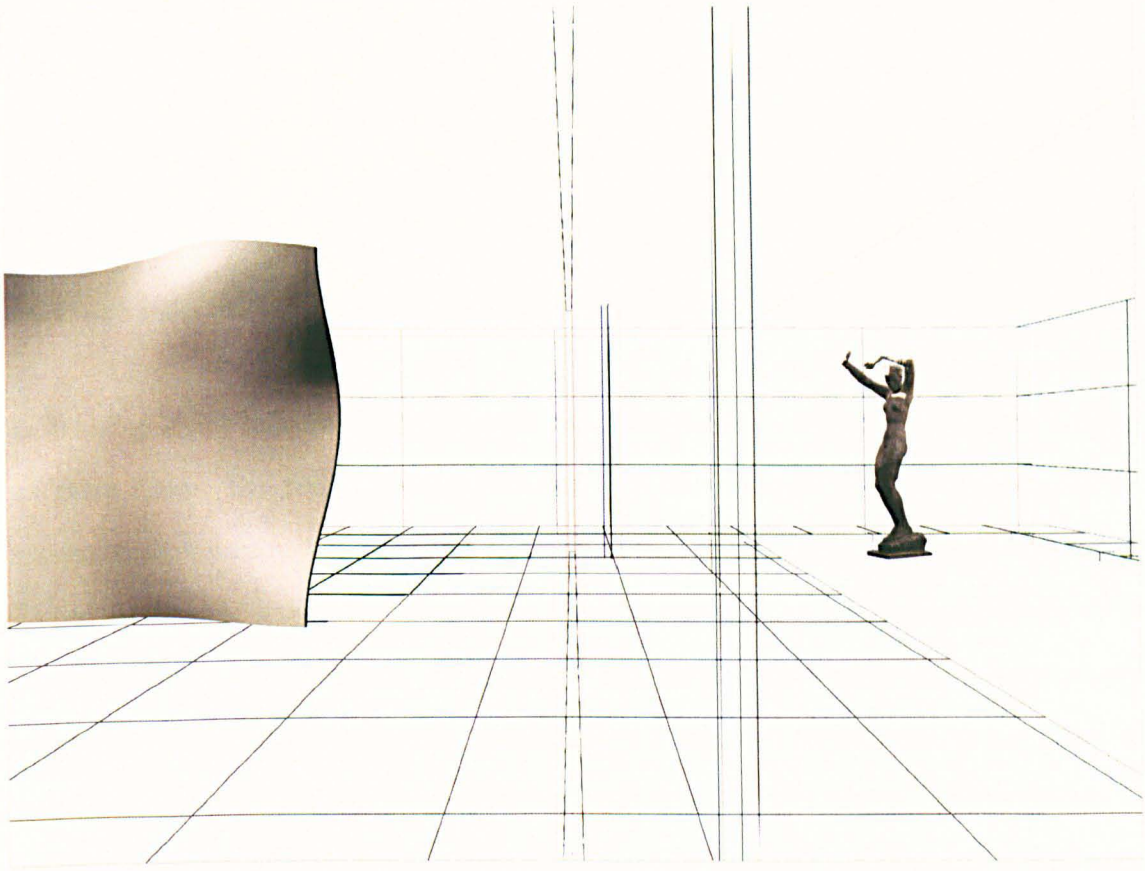


Figure 3.2.12
The dialogue between inflected surface and sculpture

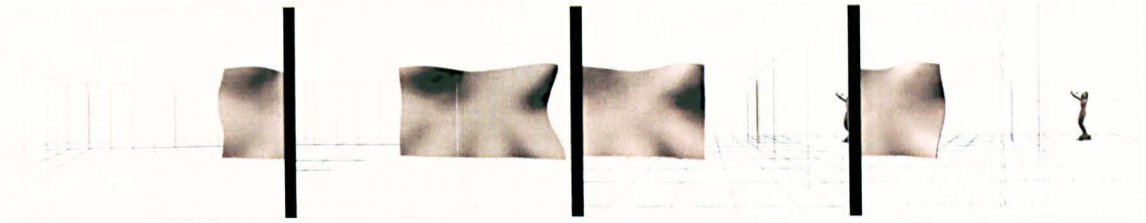


Figure 3.2.13
The dialogue between inflected surface and sculpture shows a 'transmission' of soft, dynamic posture. Such 'transmission' brings a spatial event into the relation between the interior and the court.

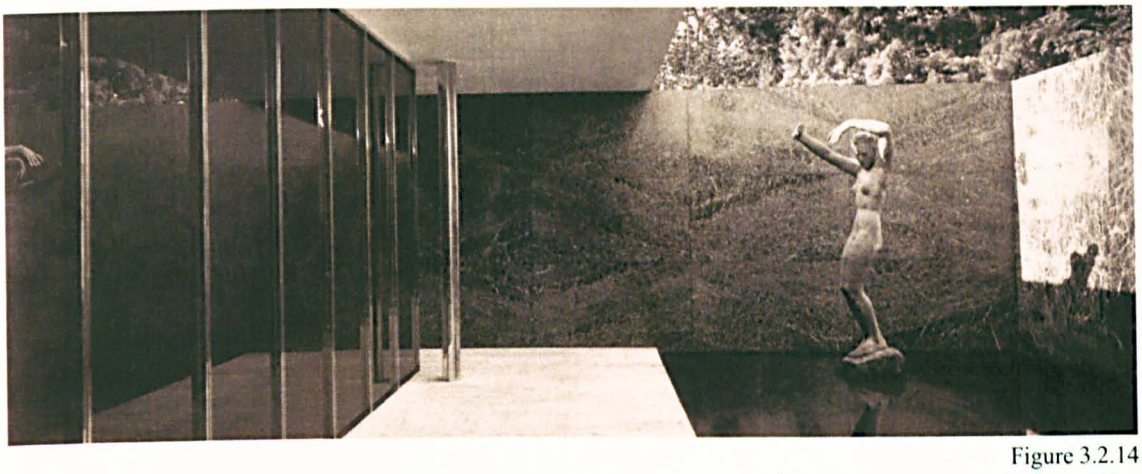


Figure 3.2.14
Photo of 1929 Mies's Barcelona Pavilion

In *Breeding A*, the inflected form brings the new surface into a dialogue with Georg Kolbe's sculpture *Dawn*. The point here concerns not only the metaphor of inflected form, as an impersonated posture in response to the representation of body standing in the small water pool. Rather, the dynamic of the new surface shows an active response to the dynamic and 'force' of the sculpture. In this sense, a spatial event, that of animation, is induced by the correspondence between the inflected surface and the sculpture. It is a particular spatial event because such an oriented relation creates a special experience of space-time which is parallel to the experience of unoriented free movement in flowing space. Such a spatial event does not interrupt the experience of 'flowing', but rather is superimposed on that existing condition. In this sense, the inflected surface brings a kind of spatial multiplicity, and, creating a spatial relationship of smoothness within the existing environment. Before the transformation, Kolbe's sculpture is an isolated element waiting to be framed or reflected as an image; the 'flowing' between the interior and the small court is supported by the continuity of horizontal surfaces and divided partition walls. With the correspondence of new surface, the sculpture becomes a factor affecting spatial formation and experience; the topology between their forms sets up a continual but heterogeneous relationship.

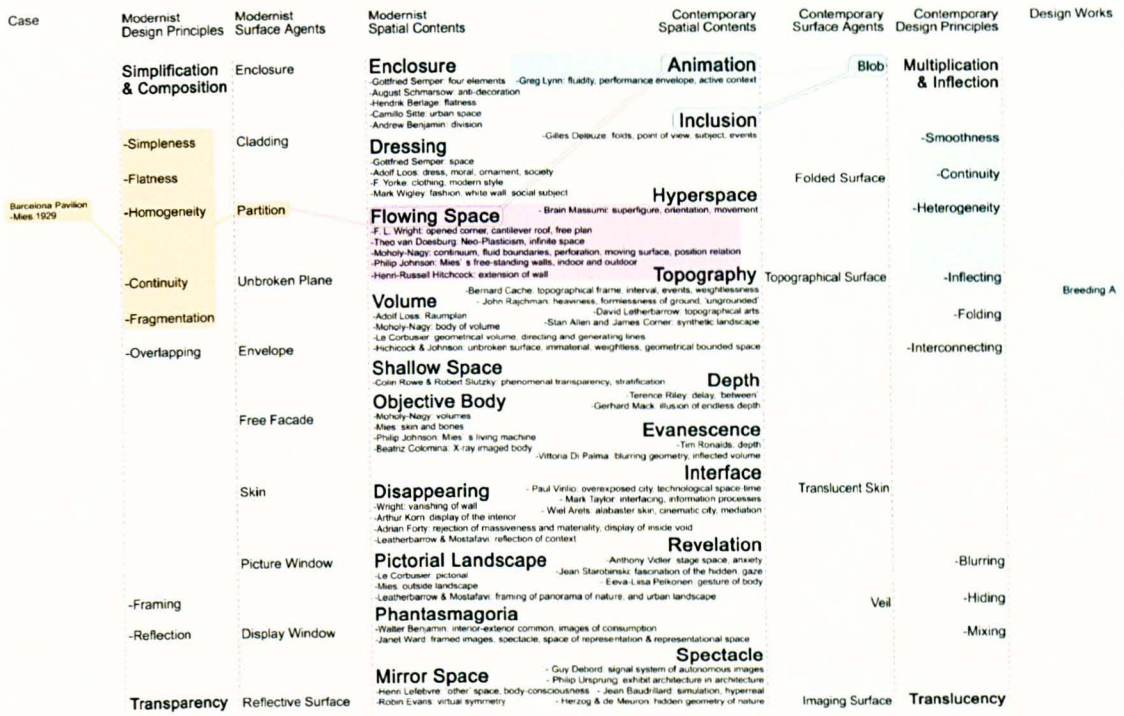


Diagram of Surfacescape, Breeding A.4

Conclusion A

Through the transformation from a partition wall to a blob form, the design of *Breeding A* shows an alternative effect, and meaning, of the inflection of *blob* and its topological geometry, which goes beyond the idea of autonomous form, of shape, which *blob* is often associated with in contemporary discourse on surface. When the form of surface shifts from Euclidean geometry to topological geometry, what is changed is not merely the representation or metaphor, as from a static volume to a posture of motion. Rather, if it produces an effect of animation, such animation can be seen to be productive and meaningful for spatial creation and experience in contrast to the performance of *envelope*. In this sense, *blob* becomes an animated form of spatial event, of *inclusion*. It goes back to what Lynn has proposed, but maybe did not achieve, in blob theory: the inflection and animation of *blob* aims to create a relationship of smoothness, as not only a smooth shape, but also a phenomenal and cultural smoothness. Moreover, when a blob form intervenes into the spatial structure and geometry of the Barcelona Pavilion, it induces a spatiality of immeasurability and uncertainty, or multiplication. What can be seen here is that the modern and contemporary versions of surface can productively be employed together, and in this combination a new form of surfacescape, and new forms of animated experience, are possible.

3.3. Breeding B:

The Transformation between Picture Window, Partition and Translucent Skin

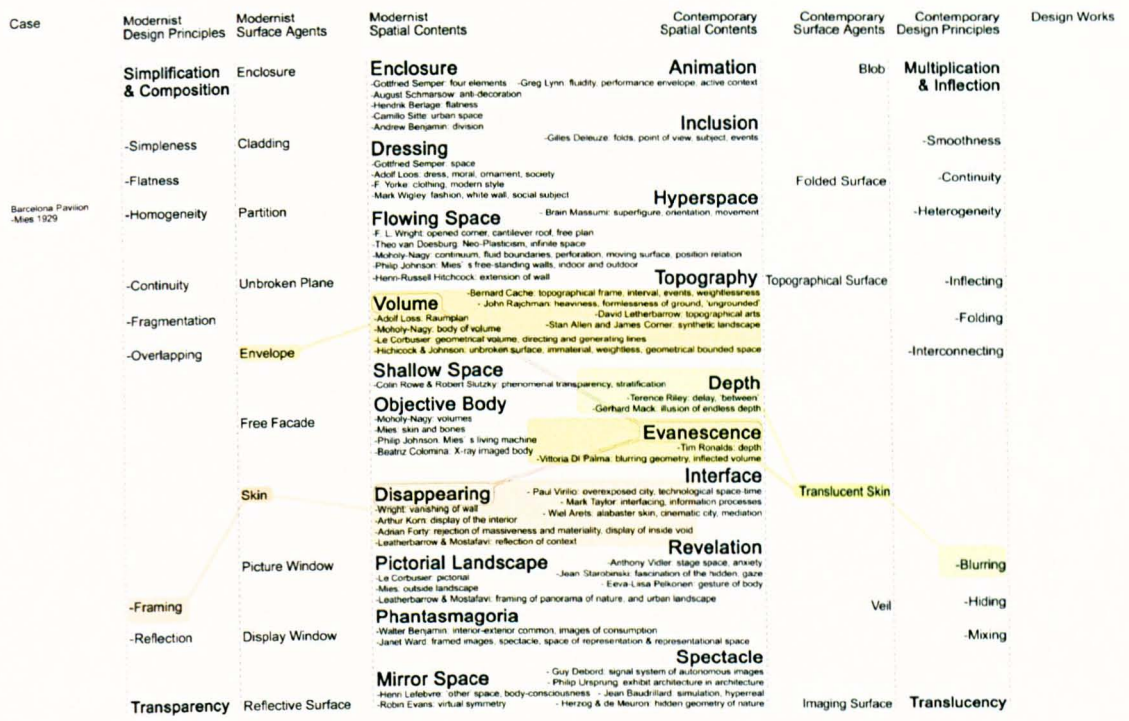


Diagram of Surfacescape, Breeding B.1

Skin – Translucent Skin, Disappearing – Evanescence

The modern architecture of *skin* visualises an image of a 'skin-bone' spatial structure. As the diagram shows, this arises out of the visual disappearance of transparent surface and, at the same time, is related to the idea framing as a Modernist design principle. In contrast, due to the effect of blurring images, the *translucent skin* of contemporary surface brings with it an illusional spatiality of 'evanescence' and 'depth'. If the effect of disappearance shows a 'result' of absence, the evanescence more shows a 'process' of departing, and a condition of 'between'. The comparison between them can be understood from preceding chapters, and is now marked by joining lines on the diagram *Breeding B1*.

Envelope – Translucent Skin, Volume – Evanescence

What has also been investigated in preceding chapters is that, as can be seen in many contemporary cases, the *translucent skin* is mainly used to wrap the building. It acts as a 'translucent envelope', presenting volumetric space of light and shadows rather than geometrical volume. Sometimes, the geometrical form is weakened by the translucent skin because it visually blurs the edges of the volume, and thus makes the volume 'evanesce' into the background. Thus the linkage between volume and evanescence is already known.

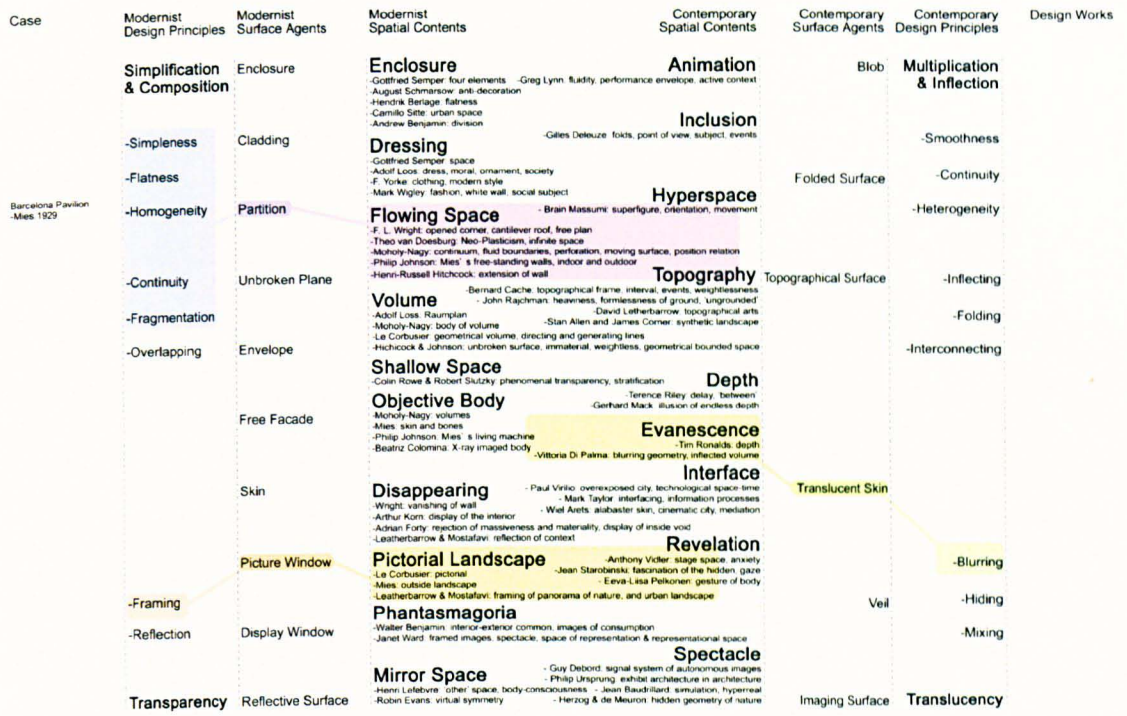


Diagram of Surfacescape, Breeding B.2

Picture Window – Translucent Skin, Pictorial Landscape - Evanescence

As the diagram indicates, the framing of transparent surface brings into play the idea of *picture window*, and with this the picture is framed as a *pictorial landscape*. The 'picture' is actually framed by the edges of the transparent surface, defined by either the wooden or metal frames, or composed by the opaque surfaces of the wall, floor, ceiling etc surrounding it. The picture window acts as a visual device for catching images from the external environment. By exploring the possible link between *picture window* and *translucent skin*, this second breeding investigates how the vision of evanescence might impact on the perception of pictorial landscape.

Partition – Translucent Skin, Flowing Space – Evanescence

In addition, by using *translucent skin* not as an agent of volume but rather as a spatial partition, it investigates how the Modernist effect of *flowing space* is transformed with the intervention of a translucent partition.

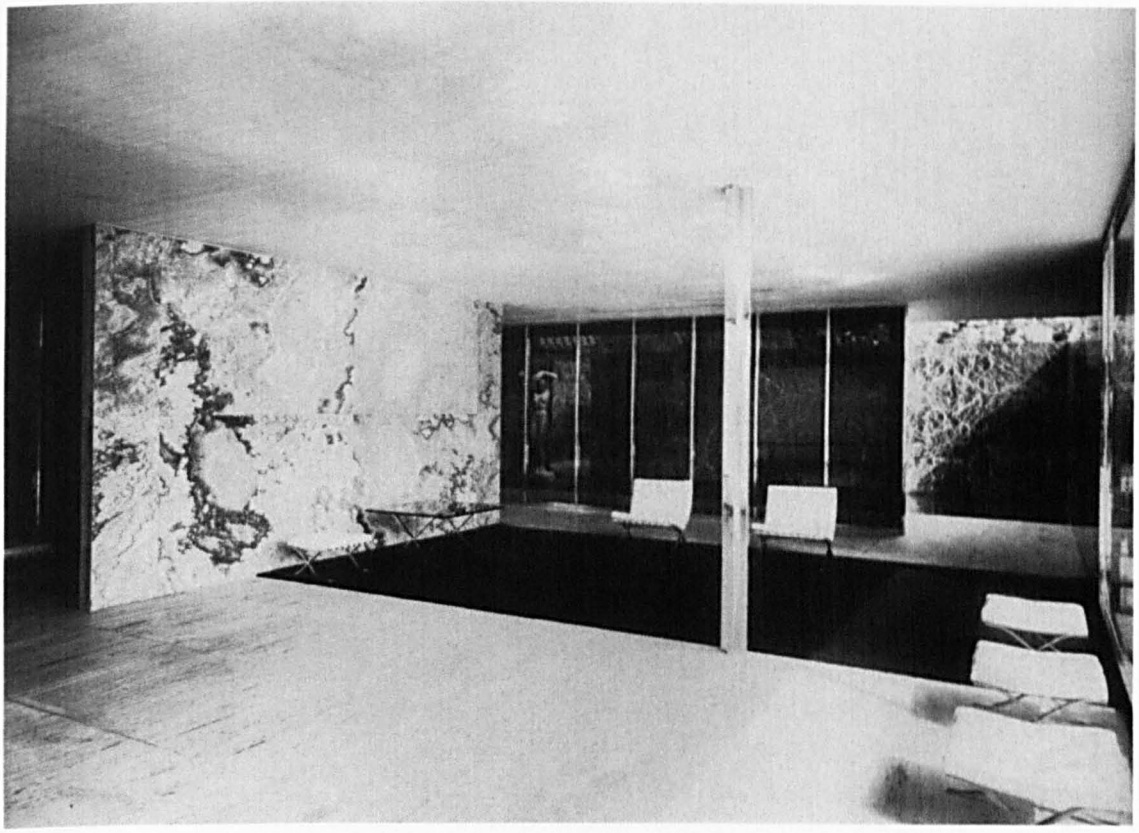


Figure 3.3.1
Photo of 1929 Mies's Barcelona Pavilion

Transparent Partition Wall in Barcelona Pavilion

There are several sections of glass partition wall in the Barcelona Pavilion. One of them is used to separate the interior space from the small pool court. The role of this transparent surface is twofold. On one hand, it plays a role of a partition wall, as a surface element of spatial composition. It is detached from other partition walls, and allows space to 'flow' visually. On the other hand, it creates a picture 'frame', or 'frames' when seen with the mullions, facing the small pool court. Through such frame(s), the scenery of the small pool court is transformed into a series of framed images, as a kind of courtyard 'landscape'.

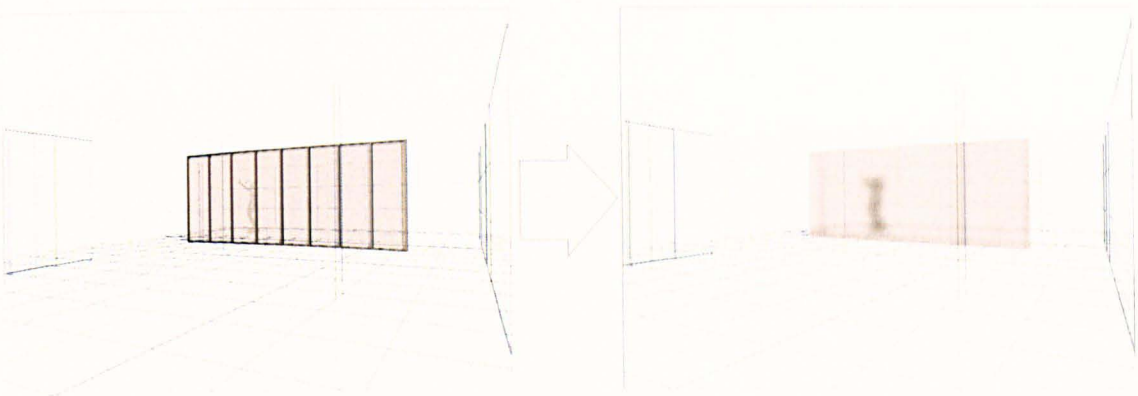


Figure 3.3.2

The illustration of transformation from *transparent partition* to *translucent surface*

The Transformation of Transparent Partition Wall

The design of *Breeding B* is a transformation of a transparent partition wall of Barcelona Pavilion into a translucent surface. The transparent partition wall, constructed out of a metal frame and mullions with infilling transparent glass sheets, is replaced by a piece of translucent glass without frame and mullions. The size and position of the new surface is as same as the previous one. However, as a consequence of the design, the thickness of this surface is largely reduced. The metal frame and mullions give the partition wall a perceivable 'thickness'. In contrast, by cancelling frame and mullions, a single sheet of translucent surface looks very thin, and thus more like a 'surface' than a 'wall'. Further, as will be discussed, the cancellation of frame and mullions has a specific influence on the creation of 'pictures' later.

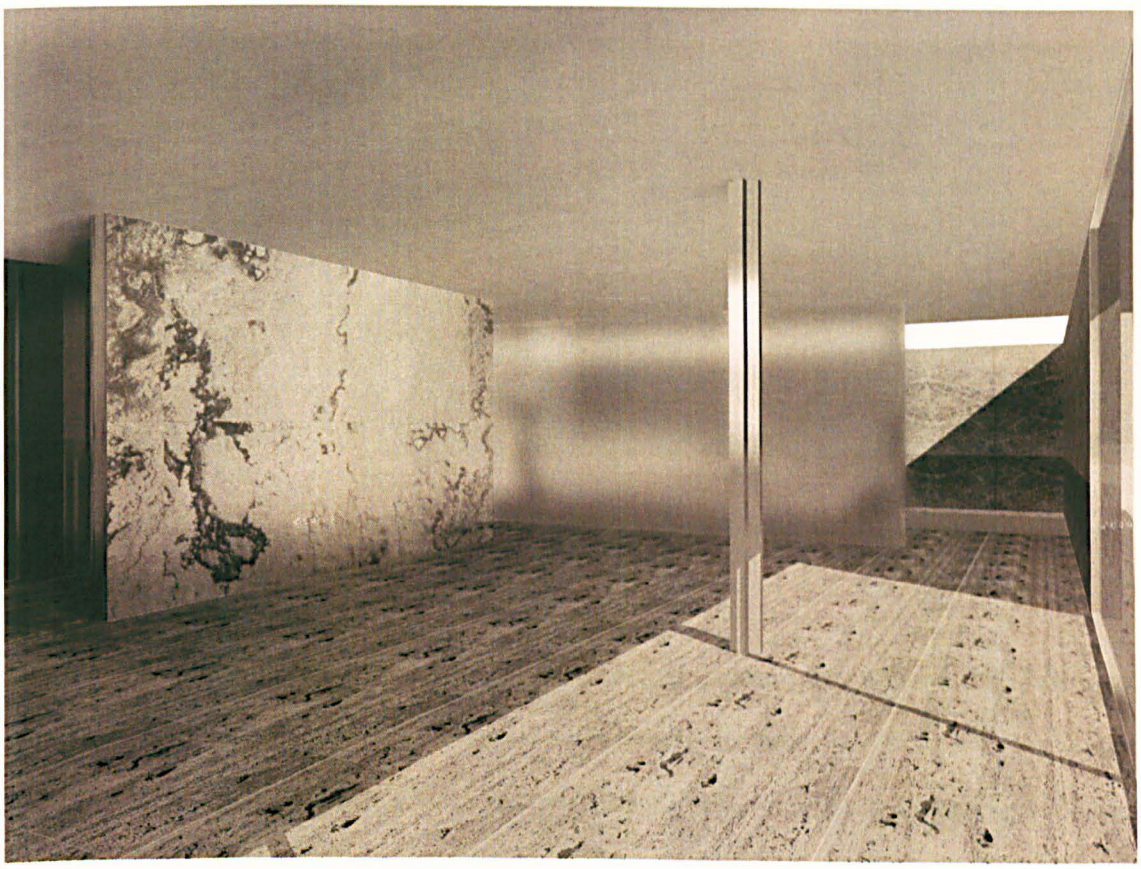


Figure 3.3.3

Render perspective drawing of Breeding B

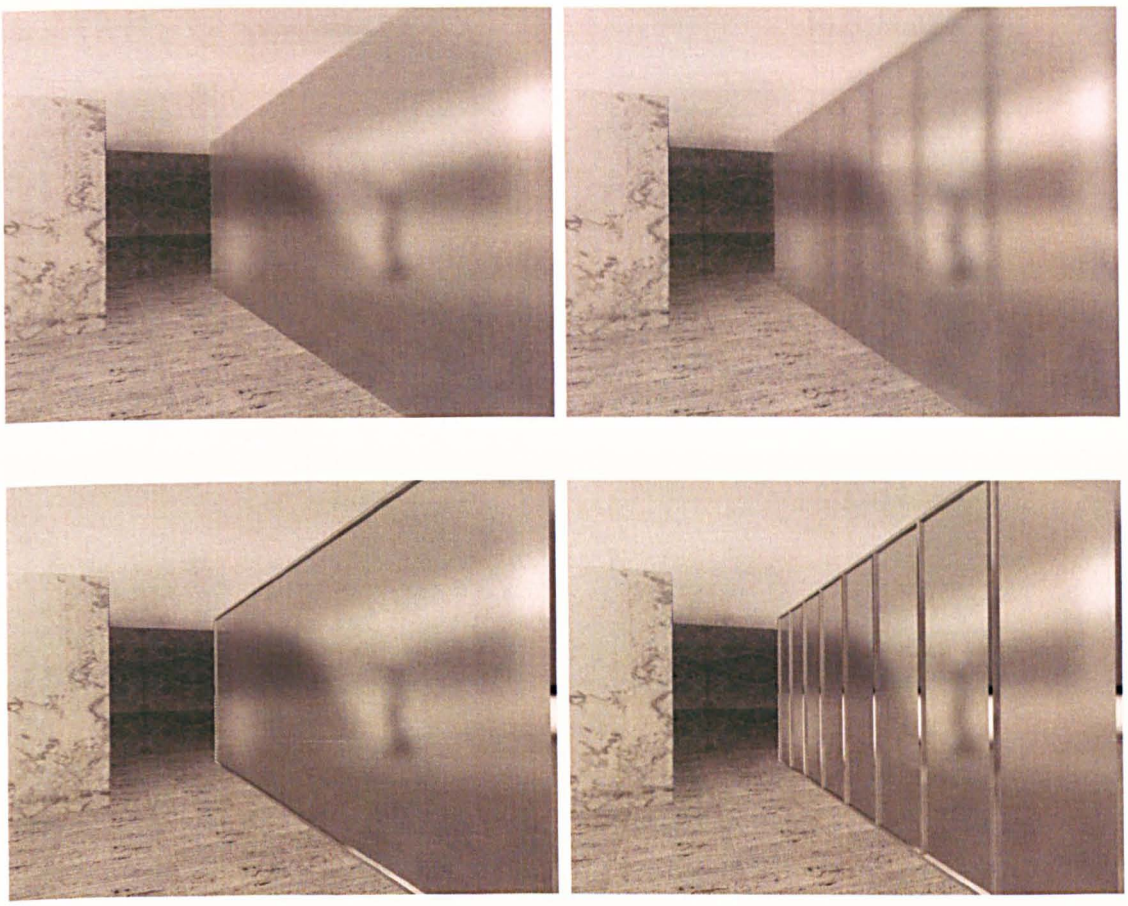


Figure 3.3.4

The comparison between the translucent surfaces with or without frame

Evanescence and Frame

Without the 'framing' of mullions and rails, a translucent surface appears more like an interface between a clear, realistic space and an ambiguous space, rather than a partition, or a creation of a framed picture. If one gives a translucent surface a metal frame, even when the mullions and rails are hidden behind the surface, it appears more like a partition wall defined by its edges. A frameless translucent surface, on the other hand, highlights the effect of evanescence, not only an evanescence of scenery behind it but also an evanescence of a surface due to the blurring of its own form. Moreover, the mullions install 'gaps' into surface, and divide the 'picture' into joined pieces. Without the interruption of mullions, the surface presents a smooth effect of blurred images. According to these reasons, a frameless translucent surface is better chosen to present the effect of evanescence.

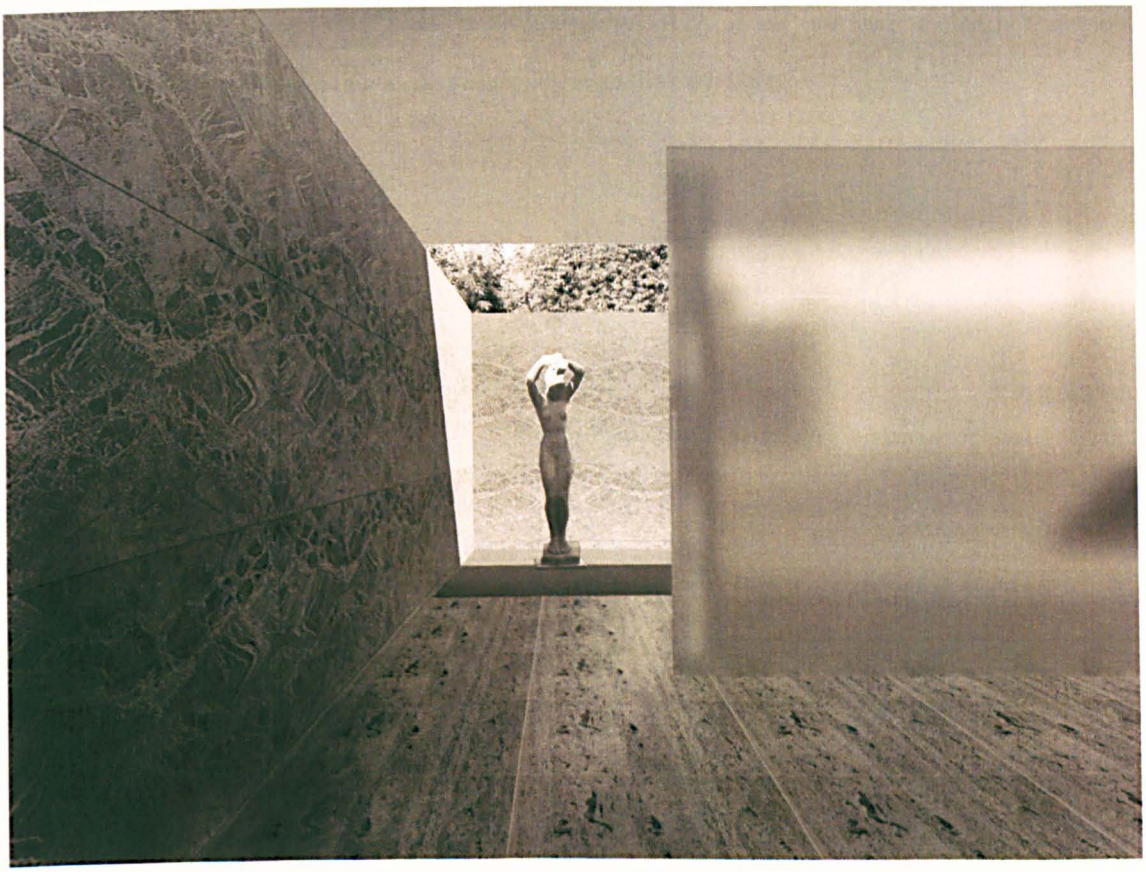


Figure 3.3.5

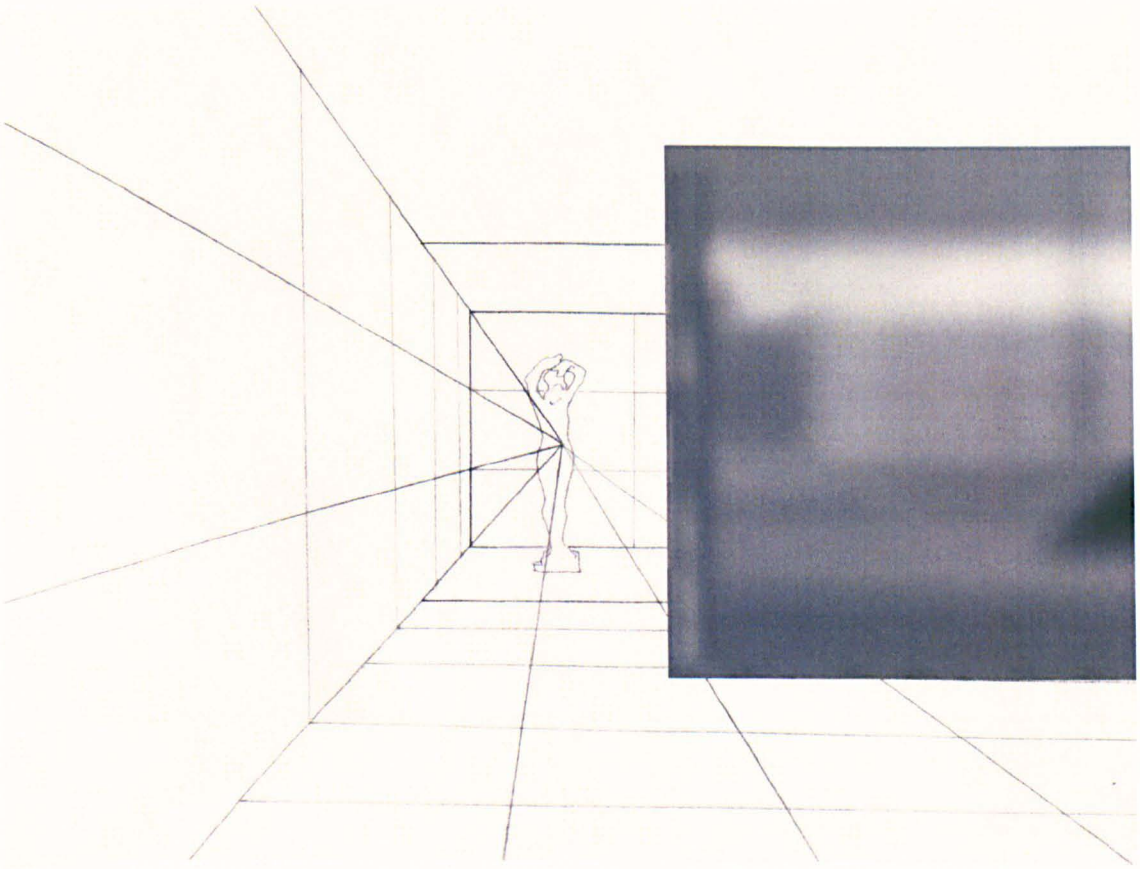
Render perspective drawing of Breeding B

Evanescence and Perspective space

As identified in Breeding A, the geometrical form of the Barcelona Pavilion often shows a very clear 'perspective' space, with the composition of surfaces dominated by controlling lines extending towards a vanishing point. The effect of perspective takes the viewer from 'here' into a space beyond, and as we have seen this contributes to the effective production of abstract space in Modernism. In contrast, using a translucent surface produces an evanescing into an illusional 'depth'. These two approaches bring about different perceptions to distance. The juxtaposition of them gives the view of the small court an ambiguous quality, on the one hand a clearly focussed image on the other a blurred one that confuses perceptions of depth.

Figure 3.3.6

The juxtaposition of 'perspective' space and illusional 'depth'



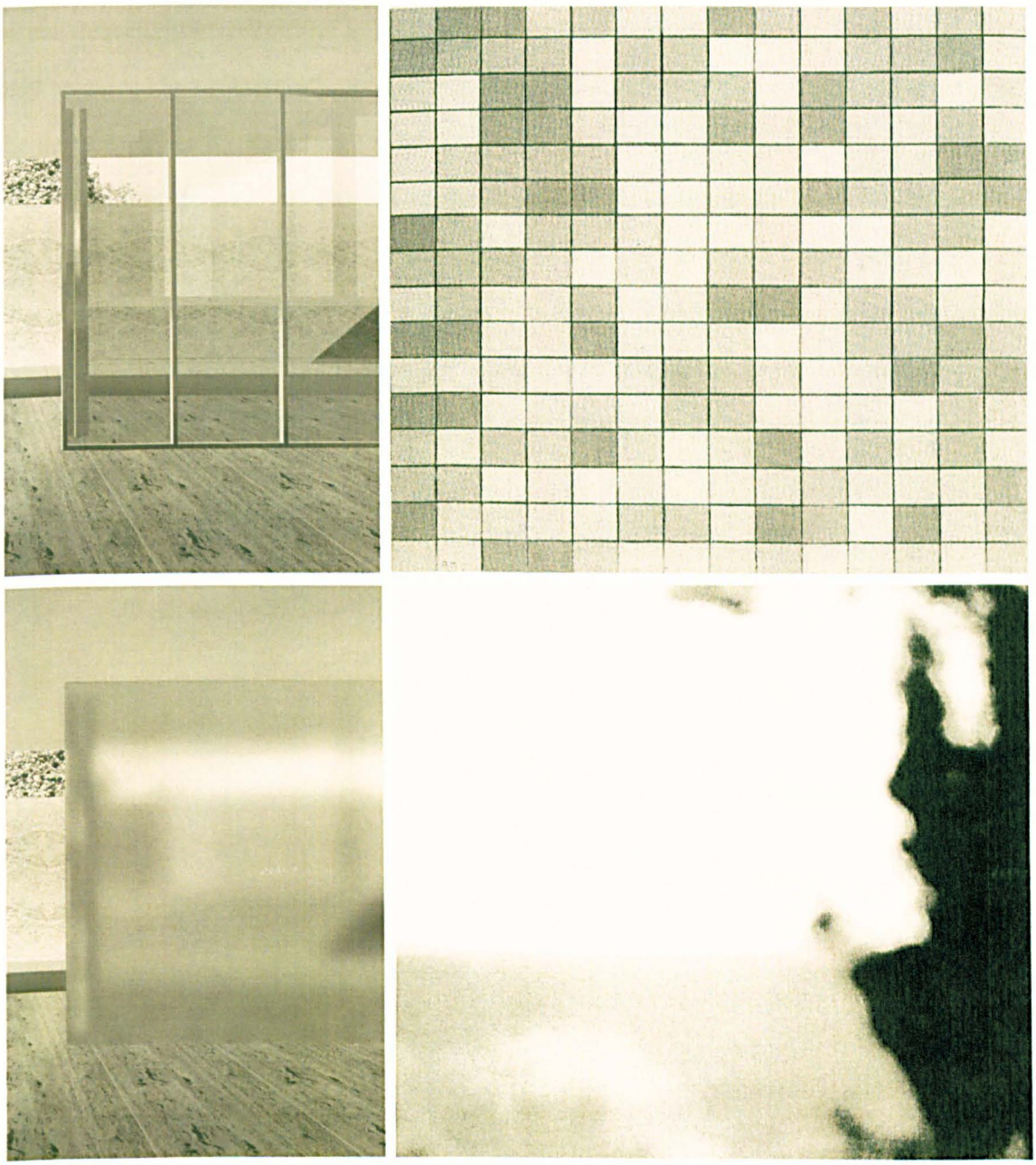


Figure 3.3.7 – 3.3.10

(Top left) Rendering of transparent partition;

(Top right) *Draughts Board composition, light colours*, Mondrian 1919;

(Bottom left) Rendering of translucent partition;

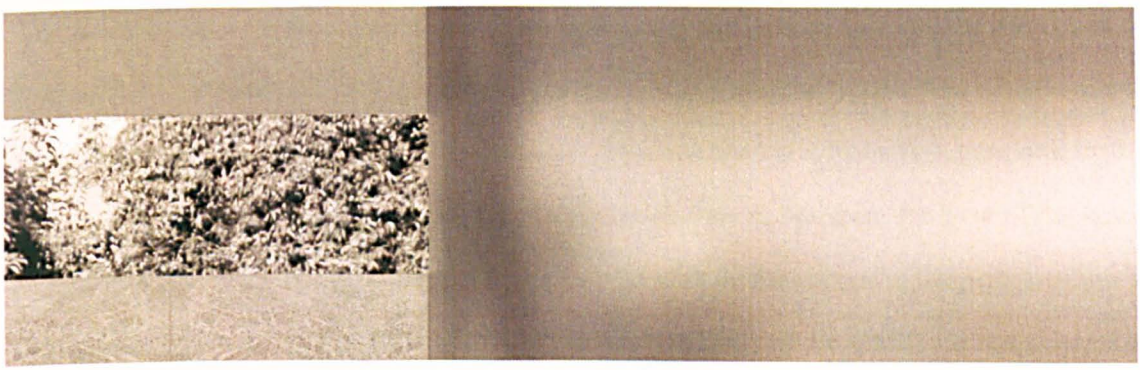
(Bottom right) *Gound # 2*, Uta Barth, 1992-93

Evanescence and Pictorial Landscape

In the case of a transparent glass partition, the mullions and rails visually join in the composition of surfaces. Through the 'framing' of the partition, the scenery of small pool is formed as a 'picture' composed of geometrical elements. The representation of such a 'picture' has a similar

visual characteristic to the form of abstract paintings from around the 1920s, even though they may be guided by different concepts. In the case of translucent surface, the connection between the surfaces of the courtyard wall, ceiling etc and the outside landscape are broken. All these aspects are transformed into blurred images on the surface, dissolving into each other. The vagueness evoked by translucent surface can also be found in the contemporary photography of Uta Barth, which investigate the representation of landscape in an ambiguous manner which goes beyond the strict measure of the eyes. As a visual mechanism, the translucent surface brings something 'between' which transforms the scenery of the small courtyard into an imaginary landscape.

Figure 3.3.11
Detail of blurred landscape.



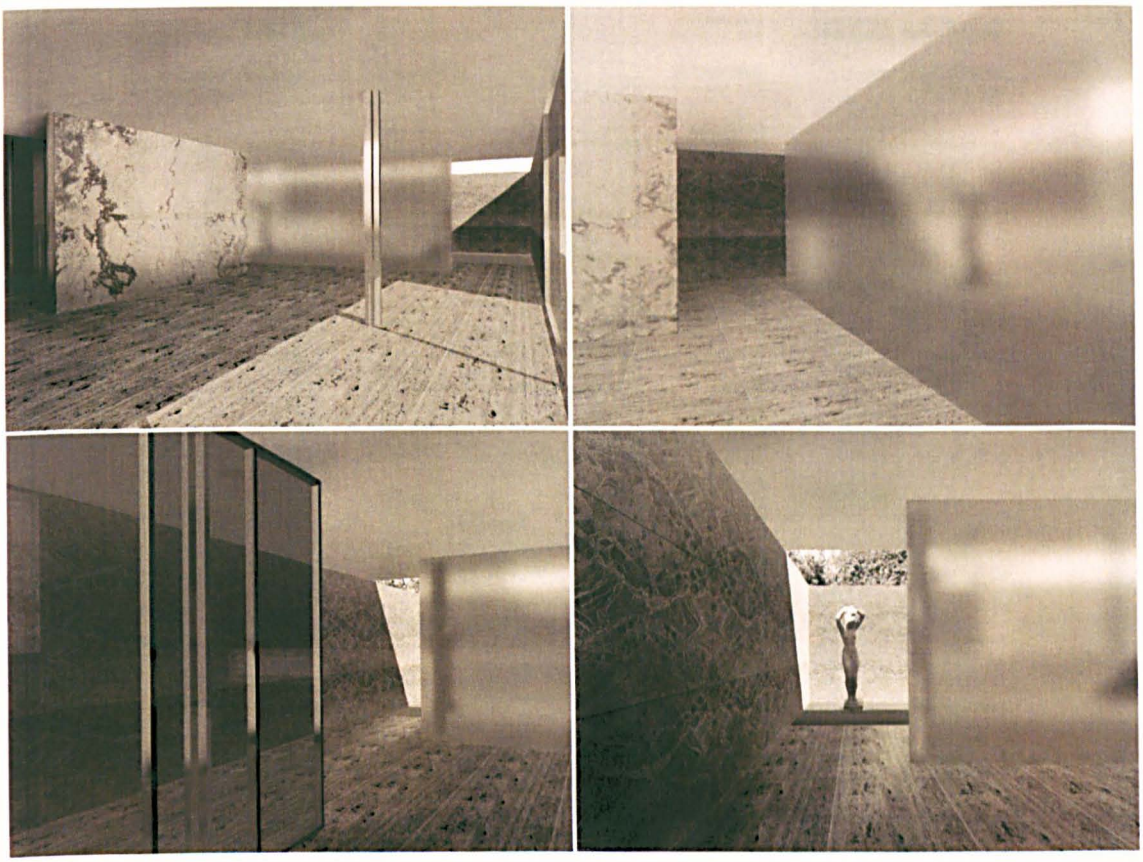


Figure 3.3.12
The changing scenes following movement inside the pavilion.

Evanescence and Flowing Space

The transformation from transparent to translucent surface also has an affect on the perception of *flowing space.* In the Modernist case, *flowing space* is clearly and easily identified with the use of transparent partitions in which the 'flow' is perceived primarily as a visual effect, graspable by the static observer. With the intervention of a translucent surface as partition, the flow of the space can no longer be seen clearly at an instant. The blurred view on the surface of the partition hints at something beyond, but in order to understand the full continuity of the space, one has to begin to move in relation to the partition. As one changes one position in relation to the partition, what was blurred becomes clear, and vice versa, in a continually changing spatial field. Such transition shows a particular process of *revelation*: an interchanging between evanescence and emergence. The translucent surface thus suggests a new type of spatiality that involves the movement of the body in space-time as part of a richer phenomenal experience in which the scenes are changed not simply as seen at different angles, but with a tension between blur and clarity, between evanescence and flowing space (see figure 3.3.12).

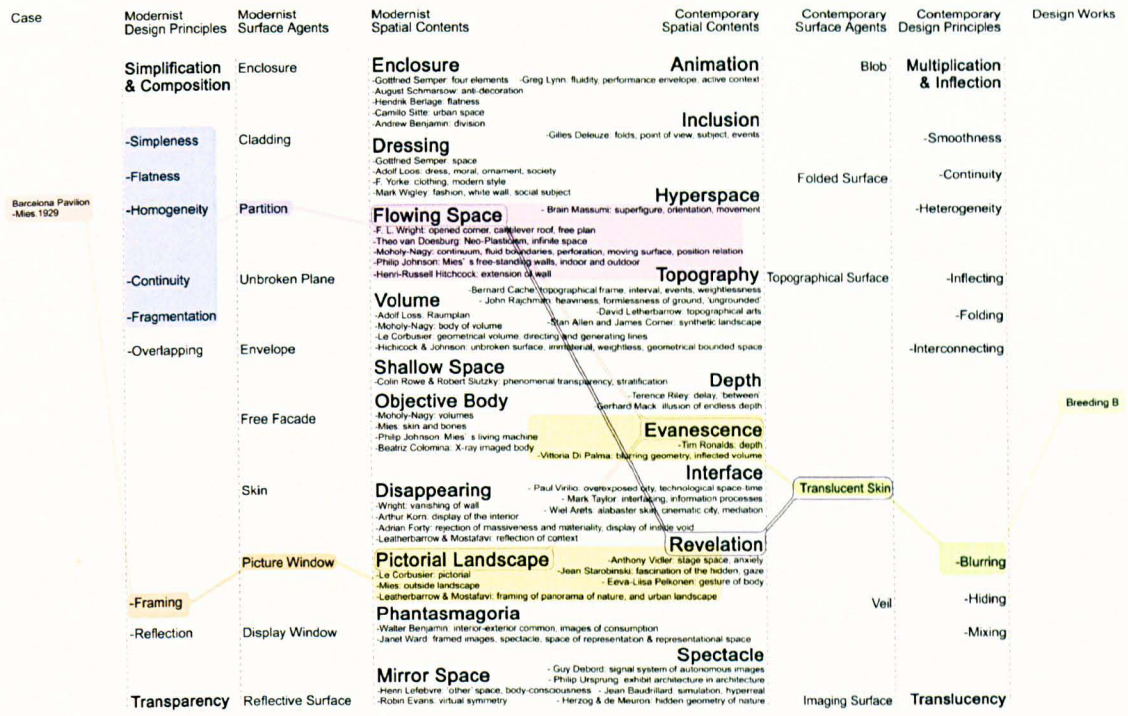


Diagram of Surfacescape, Breeding B.3

Conclusion B

Through the transformation from a transparent partition wall to a translucent surface, the design of Breeding B shows a further usage, and associated effect, of *translucent skin*. In comparison with the effect of *picture window* and its framed *pictorial landscape*, translucent surface creates a presentation of blurred images which show an evanescence of, or into, the scenery behind that surface. As a replacement of the transparent partition, the translucent surface introduces a complex spatiality, and brings a mixture of different or multiple spatial formations, such as perspective and depth, clarity and blur. Furthermore, as used in *flowing space*, the translucent surface shows not only a simple relation between connection and separation, but a specific process of *revelation*, a process of emerging i.e. a smooth transition from blur to clarity. Through the design of Breeding B, an influence of evanescence on pictorial landscape and flowing space, and a potential relation between flowing space and revelation, are explored. These new relations are marked on the diagram (see above) as new linkages differing from the diagram of B.1.

3.4. Breeding C: The Transformation between Unbroken Plane and Topographical Surface

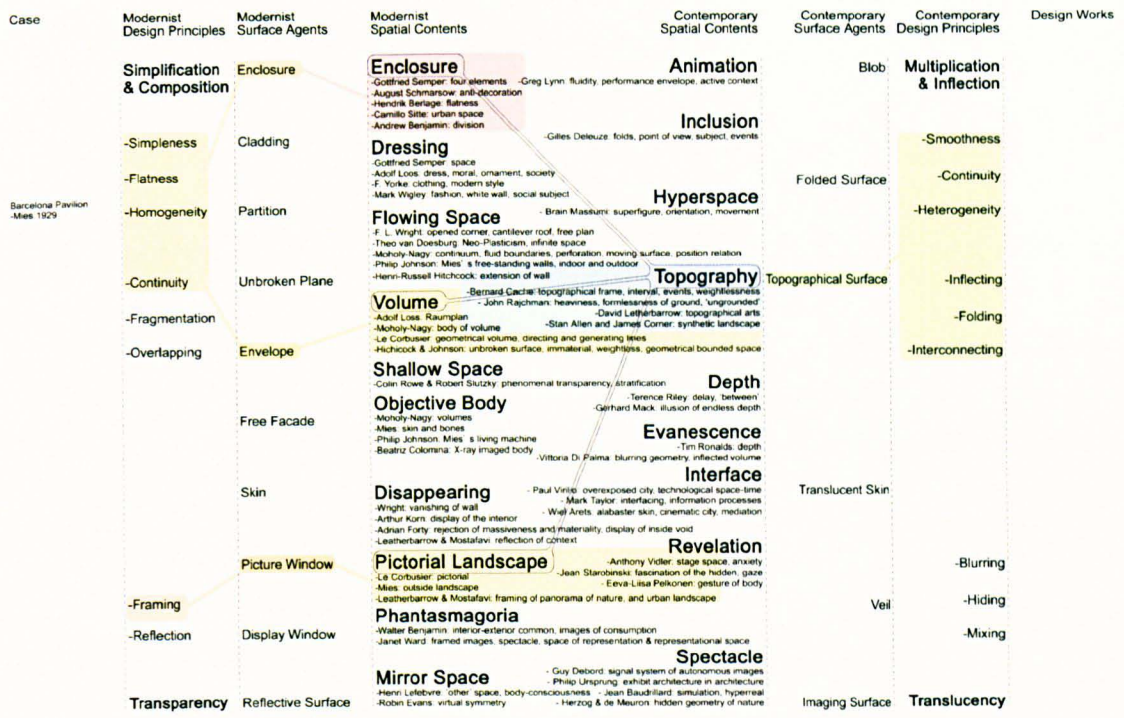


Diagram of Surfacescape, Breeding C.1

Enclosure, Volume, Pictorial Landscape – Topography

The diagram Breeding C.1 shows the linkages which can be drawn from the investigation of preceding chapters. The contemporary idea of topography brings a challenge to the Modernist forms of enclosure and volume, and to the relationship between architecture and landscape. As we have seen, through the inflections of topographical surface, the building is formed as an 'inflection' of the site and of the ground. The perception of space is neither given by enclosing – which is effectively an act of separating a place from its surrounding – nor by creating a volume sitting 'on' the ground. Rather, it comes from the experience of the interchange and relationship between topographical surface and the ground, creating a new form of landscape. Such landscape is created for bodily experience and actual events. In this sense, it is not a thing of vision, not a kind of pictorial landscape, but rather a topographical art. These relations describe the knowledge of surface architecture as is already understood.

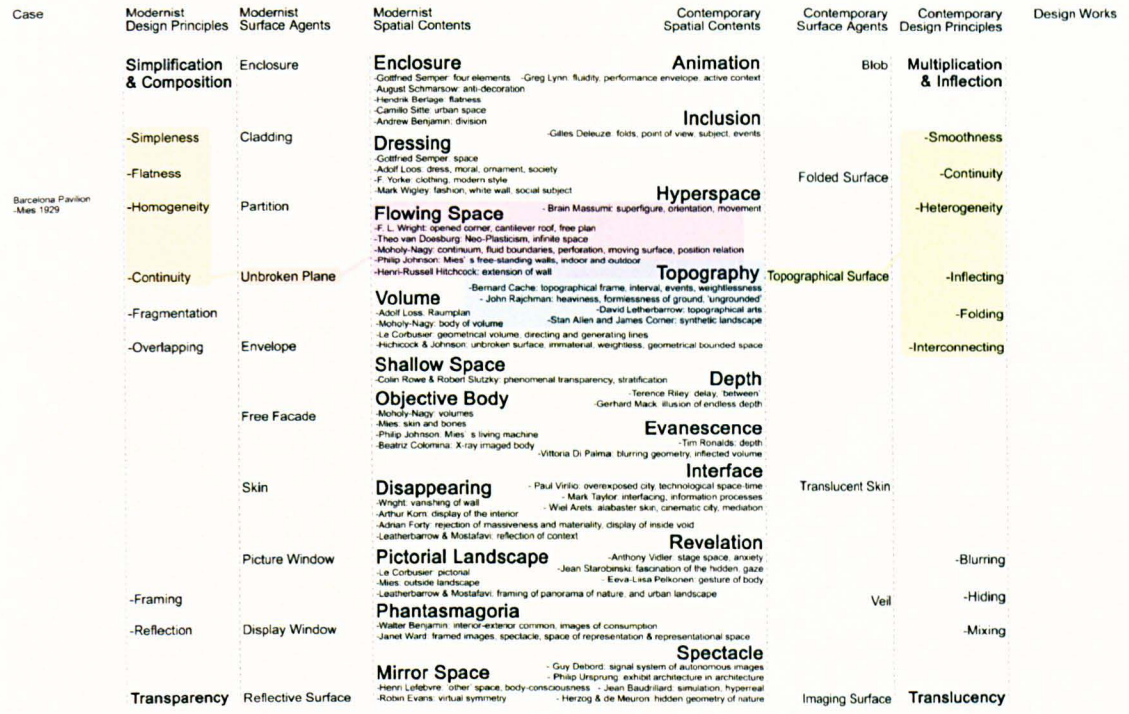


Diagram of Surfacescape, Breeding C.2

Unbroken Plane – Topographical Surface, Flowing Space - Topography

The form of *unbroken plane* is used in modern architecture for the perception of the extension of surface, and thus of a connection between spaces, and between inside and outside. Usually, this is a significant condition for the creation of *flowing space*. These surfaces extend to the outside, go beyond the boundary drawn by exterior walls, and break the form of 'box'. As described in the diagram above, the sections of unbroken plane and topographical surface are drawn up. This design exercise, Breeding C, sees what happens if *unbroken plane* is transformed into *topographical surface*; how does the transition of *topography* intervene in, and further proliferate, the sense of flowing space?

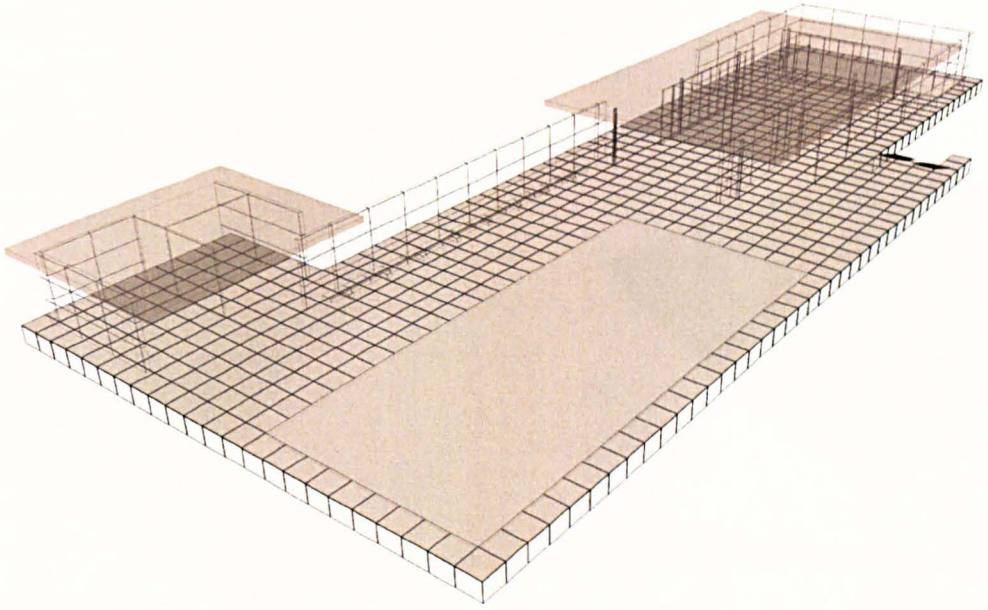


Figure 3.4.1 Illustration of unbroken plane

Unbroken Plane in the Barcelona Pavilion

The periphery of the Barcelona Pavilion is first defined by the flooring surface which is covered with homogeneous travertine panels. It spreads from the interior out to the two semi-closed courts, creating a continuity between these parts of the project. Sections of this surface are included in the water pools, overlaid with images reflected in the surface of the water. The interior spaces are covered by two slabs, and visually connected to the courts by the openness of the partition walls and the extension of the ceiling surfaces. Moreover, both the flooring and roofing surfaces extend beyond the boundary walls, forming a semi-open space between the pavilion and the external context. Despite this, the sense of connection, or the 'flowing', between inside and outside does not make the building connect to, and belong to, the site.[6] Rather, the building can be seen as a piece of autonomous architecture landed on the site, capturing the views of the surroundings, and introducing them into the experience within the world of the pavilion.

---

[6] As Robin Evans argued, the pavilion is very "antagonistic" to its context. See Robin Evans (1990), "Mies van der Rohe's Paradoxical Symmetries", in Robin Evans (1997), *Translations from Drawing to Building and Other Essays*, (London: Architectural Association Press), 235.

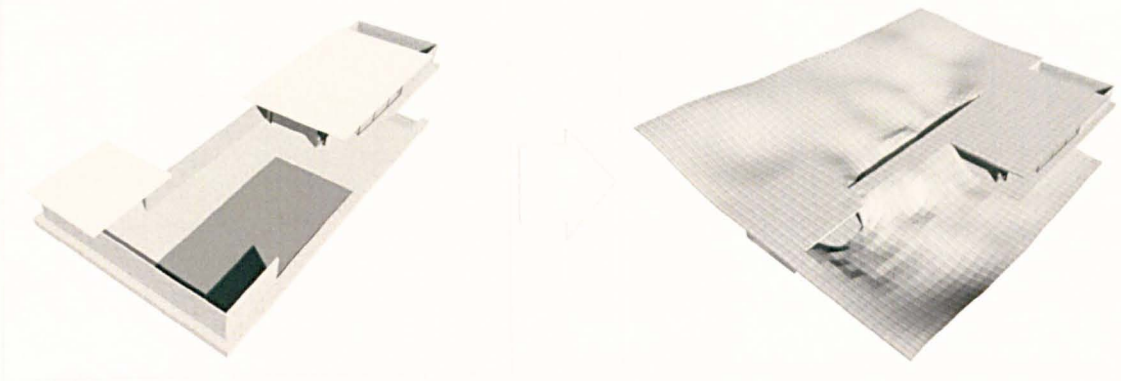


Figure 3.4.2 Illustration of the transformation from unbroken plane to topographical surface

The Transformation of Unbroken Plane

In Breeding C, the composition of roofing surfaces, flooring surface and some partition walls are transformed into the inflections of a topographical surface. The transformation is mainly made in the large pool court. Due to the character of topographical surface, this transformation is not a straight replacement. At the front (see the bottom-right side of the figure), the new surface basically keeps the same position and edges of the previous roofing and flooring surfaces. On the other side (see the top-left side of the figure), it extends into surrounding site following the rising ground at the back of the building. The original partition walls, located around the large court, are displaced by the rise of the inflected surface. The large water pool is also lost in order to preserve the continuity of new surface. For the purposes of this exercise the materiality and construction of the inflected surface are not considered; the emphasis is more on the formal differences, and their spatial effects. However, it is assumed that the surface is constructed to create a sense of smoothness.

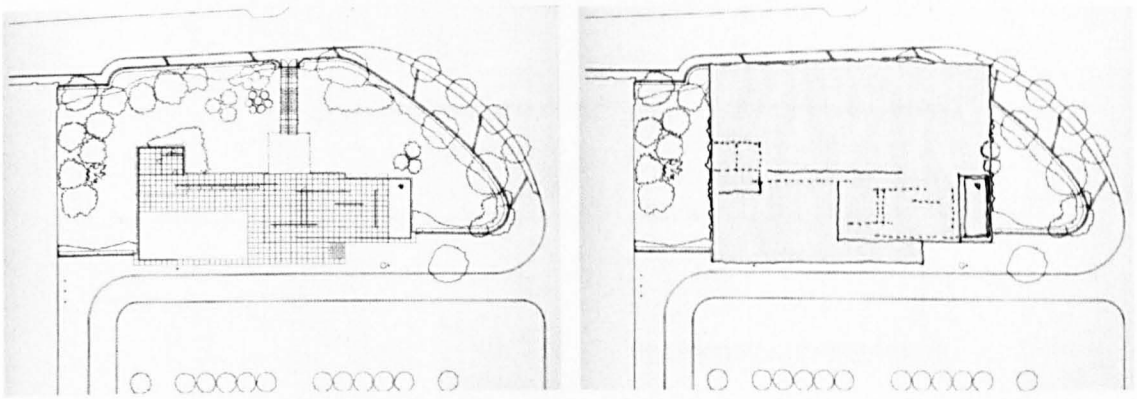


Figure 3.4.3 Site Plan (before and after the transformation)

Figure 3.4.4 Sketch of topographical surface, the numbers from a to g show the position of sections on next page.

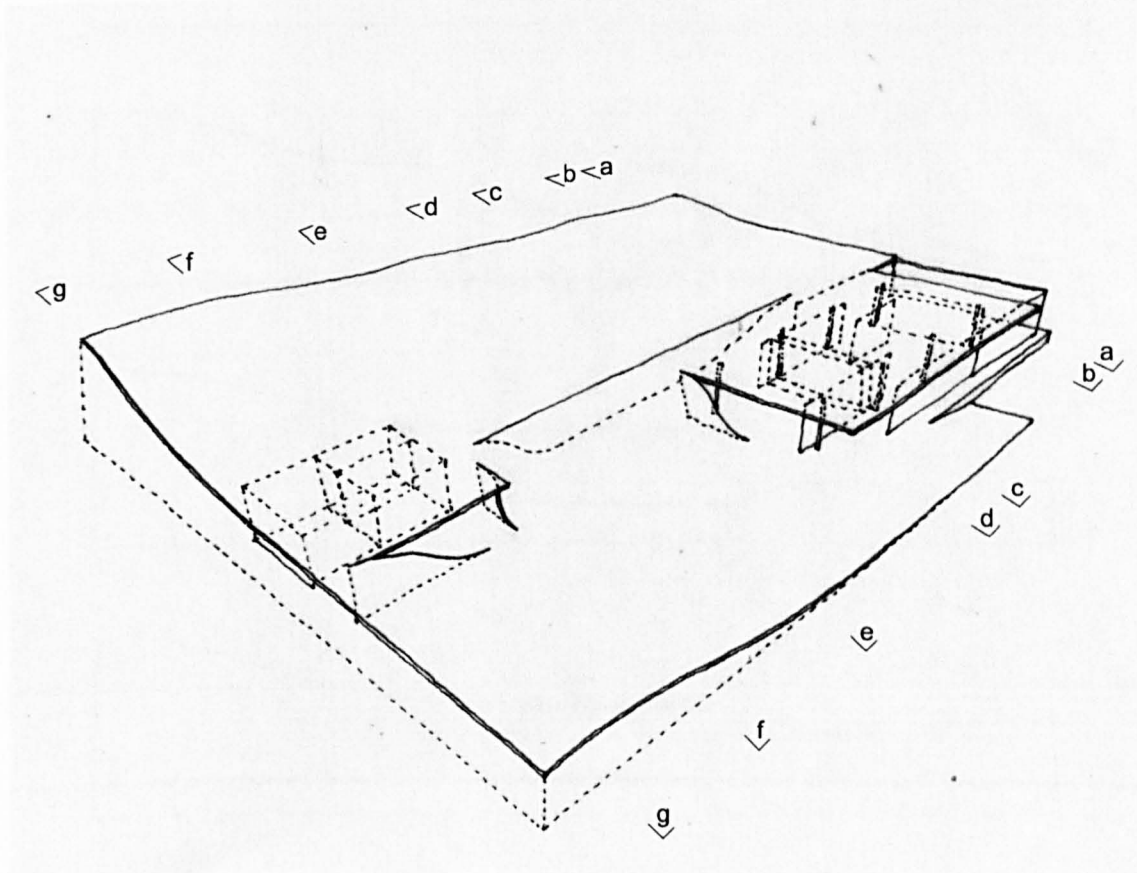
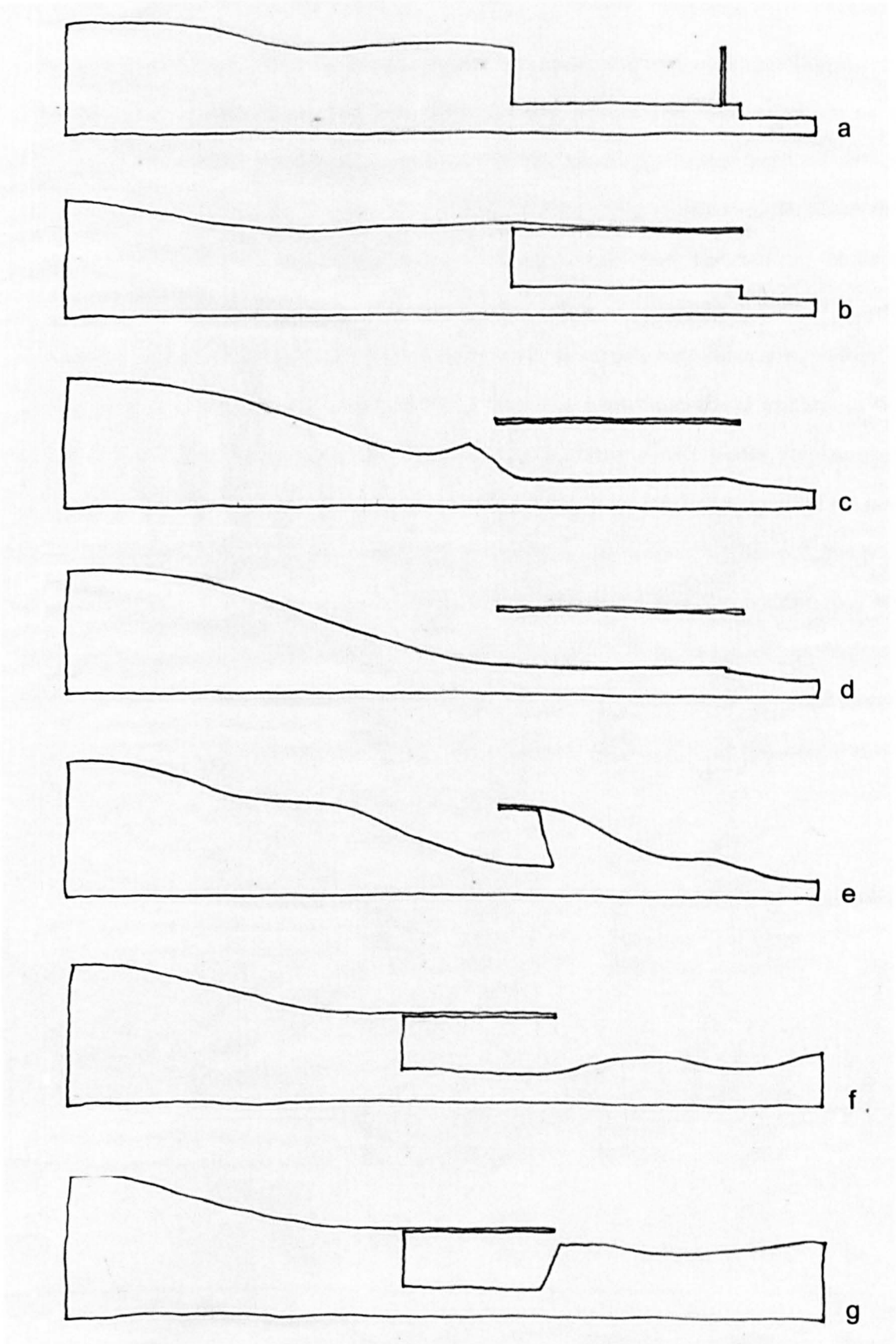
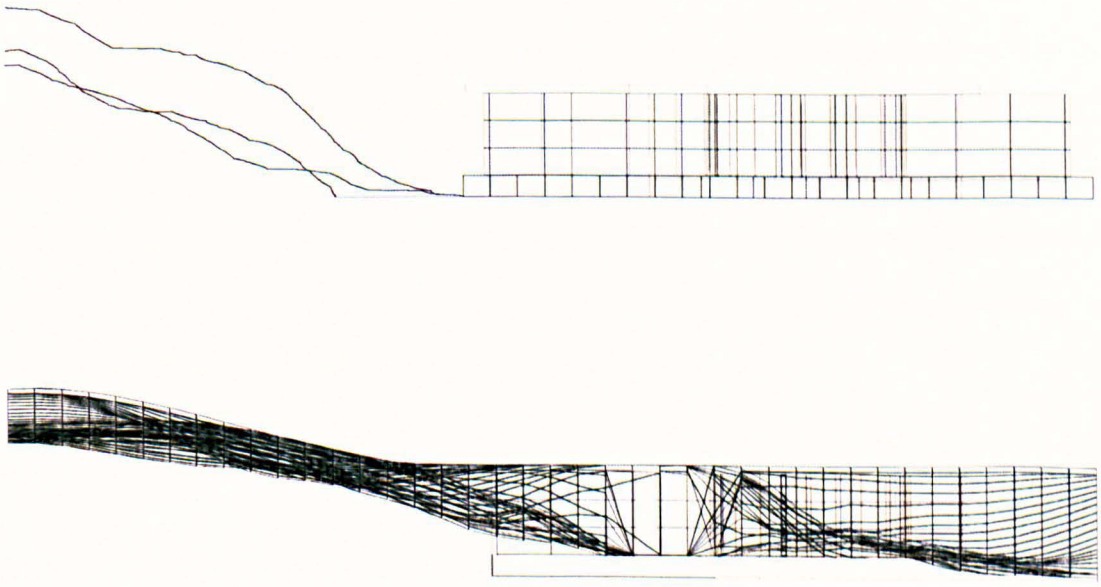


Figure 3.4.5 Sketch of sections from a to g


a
b
c
d
e
f
g

As shown in figure 3.4.6, before the transformation, the regular geometry of the pavilion is seen as a constructed creation in contrast with the undulating terrain. The floor, raised up on a podium defines a separate plane over the ground. After the 'breeding', the topographical surface introduces the character of the site into the spatial formation of the architecture. To match the changing of the terrain, the new surface shows a topological inflection. The roof and the floor are joined as two aspects of a single surface, so that the previous definitions of under and over are confused and the 'flowing space' of the original pavilion given a new dimension, shifting it from being held with horizontal planes to being seen in a three-dimensional manner. In the sections (figure 3.4.5), the relations between building and site are clearly shown. As described by sections *b*, *f* and *g*, the 'roofs' become an extension of the ground, and thus a part of the new terrain. With the sections of *c* and *d*, it can be seen that the ground surface falls toward, and goes through, the pavilion, thereby forming the 'floor'. The outside and the interior thus are interconnected. The undulation drawn in the section *c* implies an influence of topographical inflection. The section *e* shows a division between the falling ground (left) and the inflected topography of the large court (right); but they are actually connected through the extension and inflections on other sections (also see the figure 3.4.4).

Figure 3.4.6 The relation between the building and the terrain (before and after the transformation)



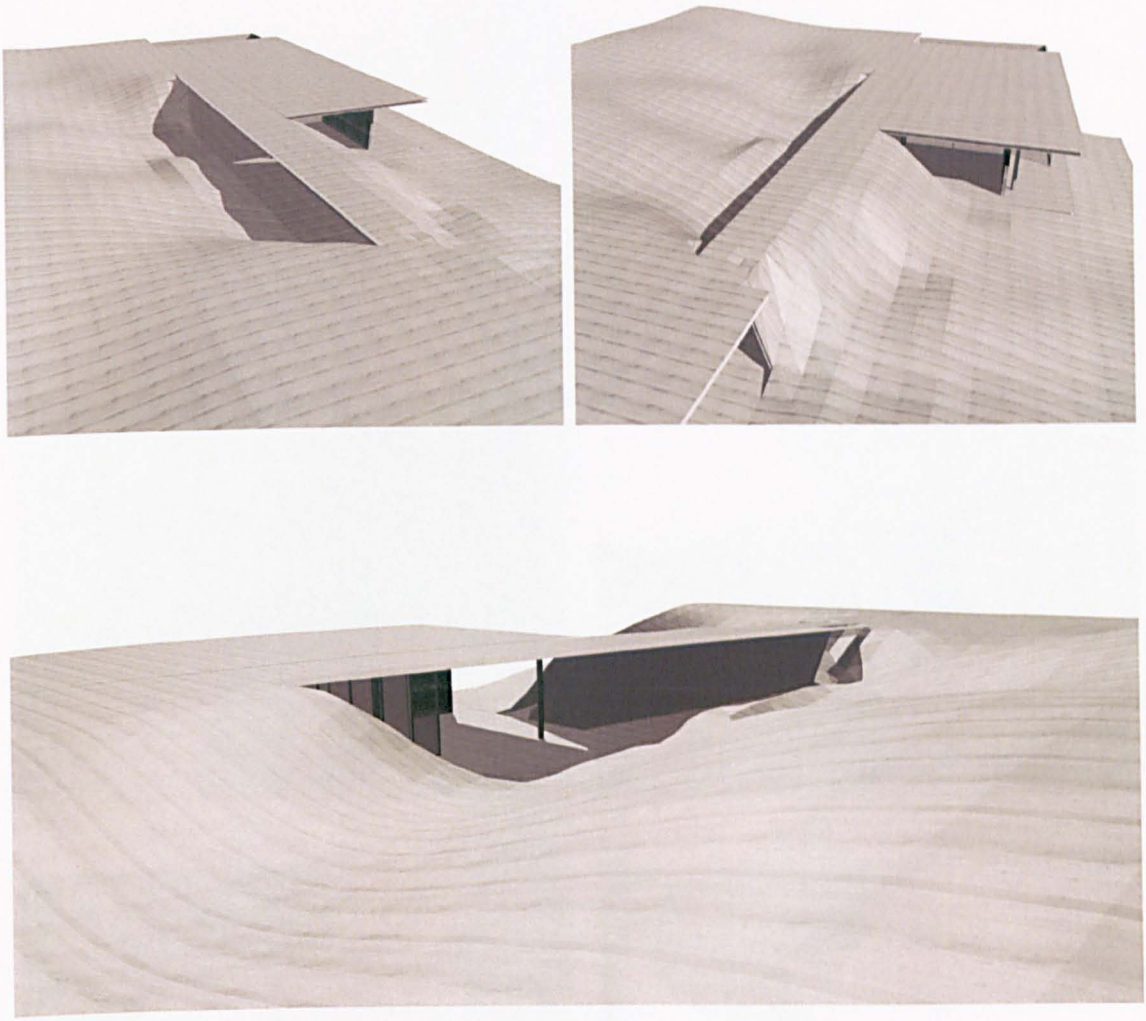


Figure 3.4.7 The continuity between the roofing and the flooring surfaces

Multi-flowing

As a part of the topographical surface, the 'roof' is endowed with multiple meanings. It is still the roof, but also an inflected 'ground'. The changing topography makes the 'roof' a place for potential events differing from the activities 'in' the pavilion. The 'flowing', previously visually dominated, is now described physically and phenomenally to give a range of different spatial experiences is joined by the continuity of surface. In this sense, the 'flowing' provides the potential for multiple events in space-time.

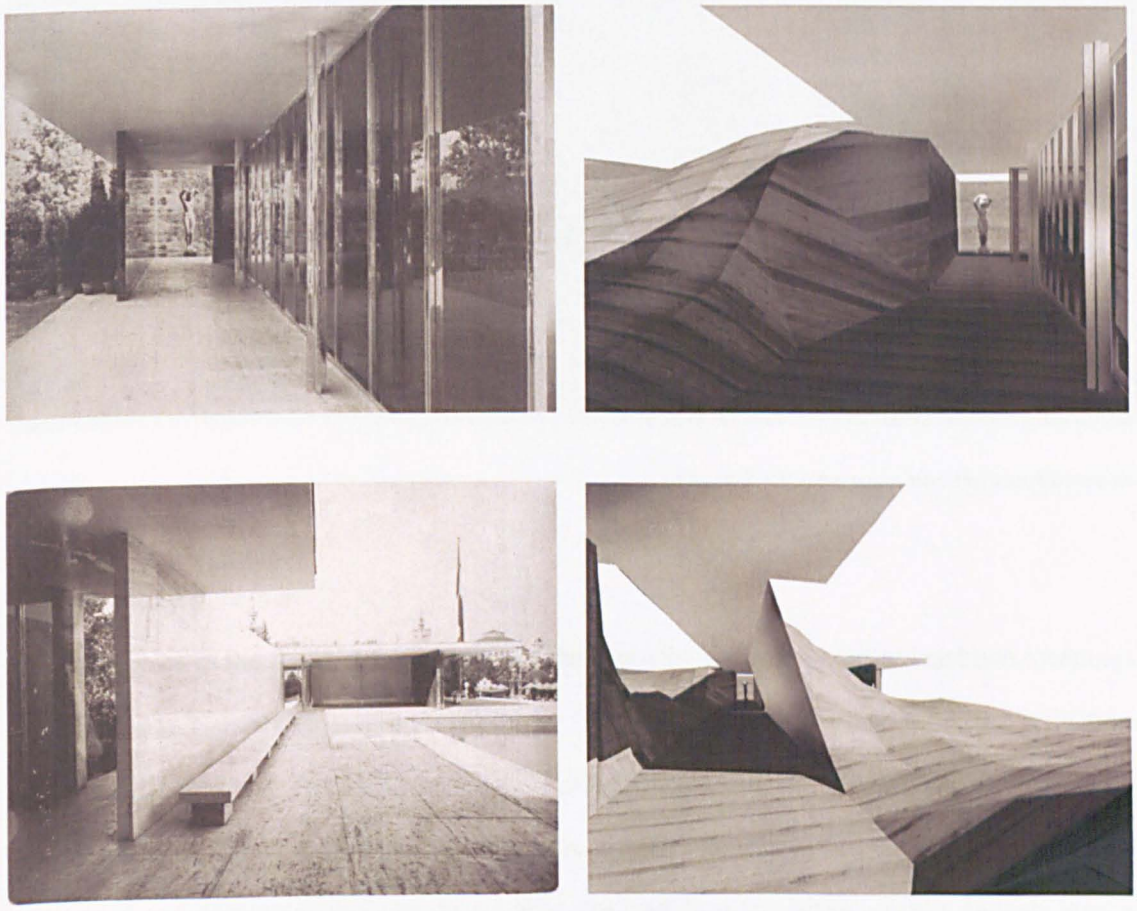


Figure 3.4.8 The comparison between the views before and after the transformation

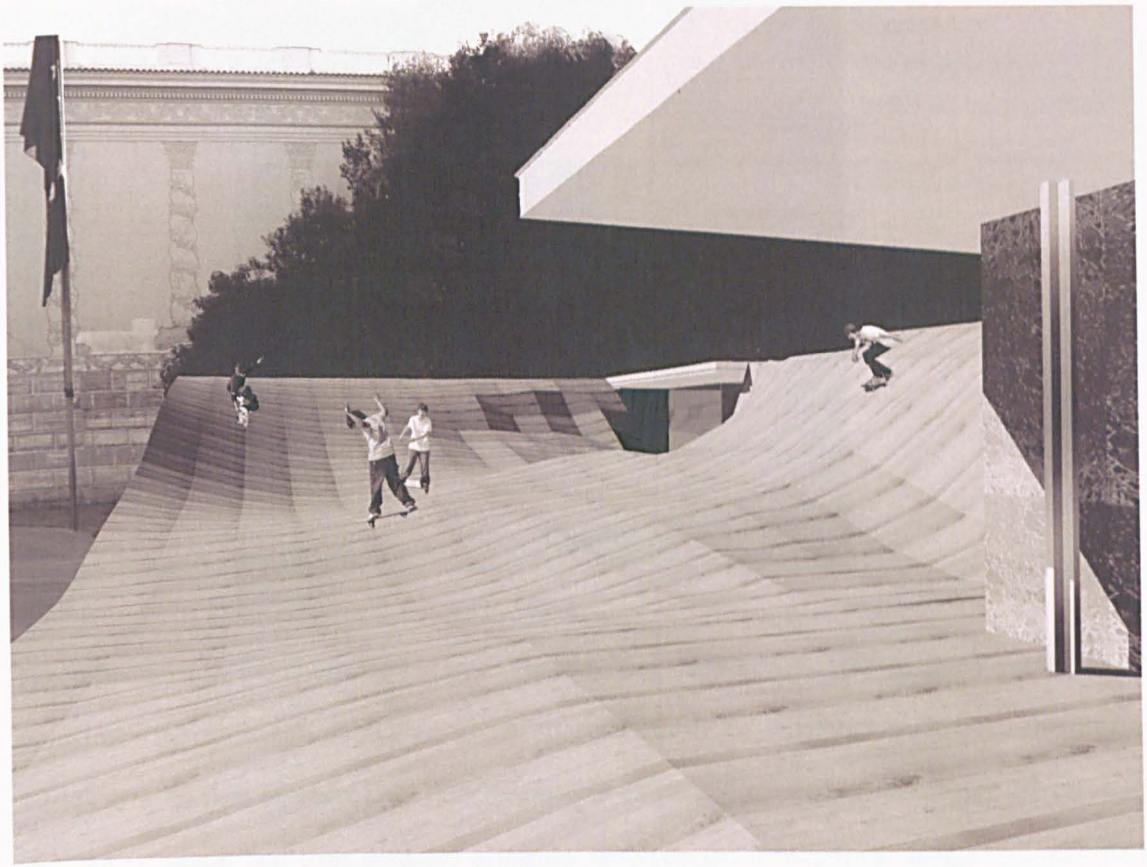


Figure 3.4.9 New court after the transformation

Reflection and Inflection

As can be seen in the figure 3.4.10, in Mies's pavilion, the water pool has at least two meanings. On one hand, it shows the continuation of the floor surface. On the other hand, the reflections make it different from the travertine grid. When the image of the marble wall is reflected in water surface, a virtual symmetry is produced in vision. The water pool thus displays a mixture of vertical and horizontal surfaces. In contrast, the transformed surface creates another kind of mixture of vertical and horizontal dimensions (see the figure 3.4.9). The division between these two dimensions is confused by the smooth inflections between them. This confusion is more related to a bodily experience of moving on the inflected surface than a visual illusion evoked by reflections. In the case of the water pool, the symmetry produced by reflections displays a juxtaposition of, and a paradox between, the real and the virtual, the reachable and the unreachable. The transformed surface, in contrast, brings a spatial tension between the reachable and the unreachable. The sharp rising at the end of the court makes access difficult, but not impossible. In this sense, the inflected surface contains a potential event of bodily experience.

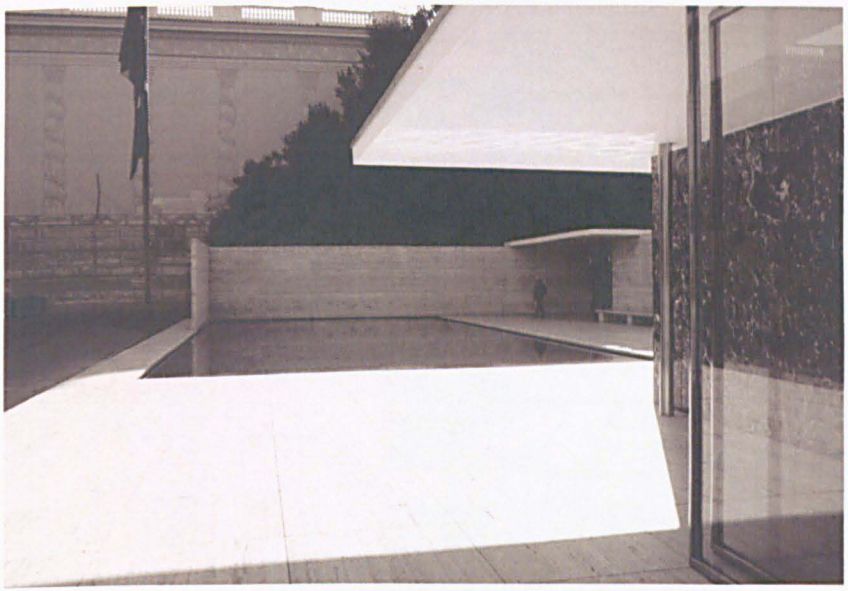


Figure 3.4.10
The court
before the transformation

The reflections in the court are various. The roof can also be reflected in water surface, and sometimes the reflection shows an image of 'inflection' in undulated water (see the figure 3.4.11). The surface of water pool thus produces a confusion of up/down firstly by the creation of a mirror space, and then contains a tension between the symmetrical image and inflected image. In contrast, the transformed surface brings another kind of richness to spatial experience. The relation of up/down is also confused but not because of the mirror image; rather, the confusion is evoked by the continuity and inflection between the roof and the floor. The undulations of inflected surface do not produce a temporal transition of images, but rather gives a condition to the variation of bodily experience with the temporality of movement.

Figure 3.4.11
The 'inflected' reflection
of the roof.

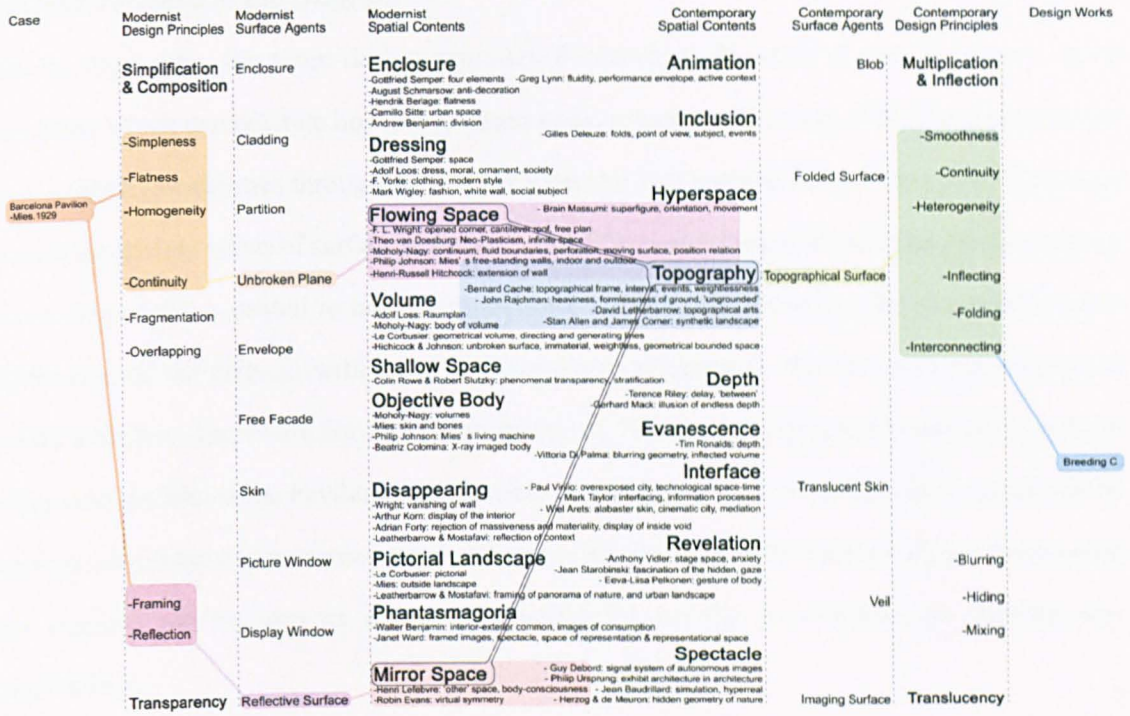


Diagram of Surfacescape, Breeding C.3

Conclusion C

The transformation of *Breeding C* brings a mixture of *flowing space* and *topography*. The experience of moving 'in' the pavilion is not simply about a tension between openness and closeness, or between extension and separation. Rather, it is now also affected by smooth inflections within the overall continuity. Unbroken plane is transformed into 'unbroken surface', which is not focussed on geometrical abstraction, but rather on the accommodation of bodily movement. The 'flowing' between inside and outside is supplied by the changing of topography rather than the production of vision. Furthermore, the new sense of 'flowing' goes beyond the meaning of free movement in the pavilion. As the roof becomes another level of ground, and another path for passing over, the topographical surface implies a potential of actually 'free' movement on the site, becoming a publicly connected space against the previous autonomy of the building. Moreover, the transformation also creates a comparison between reflection and inflection. In contrast to the illusional variation produced by the reflected images, the changing of topography contains an opportunity of actual variation of the event and bodily experience, and thus of the production of space.

3.5. The Potential of the Diagram

As has been seen, the three design exercises *Breeding A*, *Breeding B* and *Breeding C* give examples which demonstrate how the diagram *surfacescape* can be used. What the diagram does is to suggest possibilities through the combination and inclusion of themes, that both Modernist and contemporary views of surface have kept apart. The particular use of the Mies pavilion allows the testing of this potential to take place, because the *Breedings* interrupt the purely Modernist obsessions of the original with some contemporary concerns. In this the building provides a useful and clear framework for the design exercises. However the diagram is useful not only in relation to the Barcelona Pavilion. The diagram provides a set of routes through it, which can be used by the designer to create new combinations of surface form, effect and meaning. In this sense, the diagram can be seen as a map of possibilities for the development of contemporary surfacescape.

Seeking 'new' forms, sometimes combined with 'new' concepts, is very often an aspiration of architectural design. As argued by Jeffrey Kipnis, the logic of Modernist "new architecture" calls for "erasure and replacement"; in contrast, Post-Modern discourse brings a critical idea to "the new" with the principles of "reiteration and recombination".[7] To differ from the "collage" of Post-Modernism, which relies on "incoherent contradictions" and "semiotic recombinations", Kipnis suggests a positive approach for contemporary new architecture, which should be "participating in recombinations", seeking to "engender a heterogeneity that resists settling into fixed (spatial) hierarchies", and "must be" a proposal of "principles (thought not prescriptions) for design" which can "experiment with and project new forms."[8] While Kipnis's argument finally goes into a description of design strategies, in this thesis the diagram *surfacescape* is proposed as an alternative approach towards a "new architecture". It is not a design strategy but a mechanism for design exploration, and thus it aims to propose potential recombinations, design principles and 'new' forms through seeking new relations in existing contexts. In this sense, it prefers to seek 'new relations' more than 'new forms'. With such a proposition, the diagram tries to encourage an architecture which does not focus on the transaction of "displacement" but rather

---

[7] Jeffrey Kipnis (1993), "Towards A New Architecture", *Architectural Design*, No.102, 41.
[8] Ibid., 42.

a breeding of "heterogeneity".

The examples of *Breedings* in this chapter concentrate on finding new relations between different conditions and themes, which go beyond the categories found and set in Chapter One and Chapter Two. This contribution suggests how the act of design, when combined with a historical and theoretical framework, brings a specific approach to the research of architecture. What is proposed is that the potential of the diagram might not only relate to 'new' relations. Rather, as partially unfolded in this chapter, the linkages referred to at the beginning of each design exercise can also be further explored, and maybe criticised, through the design of more *Breedings*. This might form further lines of research.

Conclusion

Following the historical and theoretical investigations of Chapter One and Chapter Two, the subsequent creation of the diagram of *surfacescape*, and the design investigations of Chapter Three, the conclusion of this thesis can be summarised in three parts:

1). It has been argued that surface architecture is best understood in terms of 'surface-space.' In contrast to being seen as an issue of appearance and representation, or else in terms of a site for ornament and material treatment, or as a product of technology and tectonics, the surface has been demonstrated to have a significant role as spatial boundary or interface – as an agent in the transaction of spatial formation and effects, which affects the spatial perception and experience of people. By investigating the effect of morphology and geometry, and the various claims of transparency and translucency, the thesis has argued that the discussion of surface goes beyond the status of materials. Surface thus can show a quality of 'demateriality', and with this surface architecture departs from the representation of externality.

This view on surface is consistent with changing the focus of architecture from an obsession with style, mass, aesthetics and symbolic meaning, to an investigation of space as lived – i.e. the daily event and bodily experience. In Modernism, surface became the subservient to space, and the discussion of it was thus reduced to simple, flat, thin, architectural 'form'. This thesis has attempted to expand the discussion of surface beyond formal characteristics, and thus has been less interested in the formal variety of surface in the modern and contemporary context, and more on the spatial and phenomenal effects that the various approaches to surface have produced. The research into surface-space has thus aimed to draw out an alternative understanding of the theme of surface, attempting to bring a critical reading to what has been recently reduced to a vogueish proliferation of formal production, enabled in particular by new technologies of the both the physical (in terms of new materials) and the virtual (in terms of new formal and generative possibilities provided by computers.)

2). The thesis has further argued that the development of contemporary surface architecture is based on but also distinguished from the prototypes formed in Modernist architecture. The forms of contemporary surface often retain some basic characters of modern issues in terms of

the simple, flat, thin, undecorated etc. These characteristics contribute to the effect of continuity of surface. Though some types of contemporary surface concentrate on the curvature and topological geometry, and thus show a character of smoothness, such a sense of 'smooth' can be seen as a kind of 'new flatness', in terms of Alicia Imperiale.[1] The main distinction between the modern and contemporary is not so much about shape, but the meaning behind the surface. The 'flat' surface in Modernism arises out of the requirements of modern aesthetics and the logic of industrial production. In contrast, the most significant aim of the 'smooth' of contemporary surface is to seek for smooth relationship between architectural elements, or between the building and its environment and context. The focus is thus transferred from the object to the relationship between objects. In this sense, the transition from 'flatness' to 'smoothness' is not simply a change of shapes, but rather an evolution of the concept and operation of architecture. Following the principle of smoothness, the 'continuity' of contemporary surface is more intense than the 'continuity' of modern surface. Further, the former is combined with the character of heterogeneity – due to the effect of inflections – and thus differs from the latter which emphasises homogeneous form. Through the replacement of the 'composition', or more precisely 'elementary composition', the idea of 'inflection' becomes a key principle for the design of contemporary surface architecture.

In the same way, the transition from the principle of 'simplification' to that of 'multiplication' is not just a matter of changing the shape of things. As the thesis argued, the seeking for multiplication responds to the requirement of flexibility (in contrast to Modernist functionalism), indeterminate spatial effect (in contrast to the stability of regular form), bodily experience (in contrast to pictorial representation), cooperation with the site (in contrast to either autonomy or contextualism), and the complexity of urban environment (in contrast to the aspiration of an ideal world) – even though the actual design practice of contemporary surface sometimes might not achieve such intents, especially in the domains of social and political. However, the aim of some contemporary ideas of surface, at least in theory, is that folding surfaces contain, or aspire to contain, the spatial formation and effects of 'animation', 'inclusion', 'hyperspace',

[1] Alicia Imperiale (2000), *New flatness: surface tension in digital architecture*, (Basel; Boston; Berlin: Birkhäuser).

'topography' and so on.

Another development is that from the Modernist paradigm of transparency to the emerging fascination with translucency. What has been changed here is not so much the formal properties of the envelope and volume but the usage of materials – from transparent glass to translucent surface – and the new emphases on the transaction of blurring, hiding, mixing, and consequently the complex perception of that volume, and the ambiguous spatial relationship between inside and outside. The property of reflection is transmitted from transparent surface to translucent surface, and with this introduces new perceptual complexities. The details of these changes have already been analyzed and discussed in the preceding chapters, so it is not necessary to repeat them here. What needs to be emphasized here is that the shift from the focus on transparency to that of translucency displays a shifting interest in the experience of people, either through psychological analyses or phenomenal perception. The shift also relates to a critical rethinking about the condition of being 'overexposed', in the terms of Paul Virilio,[2] which was not only a character of late-modern society but has continued into the experience of the contemporary urban environment. The ambiguity evoked by translucent surfaces relates to personal experience, the process of perceiving and the engagement of the body's action, and particular values of imagination, memory, emotion etc, based around the spatial effects of 'depth', 'evanescence', 'interface', 'revelation' and so on that are apparent in the form of translucent surfaces. However, as noted by some theorists, such effects may also bring with them the issue of 'spectacle'.[3] This critique acts a reminder that one needs to question the relationship between the production of translucent surfaces and the consumption of contemporary visual culture. The relationship between production and consumption in architecture is a subject that is beyond the scope of this thesis, but which may be worth pursuing further.

3). The work of Chapter Three demonstrates how design can be used to develop a theoretical

---

[2] Paul Virilio (1984), "The Overexposed City", in K. Michael Hays (ed.) (2000), *Architecture Theory since 1968 (paperback edition)*, (London, Cambridge Mass.: MIT Press).

[3] See the discussions in Philip Ursprung (2002), "Exhibiting Herzog & de Meuron", in Philip Ursprung (ed.) (2002), *Herzog & de Meuron: Natural History*, (Baden: Lars Müller Publishers), 28-33; and Joan Ockman's essay at a symposium held at Columbia Unveristy in 1995, in Todd Gannon (ed.) (2002), *The Light Construction Reader*, (New York: The Monacelli Press), 66-69.

framework, how historical and theoretical study can support the exploration of design, and how the dialogue between the design of *Breeding* and the diagram *Surfacescape* brings an alternative approach to further understand the knowledge which is obtained through general research methods. The design project shows three examples out of a myriad of possibilities in which the form of surface architecture can be developed out of the prototypes of modern and contemporary approaches. The theory 'coordinates' offered by the diagram makes the design depart from the autonomy of form generation, and occur instead as part of a process of research thinking. The historical and theoretical context makes the design both more rigorous and, hopefully, more meaningful.

The contribution of this thesis consists of a specific investigation of contemporary surface architecture, especially developing out of a comparative study with Modernist prototypes; an original diagram of surface architecture arises out of this investigation, which supports both the historical and theoretical reading and the development of design, and from this comes a series of design explorations of surface form in the Barcelona Pavilion which show a productive tension between Modernist and contemporary themes.

Furthermore, this thesis opens a window through which the world of contemporary surface architecture can be observed. A world can never be taken in by only a glance. From this window, there could be more views worth seeing. Some further questions might arise after the reading of this thesis. For example, besides of the role of spatial boundary, or spatial interfacing, and the desire of representation, does surface architecture offer any consideration for other propositions, such as climate change or ecological threat? In particular, how can the design of surface architecture can be an important approach responding to the matters of energy saving. As mentioned in the section of the translucent skin, the structure of double-layer skin relates to a consideration for insulation and ventilation of architecture. Such a theme is not the domain of the present author, but it is worthy of being explored by other researchers.

Besides this, there are other questions that could be pursued as the continuation of this thesis in future. For example, is the transition from 'facade' to 'surface' a one way procedure? Are there

any hidden relationships between 'folding' and 'translucency'? And, is there any deeper reading relevant to the relation between surface architecture and current cultural conditions? The final part of this conclusion will try to draw out some suggestions around these topics in order to encourage further discussions.

As mentioned in preceding chapters, history is never a story of a single linear evolution. It thus cannot be said that the concept of 'facade' is absolutely dead, replaced by the idea of 'surface'. With the same logic, it cannot be said that 'folding' and 'translucency', which may now be seen as the new trends of surface architecture, must necessarily become the models of tomorrow as the displacement of Modernist issues. As can be seen, there are some architects, and critics who still use the term 'facade' talking about some contemporary cases of surface architecture. The reasons are complex. Sometimes, it is the problem of language. The complex relationship between words and architecture has been well discussed by Adrian Forty.[4] The usage of vocabularies in this thesis, as well as in many theoretical and historical discussions, attempts to be specifically defined by precise meanings and context. However, the language used in a non-academic environment might not be so specific. In this situation, the difference between the concepts of 'facade' and 'surface' is ignored unconsciously. When one uses the term 'facade', the intent of using this term might actually be related to the meaning of 'surface' as discussed here, rather than the sense of Classical facade. However, the usage of the term 'facade' might also precisely reveal the latent thought or intent of the speakers – in particular their concern with the meaning of 'facade', i.e. the emphasis on its externality, frontality and representation – even if it may be represented through a modern 'style' rather than in a Classical manner.

The persistence of the expression of 'facade' may also be explained by the stability of some traditional architectural values, in which the questions of appearance and its relation with representation are often given precedence. Moreover, the requirement of 'facade' sometimes can also come from the specific cultural and political context. Architecture is never developed as an autonomous machine. Rather, it is always a procedure that occurs within a network of the

[4] Adrian Forty (2000), *Words and Buildings: A Vocabulary of Modern Architecture*, (London: Thames & Hudson ltd).

relations of social forces. In the contemporary condition of the culture of consumption, it is common that the forms of architecture become assimilated into the system of exchange and so consumed as a kind of symbol or sign. It is not only because the forms of architecture are used to produce the 'representational spaces' (in terms of Lefebvre) in corresponding to the invisible social relations under the system of exchange, but also due to the significant role of media in which images, rather than real spatial creations, occupy the core of exchange. For the architecture that is designed principally for media, the first target is to show an appearance and a representation. To meet such conditions and the aspiration of the market, it is unsurprising that the model and idea of 'facade' is still employed, serving as a clear sign and symbol. In this context, the transition from 'facade' to 'surface', as described in this thesis, cannot be seen a linear evolution of architecture, with a clear break between the two. Instead the two will coexist, their respective prevalence dependent on the context of the particular cultural condition.

The complex mixture of the ideas of 'facade' and 'surface' is not only a phenomenon in Western architecture, but also a problem arising in the tension between global and local cultures. For example, for Chinese contemporary architecture, there is a significant tension between the impact of globalisation and the conditions of the local cultural context. On the one hand, fuelled by the quick transmission of media – publications, lectures, TV, websites, etc. – the 'new' architecture occurring in the West is often introduced into the China soon after its origin, but always as an image rather than a spatial creation. On the other hand, the strong requirement for symbols is a stubborn, but important, content of Chinese culture. Correspondingly, the representational role of buildings is always regarded as the primary task of architecture. In this context, the 'facade' remains today a significant theme for Chinese architecture. When images of contemporary surface architecture are introduced into China, they are used as no more than a 'new' source for the design of 'facade', and thus divert away from the original intent and effects of surface as described in this thesis. In this sense, the conflict between 'facade' and 'surface' is more complicated due to the interaction of different cultural conditions. For example, when the translucent skin was brought into China as a 'new fashion' of Western architecture, many designers concerned themselves with the 'style' of translucent skin rather than the effect of translucency; and more interestingly, this is also seen as a contemporary interpretation of

Chinese traditional translucent walls which were made of rice papers and thin wooden grids, and is thereby treated as a symbol of reborn Chinese culture.

Though in the last fifteen years the emergence of 'folding' and 'translucency' of surface architecture is clear in both theoretical and practical domains, the energies and implications of these two new trends are perhaps not fully released thus far. 'Folding' surface requires a complex form not only occurring in the design process. Thus a problem of realisation often lies in the difficulty of construction and the limitation of budget. The main methods of construction are still controlled by the productions of standard industrialisation. The industry of non-standard production is developing widely, on which the complexity of folded surface relies, but is still not available widely enough to become an economic choice. Due to the limitations in technology and finance, there are not many realised examples of 'folding' surface in architecture. However, for the concept of 'folding' surface, what might be more problematic is not the limitation of conditions but rather the limitation of thought and representation: the concept of 'folding' is often connected to the presentation of curvilinear shapes. If the concentration were transferred from the folding shapes to the 'folding' effects of surface-space, there should be more potential and more opportunities opened for architecture. For example, as has been seen in the examples of the topographical surface in the Chapter Two, the effects of 'folding' can be realised not through the introduction of curvilinear surfaces but rather by the elaborate changes of different planes. Such solutions introduce a tension between standard and non-standard constructions. In other words, the solutions of those examples bring an exploration of flexibility: how to use standard products and systems in a non-standard way? For designers, the focus on 'folding' thus moves between the production of design and the process of design, between the condition of production and the creativity of design. In addition, if 'folding' surface blurs the spatial relationship between wall, floor and ceiling, is there an alternative approach for surface architecture to achieve such an effect beyond a simple continuous form? Further, if the current architectural drawing system is often defined by the division of plan, elevation and section, how deeply can the blurring of wall, flooring and ceiling affect the way architects draw? And then even further affect architectural praxis?

In contrast to 'folding' surface, the issue of 'translucency' has been applied more often and more widely. This is because the effects of translucent surfaces can be achieved through research into materials and ingenuity of design. The creation of a translucent surface does not demand big changes in the conventional models of structure and construction. It is thus easier to be realised. Currently, it is worth noting that sometimes the adoption of a translucent surface is used as a 'fashionable' choice, and the translucent surface becomes no more than an exhibition of materials. In contrast, if the focus is transferred from the materials of translucent surface to the spatial effects of 'translucency', there will be new opportunities waiting to be explored. For example, is there a chance to rethink the relationship between transparent surfaces and 'translucency': is it possible to use transparent surfaces to achieve an effect of 'translucency' (for example, through an overlapping of transparent glass panels)? Furthermore, if the effect of 'translucency' has the potential to address social, cultural and political meanings, how can such potential be further unfolded into the creation of spatial relations?

In addition, this thesis raises further questions regarding the connections between 'folding' and 'translucency'. The idea of 'folding' mainly concentrates on the morphological properties; in comparison, the concept of 'translucency' is more concerned with the effects of translucent materials. The combination of these two prototypes thus would be an interesting proposal for further exploration. Besides the combination of forms, it would also be worth investigating the relations between the effects and the concepts of 'folding' and 'translucency'. As has been explored in this thesis, both 'folding' and 'translucency' concern an effect of uncertainty and ambiguity, and present a kind of 'formlessness'. It is thus quite interesting and productive to compare their different logics of operation and effect, and then to find the possible relationship. Such a relationship is not simply a mixture of forms but rather a proliferation of theories and design approaches.

There is also a potential to go beyond the concepts of 'folding' and 'translucency', and come into broader theoretical issues. The exploration does not stop at 'folding' and 'translucency', but looks forwards to pursue the questions behind and beyond them. For example, besides of 'folding', is there any other way to achieve the spatial relationship of 'smoothness'? Without the

translucent surface, is there another way to create the effect of 'evanescence'? If the ideas such as 'hyperspace' and 'interface' are more like a theoretical proposition in their current stage, is it possible that they might be achieved in specific conditions, closer to their intrinsic richness, in architectural practice?

Lastly, the effects of 'folding' and 'translucency' may bring an opportunity to resist the domination of contemporary image culture and consumption system. On the one hand the surface architecture of 'folding' and 'translucency' invokes the concentration on the experience of the body, and thus offers a chance to resist the dominance of visual-representational systems. On the other hand, what is challenged might also be the semantic structure – the stable correspondence of the signifier and the signified – of the sign system in the mechanism of image-consumption. Images are transferred to specific signs of consumption through being given certain representational roles. Accordingly, a sign system is established within such an image world, and becomes a spatial and social condition of everyday life. However, the ambiguity induced by the effects of 'folding' and 'translucency' might present an opportunity to escape from such a direct, and prescriptive, sign system. First because the ambiguity of perception might lead people to being in a situation of "not-sure-yet", and thus bring them away from the precise and dominant discipline of the sign system. Second, and maybe more importantly, the concentration on bodily experience will always bring people back into their personal world of memories, emotions, habits and so on. Such personal experience could be seen as a basic condition for the independence of individuals. In this way, the ambiguity of 'folding' and 'translucency' brings a potential of personalisation, a potential of freedom, in which people inhabit spaces through their personal bodily experience rather through than the external sign systems.

In summary, the outcome of this research presents a valuable work for current discussion and design practice around the theme of surface, and also for the discussion about how design can be used as a form and means of research. There are still many interesting questions to be discussed and explored in further studies. It is hoped that this thesis has offered a beginning and an open framework for future research in the field. Further work would in particular centre on

the use of the diagram to create new possibilities in the thinking and conceiving of surface in contemporary architecture.

Bibliography

Aelevansky, Lynn (2004), *Beyond Geometry: Experiments in Form, 1940s-70s*, (Cambridge, Mass. and London: The MIT Press).

Allen, Stan (2000), *Practice: architecture, technique and representation*, (Amsterdam: G+B Arts International).

Anderson, Christy (ed.) (2002), *The built surface Vol.1: Architecture and the pictorial arts from antiquity to the Enlightenment*, (Aldershot: Ashgate Publishing Limited).

Balmond, Cecil (2002), *informal*, (Munich, Berlin, London, New York: Prestel Verlag).

Banham, Reyner (1960), *Theory and design in the first machine age*, (London: The Architectural Press).

Baudrillard, Jean (1983), trans. by Paul Foss, Paul Patton and Philip Beitchman, *Simulations*, (New York: Semiotext(e), Inc.).

Benjamin, Andrew (2000), *Architectural philosophy*, (London & New Brunswick: The Athlone Press).

Benjamin, Andrew (2006), "Surface effects: Borromini, Semper, Loos", *The Journal of Architecture*, Volume 11 No. 1, pages 1-35.

Benjamin, Walter (1970), ed. by Hannah Arendt, trans. by Harry Zohn, *Illuminations*, (London: Jonathan Cape Ltd).

Benjamin, Walter (1999), trans. by Howard Eiland and Kevin Mclaughlin, *The Arcades Project*, (Mass. Cambridge and London: The Belknap Press of Havard University Press).

Benjamin, Walter (2003), ed. by Howard Eiland and Michael W. Jennings, trans. by Edmund Jephcott and Others, *Selected Writings Volume 4: 1938-1940*, (Mass. Cambridge and London: The Belknap Press of Havard University Press).

Benton, Tim and Charlotte (eds.) (1975), *Form and Function: A source book for the history of architecture and design 1890-1939*, (London: Crosby Lockwood Staples).

Blau, Eve and Troy, Nancy J. (eds.) (2002), *Architecture and cubism*, (London, Cambridge Mass.: The MIT Press).

Bock, Ralf (2007), *Adolf Loos Works and Projects*, (Milan: Skira editore).

Borden, Lain and Rendell, Jane (eds.) (2000), *Intersections: Architectural Histories and Critical Theories*, (London & New York: Routledge).

Bowness, Alan (1972), *Modern European Art*, (London: Thames & Hudson Ltd).

Branzi, Andrea (1984), Translated by C.H. Evans, *The Hot House – Italian New Wave Design*, (Cambridge Mass.: MIT Press).

Brolin, Brent C. (1980), *Architecture in Context: fitting new buildings with old*, (New York: Van Nostrand Reinhold Company).

Butz, Pamela A. and Klug, Jeffrey L. (eds.) (1987), *The Vertical Surface, The Cornell Journal of Architecture* (Volume 3), (New York: Rizzoli International Publications. Inc).

Cache, Bernard (1995), trans. by Anne Boyman, *Earth moves: the furnishing of territories*, (London and Cambridge Mass.: The MIT Press).

Carr, Stephen, and Francis, Mark, and Rivlin, Leanne G, and Stone, Andrew M. (1992), *Public Space*, (Cambridge, New York, Victoria: Cambridge University Press).

Colquhoun, Alan (1981), *Essays in Architectural Criticism: Modern Architecture and Historical Change*, (London and Cambridge Mss.: The MIT Press).

Colquhoun, Alan (1991), *Modernity and the Classical Tradition: Architectural Essays 1980-1987 (paperback edition)*, (London and Cambridge Mass.: The MIT Press).

Conrads, Ulrich (ed.) (1971), trans. by Michael Bullock, *Programs and manifestoes on 20th-century architecture*, (London and Cambridge Mass.: The MIT Press).

Costa, Xavier (ed.) (2002), *Wiel Arets*, (Barcelona: Ediciones Poligrafa).

Curl, James Stevens (1999), *A Dictionary of Architecture*, (Oxford: Oxford University Press).

Darley, Andrew (2000), *Visual Digital Culture: Surface play and spectacle in new media genres*, (London: Routledge).

Debord, Guy (1994), trans. by Donald Nicholson-Smith, *The Society of the Spectacle*, (New York: Zone Books).

dECOi (2001), "Aegis Hypo-Surface", *a+u* Vol. 370: (2001:07), (Tokyo: A+U Publishing Co., Ltd.)

DeLanda, Manuel (2005), "Space: Extensive and Intensive, Actual and Virtual", in Ian Buchanan and Gregg Lambert (eds.) (2005), *Deleuze and Space*, (Edinburgh: Edinburgh

University Press).

Deleuze, Gilles (1988), trans. and ed. by Seán Hand, *Foucault*, (London: The Athlone Press).

Deleuze, Gilles (1993), trans. by Tom Conley, *The Fold: Leibniz and the Baroque*, (London and New York: Continuum).

Deleuze, Gilles and Guattari, Félix (1984), trans. by Robert Hurley, Mark Seem and Helen R. Lane, *Anti-Oedipus: Capitalism and Schizophrenia*, (London: The Athlone Press).

Deleuze, Gilles and Guattari, Félix (1988), trans. by Brian Massumi, *A Thousand Plateaus: Capitalism and Schizophrenia*, (London: The Athlone Press).

Dodds, George (2005), *Building desire: On the Barcelona Pavilion*, (London and New York: Routledge).

Eisenman, Peter (1987), *Houses of cards*, (New York: Oxford University Press, Inc.).

Eisenman, Peter (1999), *Diagram Diaries*, (London: Thames & Hudson Ltd).

Eisenman, Peter (2003), *Giuseppe Terragni: transformations, decompositions, critiques*, (New York: The Monacelli Press, Inc.).

Eisenman, Peter (2004), *Eisenman inside out: selected writings, 1963-1988*, (New Haven and London: Yale University Press).

Evans, Robin (1995), *The Projective Cast: architecture and its three geometries*, (London, Cambridge Mass.: The MIT Press).

Evans, Robin (1997), *Translations from Drawing to Building and Other Essays*, (London: Architectural Association Publications).

Featherstone, Mike (1991), *Consumer Culture and Postmodernism*, (London: Sage Publications).

Foreign Office Architects (2003), *Phylogenesis: foa's ark*, (Barcelona: Actar).

Forty, Adrian (2000), *Words and Buildings: A Vocabulary of Modern Architecture*, (London: Thames & Hudson ltd).

Frampton, Kenneth (1992), *Modern Architecture: A Critical History (Third edition)*, (London: Thames & Hudson Ltd).

Frampton, Kenneth (1995), *Studies in Tectonic Culture*, (London, Cambridge Mass. : MIT Press).

Gannon, Todd (ed.) (2002), *The Light Construction Reader*, (New York: The Monacelli Press).

Gelernter, Mark (1995), *Sources of Architectural Form: A critical history of Western design theory*, (Manchester, New York: Manchester University Press).

Gibson, James J. (1979), *The Ecological Approach to Visual Perception*, (Boston: Houghton Mifflin Company).

Giedion, Sigfried (1949), *Space, Time and Architecture: the growth of a new tradition (Second edition)*, (London: Oxford University Press).

Grosz, Elizabeth (2001), *Architecture from the outside: essays on virtual and real space*, (London, Cambridge Mass.: The MIT Press).

Harvey, David (1990), *The Condition of Postmodernity*, (Cambridge Mass.: Blackwell Publishers).

Hays, K. Michael (ed.) (1998), *Oppositions reader: selected readings from a journal for ideas and criticism in architecture, 1973-1984*, (New York: Princeton Architectural Press).

Hays, K. Michael (ed.) (2000), *Architecture Theory since 1968 (paperback edition)*, (London, Cambridge Mass.: MIT Press).

Harris, Paul A. (2005), "The See with the Mind and Think through the Eye: Deleuze, Folding Architecture, and Simon Rodia's Watts Towers", in Ian Buchanan and Gregg Lambert (eds.) (2005), *Deleuze and Space*, (Edinburgh: Edinburgh University Press), pages 37-60.

Herrmann, Wolfgang (1984), *Gottfried Semper: In Search of Architecture*, (Cambridge Mss. & London: The MIT Press).

Heynen, Hilde (1999), *Architecture and modernity: a critique*, (Cambridge Mass., London: The MIT Press).

Hill, Jonathan (2003), 'Hunting the shadow- immaterial architecture', *The Journal of Architecture* Volume 8: 2003.

Hill, Jonathan (2003), 'Introduction: opposites that overlap', *The Journal of Architecture* Volume 8: 2003.

Hill, Jonathan (2006), *Immaterial Architecture*, (London and New York: Routledge).

Hitchcock, Henry-Russell (1977), *Architecture: Nineteenth and Twentieth Centuries* (Fourth edition), (Harmondsworth: Penguin Books).

Hitchcock, Henry-Russell and Johnson, Philip (1966), *The International Style*, (New York and London: W. W. Norton & Company).

Imperiale, Alicia (2000), *New flatness: surface tension in digital architecture*, (Basel; Boston; Berlin: Birkhäuser).

Jameson, Fredric (1991), *Postmodernism, or, The Cultural logic of Late Capitalism*, (London and New York: Verso).

Jencks, Charles and Baird, George (eds.) (1969), *Meaning in Architecture*, (London: Barrie and Rockliff, The Cresset Press).

Johnson, Philip C. (1947), *Mies van der Rohe*, (New York: The Museum of Modern Art).

Johnson, Steven (1997), *Interface Culture*, (New York: HarperCollins Publishers).

Kaufmann, Edgar (ed.) (1955), *An American Architecture: Frank Lloyd Wright*, (New York: Horizon Press).

Koehler, Karen (ed.), *The Built Surface Vol. 2 – Architecture and the pictorial arts from Romanticism to the twenty-first century*, (Aldershot: Ashgate Publishing Limited).

Lang, Peter and Menking, William (2003), *Superstudio: Life without Objects*, (Milan: Skira Editore S.p.A).

Langenhuizen, Anja, and van Ouwerkert, Marieke, and Rosemann, Jürgen (eds.) (2001), *Research by Design International Conference proceedings B (November 2000)*, (Delft: Delft University Press).

Lawson, Bryan (2001), *The language of space*, (Oxford: Architectural Press).

Lawson, Bryan (2002), "Design as research", *arq*, Vol. 6 No. 2.

Lawson, Bryan (2006), *How Designers Think: The design process demystified* (Fourth edition), (London: Architectural Press).

Le Corbusier (1989), trans by Frederick Etchells, *Towards A New Architecture*, (London: Butterworth Architecture).

Leach, Neil (ed.) (1997), *Rethinking architecture: a reader in cultural theory*, (London: Routledge).

Leatherbarrow, David (2000), *Uncommon Ground: Architecture, Technology, and Topography*, (London and Cambridge Mass.: The MIT Press).

Leatherbarrow, David (2004), *Topographical stories: Studies in Landscape and*

Architecture, (Philadelphia: University of Pennsylvania Press).

Leatherbarrow, David and Mostafavi, Mohsen (2002), *Surface architecture*, (London and Cambridge Mass.: The MIT Press).

Lefebvre, Henri (1991), trans. by Donald Nicholson-Smith, *Production of Space*, (Oxford: Blackwell Publishers Ltd).

Liaropoulos-Legendre, George (2003), *ijp: the book of surface*, (London: AA Publications).

Loos, Adolf (1982), trans. by Jane O. Newman and John H. Smith, *Spoken into the Void: collected essays 1897-1900*, (Cambridge, Mass. and London: The MIT Press).

Loos, Adolf (2002), trans. by Michael Mitchell, *On architecture*, (Riverside, Carlifornia: Ariadne Press).

Lupton, Ellen (2002), *Skin: surface, substance, and design*, (New York: Princeton Architectural Press).

Lynn, Greg (1998), *Folds, Bodies & Blobs*, (La Lettre Volée).

Lynn, Greg (1999), *Animate Form*, (New York: Princeton Architectural Press).

Lynn, Greg (ed.) (1993), *Folding Architecture*, *Architectural Design* Vol. 63 No 3/4: 1993, (London: John Wiley & Sons Limited.).

Mack, Gerhard (1997), *Herzog & de Meuron 1978-1988*, (Basel: Birkhauser).

Mack, Gerhard (1996), *Herzog & de Meuron: 1989-1991*, (Basel: Birkhäuser).

Mack, Gerhard and Liebermann, Valeria (2000), *Eberswalde Library: Herzog & de Meuron*, (London: AA Publications).

Massumi, Brian (1992), *A user's guide to capitalism and schizophrenia: deviations from Deleuze and Guattari*, (London & Cambridge, Mass.: The MIT Press).

Merleau-Ponty, Maurice (1962), trans. by Colin Smith, *Phenomenology of perception*, (London and Henley: Routledge & Kegan Paul Ltd).

Middleton, Robin and Watkin, David (1980), *Neoclassical and 19th century architecture*, (New York: Harry N. Abrams, Inc.).

Mirzoeff, Nicholas (ed.) (1998), *The Visual Culture Reader*, (London: Routledge).

Moholy-Nagy, László(1947), *The new vision 1928 and abstract of an artist* (fourth edition), (New York: George Wittenborn, Inc.)

Moneo, Rafael (2004), *Theoretical anxiety and design strategies: in the work of eight*

contemporary architects, (Cambridge, Mass. and London: The MIT Press).

Moravánszky, Akos (1996), "'Truth to Material' vs 'The Principle of Cladding': The language of Materials in Architecture", *AA files* 31, (London: AA Publications).

Moussavi, Farshid and Zaera-Polo, Alejandro (2002), *The Yokohama Project / Foreign Office Architects*, (Barcelona: Actar).

Münz, Ludwig and Künstler, Gustav (1966), *Adolf Loos: pioneer of modern architecture*, (London: Thames and Hudson).

Nesbitt, Kate (ed.) (1996), *Theorizing a New Agenda for Architecture: An Anthology of Architectural Theory 1965-1995*, (New York: Princeton Architectural Press).

Ockman, Joan (ed.) (1993), *Architecture Culture 1943-1968: A Documentary Anthology*, (New York: Rizzoli International Publications, Inc.)

Overy, Paul (1991), *De Stijl*, (London: Thames and Hudson Ltd).

Palma, Vittoria Di (2006), "Blurs, Blots and Clouds: Architecture and the Dissolution of the Surface", *AA files* 54, (London: AA Publications).

Papa, Dominic (1997), "A Conversation with Wiel Arets", in *EL Croquis* 85.

Pelkonen, Eeva-Liisa (2002), "Constructed grounds: new strategies in contemporary European architecture", Karen Koehler (ed.), *The Built Surface (Volume 2) – Architecture and the pictorial arts from Romanticism to the twenty-first century*, (Aldershot: Ashgate Publishing Limited).

Perrella, Stephen (ed.) (1998), *Hypersurface Architecture*, *Architectural Design* Vol. 68 No 5/6: 1998, (London: John Wiley & Sons Limited.).

Perrella, Stephen (ed.) (1999), *Hypersurface Architecture II*, *Architectural Design* Vol. 69 No 9/10: 1999, (London: John Wiley & Sons Limited.).

Rajchman, John (1998), *Constructions*, (Cambridge Mass., London: The MIT Press).

Rendell, Jane (2003), "Between two", *The Journal of Architecture*, Volume 8: 2003.

Richter, Dagmar (2004), *Armed Surfaces*, (London: Black Dog Publishing Limited).

Riley, Terence (1995), *Light Construction*, (New York: The Museum of Modern Art).

Russell, Frank (ed.) (1986), *Mies van der Rohe: European works*, (London: Academy Editions).

Schumacher, Thomas L. (1991), *Surface & Symbol – Giuseppe Terragni and the*

Architecture of Italian Rationalism, (London: Architecture Design and Technology Press).

Semper, Gottfried (1989), trans by Harry Francis Mallgrave and Wolfgang Herrmann, *The Four Elements of Architecture and Other Writings*, (New York, Melbourne: Cambridge University Press).

Shields, Rob (1998), *Lefebvre, Love and Struggle: Spatial dialectics*, (London & New York: Routledge).

Solà-Morales, Ignasi de (1997), trans. by Graham Thompson, *Differences: Topographies of Contemporary Architecture*, (Cambridge Mass., London: The MIT Press).

Speaks, Michael (1998), "IT'S OUT THERE...: The Formal Limits of The American Avant-Garde", *Architectural Design*, Vol.68 No.5/6.

Speaks, Michael (2003), "Greg Lynn FORM: Concept and Interview", *a+u* Vol. 396: (2003:09), (Tokyo: A+U Publishing Co., Ltd.)

Spuybroek, Lars (2004), *NOX: machining architecture*, (London: Thames & Hudson).

Stroll, Avrum (1988), *Surfaces*, (Minneapolis: the University of Minnesota Press).

Suzuki, Hiroyuki (ed.) (2002), *Shuhei Endo: paramodern architecture*, (Milan: Electa Architecture).

Tafuri, Manfredo (1976), thans by Barbara Luigia La Penta, *Architecture and Utopia – Design and Capitalist Development*, (Cambridge Mass.: MIT Press).

Tafuri, Manfredo and Dal Co, Francesco (1986), trans. by Robert Erich Wolf, *Modern Architecture Vol.1*, (London: Faber and Faber Limited).

Tafuri, Manfredo and Dal Co, Francesco (1986), trans. by Robert Erich Wolf, *Modern Architecture Vol.2*, (London: Faber and Faber Limited).

Taylor, Mark (2003), *Surface Consciousness*, Architectural Design Vol. 73:2003, (London: John Wiley & Sons Limited.).

Taylor, Mark C. (1997), *Hiding*, (Chicago, London: The University of Chicago Press).

Tierney, Therese (2007), *Abstract Space: beneath the media surface*, (Abingdon: Taylor & Francis).

Thompson, D'Arcy Wentworth (1961), *On Growth and From*, (Cambridge: Cambridge University Press).

Tschumi, Bernard (1996), *Architecture and disjunction (First paperback edition)*, (London,

Cambridge Mass.: The MIT Press).

Tschumi, Bernard and Cheng, Irene (Eds.) (2003), *The State of Architecture at the Beginning of the 21st Century*, (New York: The Monacelli Press, Inc.).

Ursprung, Philip (ed.) (2002), *Herzog & de Meuron: Natural History*, (Baden: Lars Müller Publishers).

van Ouwerkerk, Marieke and Rosemann, Jürgen (eds.) (2001), *Research by Design International Conference proceedings A (November 2000)*, (Delft: Delft University Press).

Vattimo, Gianni (1992), trans. by David Webb, *The Transparent Society*, (Cambridge: Polity Press).

Venturi, Robert (1977), *Complexity and Contradiction in Architecture (Second edition)*, (New York: The Museum of Modern Art).

Venturi, Robert and Brown, Denise Scott and Izenour, Steven (1977), *Learning from Las Vegas: The Forgotten Symbolism of Architectural Form (Revised edition)*, (London, Cambridge Mass.: The MIT Press).

Vesely, Dalibor (2004), *Architecture in the age of divided representation: the question of creativity in the shadow of production*, (Cambridge Mass., London: The MIT Press).

Ward, Janet (2001), *Weimar surfaces: urban visual culture in 1920s Germany*, (Berkeley, Los Angeles and London: University of California Press).

Warncke, Carsten-Peter (1994), *The Ideal as Art: De Stijl 1917-1931*, (Köln: Benedikt Taschen Verlag).

Weston, Richard (2003), *Materials, Form and Architecture*, (London: Laurence King Publishing Ltd).

White, John (1987), *The Birth and Rebirth of Pictorial Space* (Third edition), (London: Faber and Faber Limited).

Wigley, Mark (1992), "Theoretical Slippage", in Sarah Whiting, Edward Mitchell and Greg Lynn (eds.), *Fetish: The Princeton Architectural Journal*, Vol. 4, (New York: The Princeton Journal and Princeton Architectural Press).

Wigley, Mark (1995), *White walls, designer dresses: the fashioning of modern architecture*, (Cambridge Mass. & London: The MIT Press).

Yorke, F. R. S. (1934), *The Modern House*, (London: Architectural Press).

Zaera-Polo, Alejandro (1993), "Herzog & de Meuron: Between the face and the landscape", in *EL Croquis* 60.

Zaera-Polo, Alejandro (1993), "Interview with Herzog & de Meuron", in *EL Croquis* 60.

Zaera-Polo, Alejandro (2002), "Roller-Coaster Construction", Ali Rahim (ed.), *Contemporary Techniques in Architecture, Architectural Design* Vol. 72: 2002, (London: John Wiley & Sons Limited.).

Zelevansky, Lynn (2004), *Beyond Geometry: Experiments in Form, 1940s-70s*, (Cambridge, Mass.: The MIT Press).

Zukowsky, John (1986), *Mies Reconsidered* (exhibition catalogue), (Chicago: Random House Inc).

Zumthor, Peter (1998), *Peter Zumthor Works: Buildings and Projects 1979-1997*, (Baden: Lars Müller Publishers).

And the issues of *2G*, *AA files*, *a+u*, *Architectural Design*, *Architectural Record*, *Architecture Review*, *arq*, *Detail*, *EL Croquis*, *Grey room*, *Journal of Architecture*, *Journal of Architectural Education*, *Perspecta* etc.

Figure Sources

The sources of figures used in the thesis come below:

Figures 1.2, 1.17: from *Surface Architecture*;

Figures 1.5, 1.14: from *The Light Construction Reader*;

Figures 1.7 and 1.8: from *Adolf Loos Works and Projects*;

Figures 1.9, 1.11, 1.12, 1.19: from *Mies van der Rohe*;

Figures 1.10, 3.2.8, 3.4.3(left): from *Mies van der Rohe's German Pavilion in Barcelona, 1929-1986*;

Figures 1.15, 1.16: from *Mies van der Rohe: European works*;

Figure 1.20: from *Architecture in Context: fitting new buildings with old*;

Figure 1.21: *Modern architecture*;

Figures 1.22, 1.23, 3.2.1, 3.2.14, 3.3.1, 3.4.8(left), 3.4.11: from *Building desire: On the Barcelona Pavilion*;

Figure 2.1: from *Animated Form*;

Figure 2.6: from Greg Lynn's website, www.glform.com;

Figures 2.11, 2.12, 2.16, 2.20, 2.21, 2.22, 2.23: from *EL Croquis* 115/116;

Figures 2.13, 2.14: from *Shuhei Endo: paramodern architecture*;

Figure 2.15: from *Beyond Geometry: Experiments in Form, 1940s-70s*;

Figure 2.17: from *EL Croquis* 103;

Figures 2.18, 2.19: from *Architectural Review*, December 2004;

Figures 2.24: from *EL Croquis* 53;

Figure 2.25, 2.35: from *Light Construction*;

Figures 2.26, 2.27: from *EL Croquis* 85;

Figures 2.28, 2.29, 2.30: from *a+u* 1998:02;

Figure 2.37, 2.41: from *EL Croquis* 84;

Figures 2.31, 2.40, 2.42: from *a+u* 2002:02;

Figures 2.43, 2.44, 2.45: from *Herzog and de Meuron 1992-1996*;

Figure 3.3.8: from *The Ideal as Art: De Stijl 1917-1931*;

Figure 3.3.10: from *AA files* 54;

Other figures are all photoed, or drawn, by Lu FENG.