



THE MEANINGS OF MATERIALS

A Phenomenological Study on the Influence of Materials on the Experience of Architecture Aimed to Address the Feeling of Alienation towards the Modern Built Environment

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Tutor: Patrick Healey

Student: Skander Saâdi

Student ID: 4081706

Student email: skander.saadi@hotmail.com

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ABSTRACT

By establishing a phenomenological frame, this research paper demonstrates that the feeling of alienation towards the modern built environment originates from the failure of this built environment to allow man to identify himself with his own human condition, abstract ideas and natural environment. The study focuses on materials as primary suspects of that failure. From the phenomenological point of view, modern and traditional materials are compared, and their physical properties are analysed in the way they allow the identification with the environment. The results show that modern materials, while allowing man to identify himself with his abstract ideas, do not allow him to do so with his natural environment and human condition. Through the analysis of contemporary architectural works, the study explains how modern materials can be transformed and articulated in a way that they can contribute to a meaningful experience of architecture. Finally, this research paper suggests a need for further study to be conducted. For that, the presented earlier methodological phenomenological frame can form the basis for the analysis of other architectural aspects, allowing a broader understanding of the problem of alienation towards the modern built environment.

Keywords: materials, meaning, architecture, experience, perception, phenomenology, identification, environment, modern built environment, feeling of alienation

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I. INTRODUCTION

In 1985, Finnish architect and phenomenologist Juhani Pallasmaa opens his essay, *The Geometry of Feeling*, with the following question: “Why do so very few modern buildings appeal to our feelings, when almost any anonymous house in an old town or the most unpretentious farm outbuilding gives us a sense of familiarity and pleasure?” (Pallasmaa, 1985/1996, p.448). Three decades later, this question is still relevant; people have difficulties to connect with buildings and be moved by them. A feeling of alienation is experienced.

A lot of authors have been dealing with the problem of alienation towards the built environment. Mexican architectural historian and theorist Alberto Pérez-Gómez for example, demonstrates in *Architecture and the crisis of modern science* (1983) that its origins trace back to 1800. He argues that, with the mathematical developments, man predicted that the world could be controlled by science and technology. This is in total discord with how the world is perceived. With the advances in perception and neurology, it has been shown that the environment is first experienced through “basic corporeal responses” (p.183) and only after that, through the capacity to rationalise it (Mallgrave, 2010). In a more intuitive way, Swiss architect Peter Zumthor¹ (2006) writes: “And I have to admit that I’m back to believing in first impressions. [...] I enter a building, see a room, and – in the fraction of a second – have this feeling about it” (p. 13).

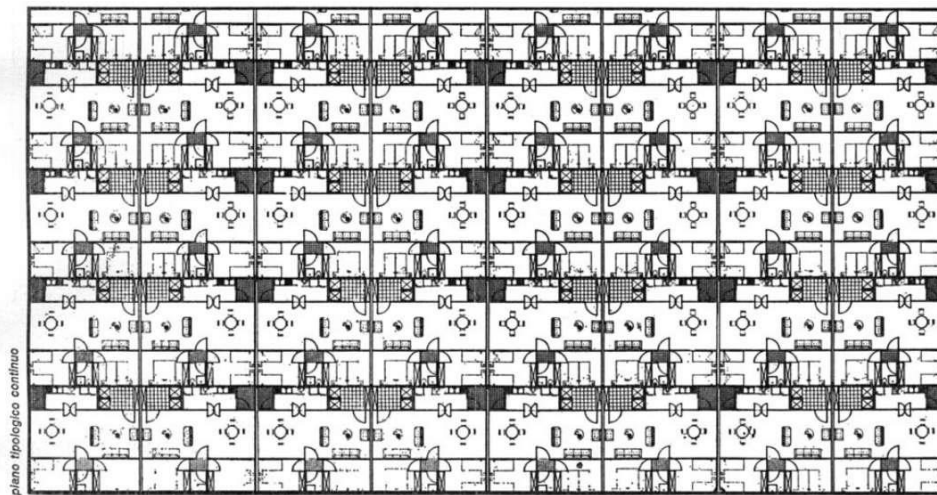


Fig. 2: No-stop city, Archizoom (Artemel, Architizer, 2013). The modern rational and formal architecture in its apogee. Designed in 1969, the work of Archizoom is still relevant.

¹ Peter Zumthor can be considered as one of the contemporary leading architects striving for an architecture of quality. He expresses in his building unique atmospheres, through the focus on the physical qualities of materials and their capacity to evoke all of the senses.

Phenomenology, with the reintroduction of the significance of perception, has shown the limitations of such formal and rational approach (Pérez-Gómez, 1983). An approach that until today, leads to an architecture in which “the poetical content of reality, [...] is hidden beneath a thick layer of formal explanations” (p.6). Phenomenology, as its etymology indicates it, is the study of phenomena. It considers reality as a total set of phenomena that are perceived and understood in the human consciousness, and are as such not independent from it. In *Genius Loci: towards a Phenomenology of Architecture*, Norwegian architect and author Norberg-Schulz (1979) also demonstrates that the scientific approach is not able to fully define what architecture is about. He shows that this approach do not consider the “here” of a place, that is, its “particular identity” (p.8). Phenomenology, however, he argues, allows a “return to things” - an antagonistic approach to “the abstraction and mental constructions” (p.8) of the scientific one. It explains architecture in an existential and thus, qualitative way, which makes it the right method to address the problem of alienation towards the modern built environment.

Humans spend the biggest part of their life inside buildings². But what are buildings? What are these *things*, so extremely anchored to the everyday life? When observing them, it is clear that their materiality is the most concrete manifestation of their substance. The materials are the only elements of a building that can be perceived through all the senses. It makes them significant and appropriate suspects to analyse in order to understand the problem of alienation³. As a result of selective physical and qualitative performance, building’s materials are “homogeneous and task-oriented” (Steinberg, 2002, p.23). Technologically reproduced in standard products and satisfying the functional, constructive and climatic quantitative criteria, they seem to lack the character and authenticity⁴ of natural materials. In other words, they lack the qualitative dimension. This could explain the problem of alienation and lack of emotional connection with the modern built environment. The idea that a qualitative reading of architecture could solve the problem of

² According to the Environmental Protection Agency (EPA) report to congress on indoor air quality (Volume II: Assessment and Control of Indoor Air Pollution), Americans spend approximately 93% of their life inside their buildings, 5% in transit (transport) and only 2% outside.

³ This study will focus on the materiality of a building. It is therefore important to analyse the other aspects of architecture (such as scale, proportions, light, etc.) to arrive at a full understanding of the problem of alienation. This paper will at least offer a methodical frame wherein these other aspects can be applied and studied.

⁴ Both terms: character and authenticity, will be defined further in the paper.

alienation is beautifully illustrated in Zumthor's (2006) following claim: "Quality architecture to me is when a building manages to move me." (p.11).

Today's lack of a qualitative attitude towards materials raise the following question: **how can modern materials, just like traditional materials, contribute to a meaningful experience of architecture?** As such, this study will research the degree to which modern materials are related to the feeling of alienation towards the contemporary built environment. While materials are the primary and most concrete tools of the architect, almost no texts discuss how they are perceived. This is especially true for modern materials. Accordingly, this research paper will present a first step in the understanding of how man perceives and experiences the materials of his built environment. The phenomenological approach of architecture will be taken as a point of departure and provide a general framework from which further studies can take place. This means that the purpose of architecture and its meaningful experience by man will first be addressed. Only then, the contribution of modern materials to that meaningful experience can be comprehended. In respect to the method of research, the research question will be answered and its terms will be defined throughout the text.

In the first chapter, the relationship between man and architecture as well as the definition of "meaningful experience of architecture" will be addressed. Next, a distinction will be made between modern and traditional materials, and their physical properties will be examined in order to understand to which degree they contribute to that meaningful experience of architecture. Based on the conclusions of the previous points, general methods to approach modern materials in a meaningful way will be presented and illustrated by contemporary architectural works.

II. THE PHENOMENOLOGY OF ARCHITECTURE

“The existential purpose of building (architecture) is therefore to make a site become a place, that is, to uncover the meanings potentially present in the given environment.”

“When the man-made environment is meaningful, man is “at home”.”

(Norberg-Schulz, 1979, p.18 & p.50)

In *Genius Loci, Towards a Phenomenology of Architecture*, Christian Norberg-Schulz (1979), on the foundations of Martin Heidegger’s philosophy of *dwelling* and the *thing*, presents a general phenomenological approach to architecture. In this chapter, this book will be studied in order to understand man’s relation to architecture. Consequently, the term *meaningful* will be defined in order to comprehend how a building can be experienced meaningfully and how materials can contribute to that.

2.1 Phenomenology of place

Norberg-Schulz (1979) describes the environment as a totality of concrete phenomena, such as people, houses, trees, sun, clouds, seasons, emotions and feelings. These phenomena, he argues, form the “[...] “content” of our existence” (p.6). For the environment to have a more concrete connotation, the author introduces the term *place*. A place, according to him, is the “totality made up of concrete *things* having material substance, shape, texture and colour” (p.6), which together, form the “environmental character” (p.6) or “atmosphere”⁵ (p.7). The concrete *things* forming a place, according to Norberg-Schulz (1979), have a meaning and a structure. He defines the meaning of a *thing* as its relationship to other *things*, that is, what the *thing* gathers⁶. The structure is defined

⁵ Atmosphere is the central concept in Zumthor’s work. It is, as he explains it, what defines the qualitative dimension of a building; what manages to move someone (as mentioned in the introduction). It is perceived according to him, “through our emotional sensibility” (Zumthor, 2006, p.13). Norberg-Schulz, just as Zumthor, perceives a place as a qualitative phenomenon.

⁶ “Heidegger illustrates the problem by means of the *bridge*; a “building” which visualizes, symbolizes and gathers, and makes the environment become a unified whole. [...] The landscape gets its value *through* the bridge. Before, the meaning of the landscape was “hidden”, and the building of the bridge brings it out into the open. “The bridge gathers being into a certain

as the “formal properties of a system or relationship” (p.166). The structure encompassing the concrete and perceivable elements composing a *thing* will further be defined. According to the author, both meaning and structure are abstracted from the total phenomena through the recognition of more constant occurrences.

Norberg-Schulz (1979) divides the environment into natural places and man-made places. The man-made environment, he explains, is not just functional - it has a structure and it embodies meanings. He argues that “these meanings and structures are the result of man’s understanding of its natural environment and of his existential situation in general” (p.50). As such, he concludes that to understand the built environment, it is crucial to take man’s relationship with his natural environment as a point of departure.

Natural Places

Norberg-Schulz (1979) uses the term landscape to designate the natural places. He explains that like the man-made environment, the landscape where man lives has structure and embodies meanings. These structures and meanings, according to him, are at the origin of the mythologies (cosmogonies and cosmologies⁷) which have formed the act of dwelling. By analysing these mythologies, the author shows that by abstracting from the flux of natural phenomena, man could understand⁸ his environment by giving these forces a meaning. Norberg-Schulz, therefore, lists five mythical modes of natural understanding:

1. The first mode, found in most of the cosmogonies, explains how the world originated. It takes the natural forces and associates them with concrete natural elements or *things*. The author takes the example of the belief that the creation of the world is a marriage between heaven and earth. Man, then, interpreted elements such as rocks, vegetation, and water as resulting from that marriage and capable of making a place meaningful.

“location” that we may call a “place”. This “place” however did not exist as an entity before the bridge (although there were many “sites” along the river-bank where it could arise), but comes-to-presence with and as the bridge.” (Norberg-Schulz, 1979, p.18.)

⁷ A cosmogony is a system explaining the formation of the universe and cosmology is the science of the universal rules governing our physical world.

⁸ By *understand*, Norberg-Schulz (1979) means “existential concept which denotes the experience of meanings.” (p.23)

2. The second mode of natural understanding is the *cosmic order*, usually abstracted from the course of the sun since it is seen as the most invariant phenomenon. Here, the author takes the example of Egypt where the east direction (the sun's rising direction) was seen as the domain of birth and life, while the west direction was considered the domain of death. As such, the *order* category consisted of a spatial and structural reading of the natural phenomena.
3. The third mode consists in defining the *character* of a natural place through the association with "basic human traits" (p.28). The Greek landscapes, as Norberg-Schulz explains it, were clearly delimited and different from each other. This allowed man to easily interpret them as being different personalities.
4. The fourth mode is represented by the phenomena related to *light*. The author shows that to Greeks, light symbolised knowledge, artistic and intellect values, while in Christianity, it symbolised the concept of love as a unifying force.
5. Finally, the fifth mode of understanding is based on the phenomenon of *time* and represents the "dimensions of constancy and change" (Norberg-Schulz, 1979, p.32).

These five categories embody the ways in which man abstracted meanings from the flux of natural phenomena. Norberg-Schulz (1979) insists on the fact that man, of course, interacts with these meanings; he is part of the total phenomena that are taken place⁹.

Man-Made Places

Norberg-Schulz (1979) then analyses the man-made places. According to him, these begin their presence from the boundaries with the natural places. Thus, they form an enclosure more or less open to their surroundings. To shape these places, the author explains that man experiences the environment and gathers its meanings by concretising them into *things*. The *things* (including buildings) become a microcosm that "explains" the environment and makes its character manifest. This is how *things* become meaningful to man (Norberg-Schulz, 1979).

⁹ "Man is "thing" among "things": he lives among mountains [sic] and rocks, rivers and trees; he "uses" then [sic] and has to know them. He also lives with the "cosmic order": with the course of the sun and the cardinal points. [...] man is related to the "character" of things. From the initial animistic stage he gradually develops a conscious or unconscious understanding that there exists [...] a correspondence between his own psychic and the "forces" of nature [...] Man also lives with "light" and is tuned by light. Personal and collective attitudes ("mentalities") are in fact influenced by the environmental "climate". Finally man lives in "time." [...] He leaves with the changes of the other four dimensions" (Norberg-Schulz, 1979, p.168).

To do so, man visualises and expresses the natural meanings he experienced by building what he has seen. Then, by adding what is lacking, man complements the given situation. And finally, he symbolises the experienced meanings of nature by making them manifest in the building's architecture (Norberg-Schulz, 1979).

Norberg-Schulz (1979) describes for example how Mediterranean civilizations concretised the natural forces in their buildings. In relation to the first mode of natural understanding (*things*), large stones, for example, were used to symbolise the solidity and permanence of the mountains and rocks. Because permanence was related to the ability to procreate, stone embodied in that sense, the meaning of procreation – leading, as such, to a megalithic architecture. The cosmic *order* was, for example, “visualised by means of spatial organization” (p.32). This can be observed in Ancient Egypt, where buildings’ spatial organisation related to the path of the sun in relation to its meanings (life and death, as explained previously). Characters, according to the author, were translated into buildings through formal articulations: that implied a “language of symbolic forms (style)” (p.53). He illustrated this point with the examples of the Greeks who explained the classical Orders in term of human character. Norberg-Schulz demonstrates, therefore, that man-made places gather the meanings of the environment. As shown before, this is generally done through symbolisation¹⁰ but the author explains that it can also be done through a concrete displacement of *things*¹¹.

Conclusion

Norberg-Schulz's (1979) phenomenological approach of architecture explains a place as consisting of concrete *things* that have a meaning and a structure. Meanings have their roots in the act of man to understand nature and his own existential situation. To understand nature, man abstracted meanings from the flux of natural phenomena. The author grouped the understanding of these natural meanings in five modes: *things, order, character, light, and time*. He considers that “man's most fundamental need is to experience his existence as meaningful” (p.166). And so, to build his world, man concretised the natural meanings into the structure of *things*, by visualizing,

¹⁰ “The Greek polis, for example, was based on a creative transposition of meanings. The meanings which are revealed in certain natural places, were translated into buildings and moved to the city, through the erection of similar buildings there. It is a grand conception, indeed, to visualize the qualities of a landscape by means of man-made structure, and then to gather several landscapes symbolically in one place!” (Norberg-Schulz, 1979, p.170).

¹¹ Both methods will be addressed in the third chapter.

complementing and symbolising the natural environment - of which, he is part of. *Things* are thus meaningful when they gather the meanings of man's existence and environment.

2.2 Architecture and Existential Space

“[...] Man gather the experienced meanings to create for himself an imago mundi or microcosmos which concretizes his world.”

Norberg-Schulz, 1979, p.17



Fig. 3: The Sense of Sight by Jan Brueghel, 1618 (Brueghel, 1618).

The Architectural Context

The next step will be to translate the concept of *thing* to architecture. Buildings are one of the *things* that define a place. Even more so, they have the capacity to *make* a place by gathering the meanings of the environment. When accomplishing this, they are experienced meaningfully.

A building, like other *things*, has a meaning and a structure. Its structure is defined by Norberg-Schulz (1979) as: “existential space” (p.5). The *space* denotes the spatial aspect of the structure while the *existential* dimension is embodied in its character. According to Norberg-Schulz’s, the spatial aspect allows man to orientate himself in his environment and the character allows him to identify himself with the environment. The understanding of the environment, as

described previously, depends, therefore, on *identification* and *orientation*. In the words of Norberg-Schulz: “Whereas identification is the basis for man’s sense of *belonging*, orientation is the function which enables him to be that *homo viator*¹², which is part of its nature” (p.22). According to the author, *identification* allows man to become friend with his environment in order for him to experience it as meaningful. Thus, the feeling of alienation towards the modern built environment results from a lack of objects of identification and orientation.

The Identification Process

To understand the relationship between the structure of a *thing* and, the *identification* and *orientation* processes, Norberg-Schulz (1979) refers to the child’s construction of reality¹³. When experiencing his environment, the child “develops perceptual *schemata*¹⁴ that determine all future experiences” (p.21). He argues that a child can perceive changing phenomena as representing the same things. It implies, therefore, that the child understands the concepts of *thing*, spatial *order*, and *time* (reflected on the ancient cosmologies’ modes of natural understanding, as described in the previous section). Norberg-Schulz also explains that children perceive the *character* of *things*. Indeed, like primitive people, they do not distinguish the psychic from the physical, and this explains why they experience objects as being alive. As a consequence, man’s identity, according to the author, “is defined in terms of the schemata developed, because they determine the “world” that is accessible” (p.21). Thus, every human being possesses orientation and identification’s schemata. Accordingly, in order for man to orientate and identify himself with his environment, buildings “must have formal properties which are structurally similar to other aspects of reality, and ultimately to natural structures” (p.169). It can be concluded that the current structures of the modern built environment do not allow the identification and orientation processes to take place.

Conclusion

Norberg-Schulz (1979) demonstrates, thereby, that since meaning is a psychic function, the identification and orientation process can only take place when the structure of a *thing* is

¹² *Homo viator* means: man on his way.

¹³ For more understanding of the child’s construction of reality, the author refers himself to another of his book: *Intentions in architecture* (1968).

¹⁴ The Schemata are organizational patterns of thought or behaviour that coordinate categories of information (DiMaggio, 1997).

experienced by man as similar to the structure of another *thing*. Only when that is achieved, architecture is experienced as meaningful since it gathers the different meanings of the environment by concretising them into its structure. The feeling of alienation towards the modern built environment results, hence, from a lack of objects identification and orientation.

2.3 Character, Identification & Materials

Now that the meaning of architecture is defined, its materiality will be addressed. As shown before, architecture's structure is based on its spatial properties (allowing man's *orientation*) and its existential dimension (allowing man's *identification*). As Norberg-Schulz (1979) explains it, the existential dimension is embodied in the character of a building. The character, according to him, "depends on *how* things are made, that is, it depends on form and technology" (p.6). Materials are therefore elements that embody the character or the existential dimension of a building, rather than its spatial properties. Accordingly, the paper will address the problem of *identification* through character.

Character

What defines the character of a building? Looking back to Norberg-Schulz's study, the character of a natural landscape has its roots in its analogy with human traits¹⁵. As he mentioned himself, Louis Kahn's famous question: "What does the building wants to be?" (p.6) touches the essence of the concept of *character*. It is related to the idea that the *character* of a building is what makes the building "alive"; or in Norberg-Schulz's words, what gives it an existential dimension. The *character* of a man-made place, according to the author, is also determined by its relation towards *earth* and *sky*. He also mentions openings, which besides regulating *light*, determines the degree of openness of a building. This explains, he argues, why windows and doors, particularly, became primary motifs to concretise the local *character* of a place. He argues that *character* can also be articulated into systematic forms representing something else, leading ultimately to a certain style with its own symbolic language.

¹⁵ As explained before with the example of the Greek landscape.

Materials and Environment

The character of a building is, thus, determined by its relation to human traits, earth, sky, and light, that is, by its relation to Norberg-Schulz's categories of *character*, *things*, *order*, and *light*. The author makes evidently himself the analogy with the traditional fourfold of mortals, earth, sky, and spirit. Partially quoting Heidegger, he explains that "dwelling consists in "preserving" the fourfold, which in general means to "keep the fourfold in that which mortals stay: in things" " (p.170). For the rest of the study, the environment will be regarded as consisting of Heidegger's (1971) fourfold of *mortals*, *divinities*, *earth*, and *sky*¹⁶.

Materials, before receiving their place in an architectural composition, are first transformed. They obtain a specific shape, texture and colour. They are *things* themselves and are part of the concrete phenomena which form a place and determine its atmosphere. They have a meaning and a structure. As a consequence, materials can contribute to the meaningful experience of architecture and their *character* (i.e. their physical properties) should allow man to identify the meanings of his environment consisting of *mortals*, *divinities*, *earth*, and *sky*.

2.4 Conclusion

Norberg-Schulz's phenomenological approach demonstrates that architecture's purpose is the making of place. In his buildings, man gathers – and as such, concretises - the meanings of the environment. This is done through the concrete displacement or symbolisation of the structure of these meanings, into the structure of buildings. In this way, these meanings can be identified and buildings can be experienced meaningfully by man. Hence, the problem of alienation originates from the failure of the modern built environment to gather and make the meanings of the environment structurally identifiable to man. Materials, being *things* too, also have a structure and a meaning. Their physical properties play therefore a part in the identification of the meanings of the environment. Consequently, materials can contribute to the meaningful experience of architecture. Thence, the following question will be addressed: **to which degree do the physical properties of materials allow man to identify himself to his environment (consisting of *mortals*, *divinities*, *earth*, and *sky*)?**

¹⁶ These terms will further be defined in the following chapter.

III. THE IDENTIFICATION OF THE ENVIRONMENT THROUGH THE PHYSICAL PROPERTIES OF MATERIALS

Since the problem of alienation towards the contemporary built environment is a modern problem, it is judicious to make the distinction between modern and traditional materials¹⁷. Their physical properties will be compared, in the way they relate to each of Heidegger's (1951/1971) fourfold of *mortals*, *divinities*, *earth*, and *sky*.

3.1 Mortals

Heidegger (1954/1971) defines mortals as follows: "The mortals are the human beings. They are called mortals because they can die. To die means to be capable of death *as* death. Only man dies [...]" (p.148). This definition will be taken as a point of departure. Mortals are subject to death, their presence in this world is not eternal. For this reason, the concept of time plays a central role in the understanding of mortality. Time has a physical impact on human bodies; from baby to old. Another fundamental human manifestation is observed in the idea of authenticity. People are different from each other and have their own personalities¹⁸. In this section, the physical properties of traditional and modern materials will be analysed in the way they relate to the human condition as a mortal, through the notions of time and authenticity.

In *The Work of Art in the Age of its Technological Reproducibility*, German philosopher Walter Benjamin (1989/2008) addresses the notion of authenticity. The authenticity of the work of art, according to Benjamin, is the "here and now" of that work which consists of "its unique existence in a particular place [...] that bears the mark of the history to which the work has been subject" (p.21). This history is defined by the physical changes of the work over time and by the changes in ownership (Benjamin, 1989/2008). For this study, only the physical changes are relevant. For the notion of time, we will refer to Juhani Pallasmaa's concept of the "continuum of time" (Pallasmaa, 2005, p.31).

¹⁷ The difference between modern and traditional materials will be explained in the following section.

¹⁸ This relates directly to Norman-Schulz's (1979) thoughts on his *character* category

Modern and Traditional Materials

In the physical properties of traditional materials, the continuity of time is perceivable. As Pallasmaa (2005) explains it, they “express their age and history, as well as the story of their origins and their history of human use” (p.31). A wooden column is made out of a tree trunk that took decades or centuries to grow; its age is inscribed in its physical structure. Like mortals, the tree is subject to death and possesses a history that is defined by the physical changes over the time. The concept of space is also deeply related to time. The historical physical testimony of the tree depends largely on the site where it grow. It has survived a specific environment and consumed the specific local nutrients, just as mortals. As a consequence, every trunk is unique and therefore physically different from others¹⁹. Traditional materials are authentic, in the same way that mortals are²⁰. In other words, the physical properties of wood, being similar to man’s physical properties, allows man to identify himself through that material.



Fig. 4: Bamboo House, Kengo Kuma & Associates (Kengo Kuma & Associates, 2002).
An example of an architecture made of traditional materials.

¹⁹ The American architect Frank Lloyd Wright was fascinated by this aspect of nature, that is, its capability to achieve harmony without sacrificing the individuality of each element (Patterson, 1994)

²⁰ In that sense, Norberg-Schulz’s (1979) *things* category is worth to mention since it considers man as “a thing among things” (p.168).

Modern materials, such as glass and steel, are nowadays technologically reproduced. Having some basic knowledge on the invisible atoms constituting the physical world, suffice to understand that however precise machines are, every reproduction will be different from the other ones. At a certain spot on a microscopic level, the colour, density or texture will change from one reproduction to another. As a consequence, at that specific spot, under the influence of time, the structure of those different aspects will also change differently. This confirms Benjamin's claim, that the authenticity of the original cannot be appropriated by the reproduction (Benjamin, 1989/2008). But despite people's scientific awareness, technology reached such a dreadful level of precision that these differences in the physical structure of reproductions are nowadays merely "invisible" to their senses²¹. This has a big impact on Benjamin's (2008) idea that "the whole sphere of authenticity eludes technological - and of course not only technological - reproduction" (p.21). In the limits of man's capacities to see, smell, hear, touch, and taste, this idea is sadly inaccurate. Authenticity is, in the limits of man's sensory apparatus, slowly dying.



Fig. 5: The Titanium Steel façade of the Guggenheim museum in Bilbao, Frank Gehry (Through Vin's Lens, 2013). An example of an architecture made of modern materials.

²¹ Benjamin refers to that as the "optical unconscious". He illustrates this idea with the act of walking: "[...] we have some idea what is involved in the act of walking (if only in general terms), we have no idea at all what happens during the split second when a person actually takes a step" (Benjamin, 1989/2008, p.37).

Consequences on the perception of Modern Materials

Today's technological reproduction has also repercussions on the uniqueness of materials. Reproduced in standard elements, it becomes impossible to differentiate these elements from each other. Materials become anonymous. Technological reproduction also has consequences on the authentic history of materials and their relation to time. Materials do not wear the marks of time anymore. They are the result of a short producing process and did not transform naturally. Their properties do not allow the "unavoidable and mentally significant process of aging" as Pallasmaa (2005) explains it. The Finnish architect describes today's materials as aiming at "ageless perfection" since "they do not incorporate the dimension of time" (p.32). This "weakening of the experience of time" (p.32), according to him, has destructive mental effects. He bases his argument on the work of the American therapist Gotthard Booth, who shows human's mental need to be rooted in the continuity of time. According to Booth, nothing gives man a fuller satisfaction than being part of processes that "supersede the span of individual life," and it is the purpose of architecture to allow that. Pallasmaa further mentions the work of David Harvey on "time-space compression" and shows that "the experiences of space and time have become fused into each other by speed". Consequently, the modern built environment is perceived by man as a perpetual present, "flattened by speed and simultaneity". Pallasmaa (2005) explains that the "fear of the traces of wear and age is related to our fear of death" (p.32). Likewise, Bernard Tschumi (1976) in *Architecture and Transgression* argues that the pure white structures of the 1930's embody society's fear of death and decay.

Conclusion

Today's modern materials' physical properties – unlike the physical properties of traditional materials - make it very difficult for man to identify himself to its own human existence as a mortal. Their structures lack marks (embodying their physical historical testament and as such, their authentic and unique identity) that are similar to the marks embodied in the human body and mind.

3.2 Divinities

In *The Thing*, Heidegger (1951/1971) explains that: "The divinities are the beckoning messengers of the godhead. Out of the hidden sway of the divinities the god emerges as what he is, which removes him from any comparison with beings that are present" (p.176). This fourfold's member, as it is opposed to mortals, can be interpreted in the idea of immortality which has always

been present in human civilizations, and as a consequence, concretised in *things*. From this emerges a paradox between mortal and eternal values. A paradox that is central in the work of the Swiss architecture firm Herzog & de Meuron for example. As they explain it: “The work of Herzog and de Meuron is as much about immaterials as about materials- it deals with the paradox of our physical world” (Mori, 2002, p.80). They understand that the history of human culture could be written on the basis of the dialectics between materiality and immateriality, and they illustrate this idea by comparing German Romanticism of the 19th century with American painters of the twentieth century such as Barnett Newman (Mori, 2002). The paintings of the former movement are extremely detailed and strive to draw all 20th the complexity of the world (see images below). The works of the latter, on the contrary, abstract the world by excluding every trace of materiality (see images below). Herzog and de Meuron understand works of art as an attempt to transcend the human condition in order to reach something else, “and ultimately to understand the world, to understand who and what we are” (Mori, 2002, p.80). And so, materials should also be analysed in the way they relate to immortality (that is to, ideas and concepts embodying eternal values).

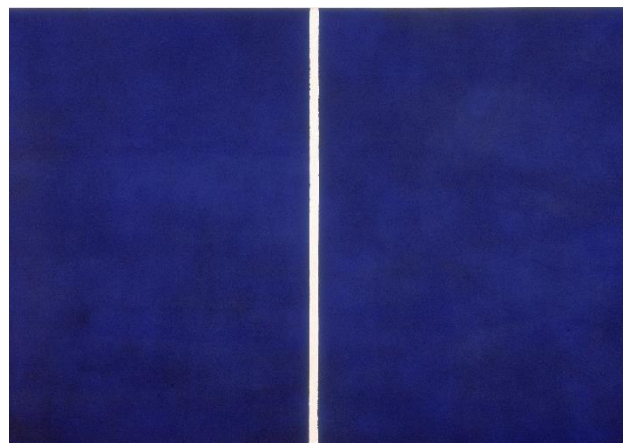


Fig. 6: “Moonrise over the sea”, Caspar David Friedrich, 1822 (Friedrich, Mondaufgang am Meer, 1822) & Fig. 7: “Cathedral”, Barnett Newman, 1951 (Newman, 1951).

Modern Materials

Eternal values can be read in different contexts. Mathematics, for example, express a certain sense of immortality in its abstract nature. It is also true for the concept of economy. Both are opposed to the concrete and time-limited nature of the mortal values described in the previous chapter. Modern materials are born in a time where abstraction and rationality were dominant in man’s perception of the world as explained in the introduction. As a consequence, their physical properties expressing immateriality, are more likely to embody meanings related to immortality. When observing the natural environment, they are more similar to elements such as water, sand,

sky or light. These elements, due to their physical structure, express a high degree of abstraction. This might explain why they became primary elements of divine architecture²². This relationship between immateriality and immortality is especially visible in the architecture of Calatrava. Embodying eternal values in their immateriality, his buildings are often situated in a landscape where elements such as water and sky are omnipresent and where the views to the horizon infinite.



Fig. 8: Florida Polytechnic University, Santiago Calatrava (Hawthorne, 2014) & Fig. 9: Milwaukee Art Museum, Santiago Calatrava (Kessler, 2001).

Traditional Materials

Traditional materials in the past also embodied immortal values. The architecture of Tataouine is a wonderful example of such architecture (see image below). Through the abstract nature of adobe, the play of lights and shadows give texture to the brown material. The adobe walls concretise the atmosphere of the surrounding desert landscape and its fundamental relationship to the sun.

²² Light and sky in the Christian world or water and light in the Muslim world, for example.



Fig. 10: Ksar Soltane in Tataouine (Livre d'or nachoua, 2000).

Conclusion

Despite their incapacity to allow man to identify himself to his own human condition as a *mortal*, the physical properties of modern materials allow them, however, to embody concepts or ideas expressing the eternal values of *divinities*. They, therefore, allow man to identify meanings that explain abstract phenomena of his environment.

3.3 Earth & Sky

“Then Marco Polo spoke: “Your chessboard, sire, is inlaid with two woods: ebony and maple. The square on which your enlightened gaze is fixed was cut from the ring of a trunk that grew in a year of drought: you see how its fibres are arranged? Here a barely hinted knot can be made out: a bud tried to burgeon on a premature spring day, but the night's frost forced it to desist. [...] Here is a thicker pore: perhaps it was a larvum's nest; not a woodworm, because, once born, it would have begun to dig, but a caterpillar that gnawed the leaves and was the cause of the tree's being chosen for chopping down. . . This edge was scored by the wood carver with his gouge so that it would adhere to the next square, more protruding . . .” (Calvino, 1974, pp.131-132)

In Heidegger's (1951/1971) words, "the sky is the sun's path, the course of the moon, the glitter of the stars, the year's seasons, the light and dusk of day, the gloom and glow of night, the clemency and inclemency of the weather, the drifting clouds and blue depth of the ether" (p.176), whereas the "earth is the building bearer, nourishing with its fruits, tending water and rock, plant and animal" (p.176). Accordingly, *earth* and *sky* will be defined as the natural landscape and climate defining a place. Both depend on each other. For this reason, their relation to natural and modern materials will be analysed in one section.

Natural Materials

As illustrated in Marco Polo's dialogue and demonstrated in the first section of this chapter, natural materials allow man to identify the environment they originated from. The marks embodying the continuum of time and their historical testament are inscribed in their physical properties.

Japanese architect Kengo Kuma considers this aspect central to his work. He always strives to use local materials in his designs and illustrates this approach with a beautiful analogy to the art of sushi making:

"Sushi is a good metaphor for my architecture. The importance in sushi is to choose the best material from the place, in season. If the journey of the ingredients is too long, the taste of the sushi is compromised. That is a problem that can't be solved by modern technology, and that program of using local material in season is the secret of good taste, and the secret of my style." (Murray, 2008)

In his design for the *Nakagawa-machi Bato Hiroshige Museum of Art*, local cedar, stones and paper made by the local craftsmen and other materials were used (see images below). The building allowed the citizens and visitors to re-identify themselves with the local landscape, as it was less visible due to the dependence of the region to the capital city of Tokyo. Another fantastic example is the *Casa Lis*, designed by Jørn Utzon on the top of a cliff on the island of Majorca. The Marés stone used for its construction is directly taken from the site, making the house an integral part of its natural surroundings (see images below). As such, a powerful sense of place and belonging can be felt by its inhabitants.



Fig. 11: Nakagawa-machi Bato Hiroshige museum, Kengo Kuma (Kengo Kuma & Associates, 2000).



Fig. 12: Nakagawa-machi Bato Hiroshige museum, Kengo Kuma (Kengo Kuma & Associates, 2000) & Fig. 13: Can Lis, Jørn Utzon (archaic, 2015).



Fig. 14: Can Lis, Jørn Utzon (archaic, 2015).

Modern Materials

Modern materials, however, because they are technologically reproduced, are unendowed with physical properties that reveal their origins. They do not relate to a specific landscape or climate. As it was described in the first section, the marks of time and place are not inscribed in their physical structure. It is, therefore, impossible for man to perceive through his senses where the steel or glass elements of a facade come from, when they were made and what they went through²³.

Conclusion

Natural materials grew in a specific landscape and were subject to a specific climate. Their concrete and authentic materiality, are a result of the marriage between *earth* and *sky*, between a specific landscape and climate. In Norberg-Schulz's words, "in these things the meaning of the natural environment is "condensed" " (p.10). These meanings are inscribed in their physical properties and can be identified. Consequently, the use of local materials engenders a feeling of belonging to its natural environment, contributing thereby, to a meaningful experience of architecture. The physical properties of modern materials do not allow this identification process with the natural environment to take place.

3.4 Conclusion

The physical properties of modern materials as they are produced nowadays, do not allow man to identify himself with his human condition as a *mortal* and with his natural environment (consisting of *earth* and *sky*). The problem lays in the absence of physical marks that embody the continuum of time or structures of a specific natural environment. Nonetheless, this allows them to embody meanings that relate to abstract phenomena²⁴ expressing eternal values.

The *Neue Nationalgalerie* by Mies van der Rohe is a good example to illustrate the conclusions of this chapter. The building is essentially composed of steel and glass. Its materials allow to identify meanings related to modern ideals and industrial achievements. However, it does not allow the identification of the natural environment and man's human condition. The intervention by David

²³ Only their form could reveal these aspects, but this is not directly related to the physical properties of a material and will be further addressed in the last chapter.

²⁴ This is not a surprise since they originated from a scientific approach (Pérez-Gómez, 1983).

Chipperfield that consists of adding tree trunks to the building's structure complement the architecture with the missing meanings (see image below). It seems that after the intervention a balance is found, and the fourfold is in harmony. However this juxtaposition of natural and modern materials does not answer the research question: **how can modern materials, just like traditional materials, contribute to a meaningful experience of architecture?** A complete answer will be presented in the next and last chapter.



Fig. 15: Neue Nationalgalerie, Mies van der Rohe. Tree trunks by David Chipperfield (Neue Nationalgalerie, 2014).

IV. RECONCILIATION WITH TECHNOLOGY

“Everything depends on our manipulating technology in the proper manner as a means. We will, as we say, “get” technology “spiritually in hand.” We will master it. The will to mastery becomes all the more urgent the more technology threatens to slip from human control.”

(Martin Heidegger, 1954/1977, p.5)

As shown in the previous chapter, technology is used today in a way that it produces materials that do not succeed in contributing to a meaningful experience of architecture. However, it would be simplistic and unproductive to blame technology for that. Heidegger, in *The Question Concerning Technology* (1954/1977), offers a relievable insight. By analysing its essence, he argues that by incorporating the poetical artistic qualities and perspective of the world, technology can be mastered and can contribute to the human existence in a meaningful manner.

Each section of the previous chapter started with Heidegger’s description of each of the fourfold. In the same way, this chapter will be based on his philosophy of the fourfold but in a direct relation to the act of dwelling. Heidegger (1971) insists on the wholeness of the four.²⁵ As explained in the previous chapter, the meanings of the environment embodied in the physical structure of materials express clear oppositions between concrete and abstract values or ideas (art and science, *mortals* and *divinities*, *earth*, and *sky*, and finally, materiality and immateriality). Following Heidegger’s thoughts, meaningful architecture lays on the harmony of the fourfold and their contradictions. This reflects on Pallasmaa’s opinion that “an architectural work is great precisely because of the oppositional and contradictory intentions and allusions it succeeds in fusing together. A tension between conscious intentions and unconscious drives is necessary for a work in order to open up the emotional participation of the observer.”²⁶ (Pallasmaa, 2005, p.29)

²⁵ He ends each description of a category (“When we say” “sky,” “earth,” or “divinities,”) with the following sentence “we are already thinking of the other three along with it by way of the simple oneness of the four.” (Heidegger, 1954/1971, p.176.) Thence, “Mortals dwell in the way they preserve the fourfold in its essential being, its presencing” (Heidegger, 1951/1971, p.148.)

²⁶ To illustrate his idea, Pallasmaa (2005) also cites Alvar Aalto who claimed: “In every case one must achieve a simultaneous solution of opposites” (p.29).

In this final chapter, based on the previous conclusions, a few works wherein modern materials have been used meaningfully will be presented. They did so through Norberg-Schulz's two methods of *symbolisation* and *concrete displacement of things*. The second method will first be analysed, followed afterwards by the method of symbolisation.

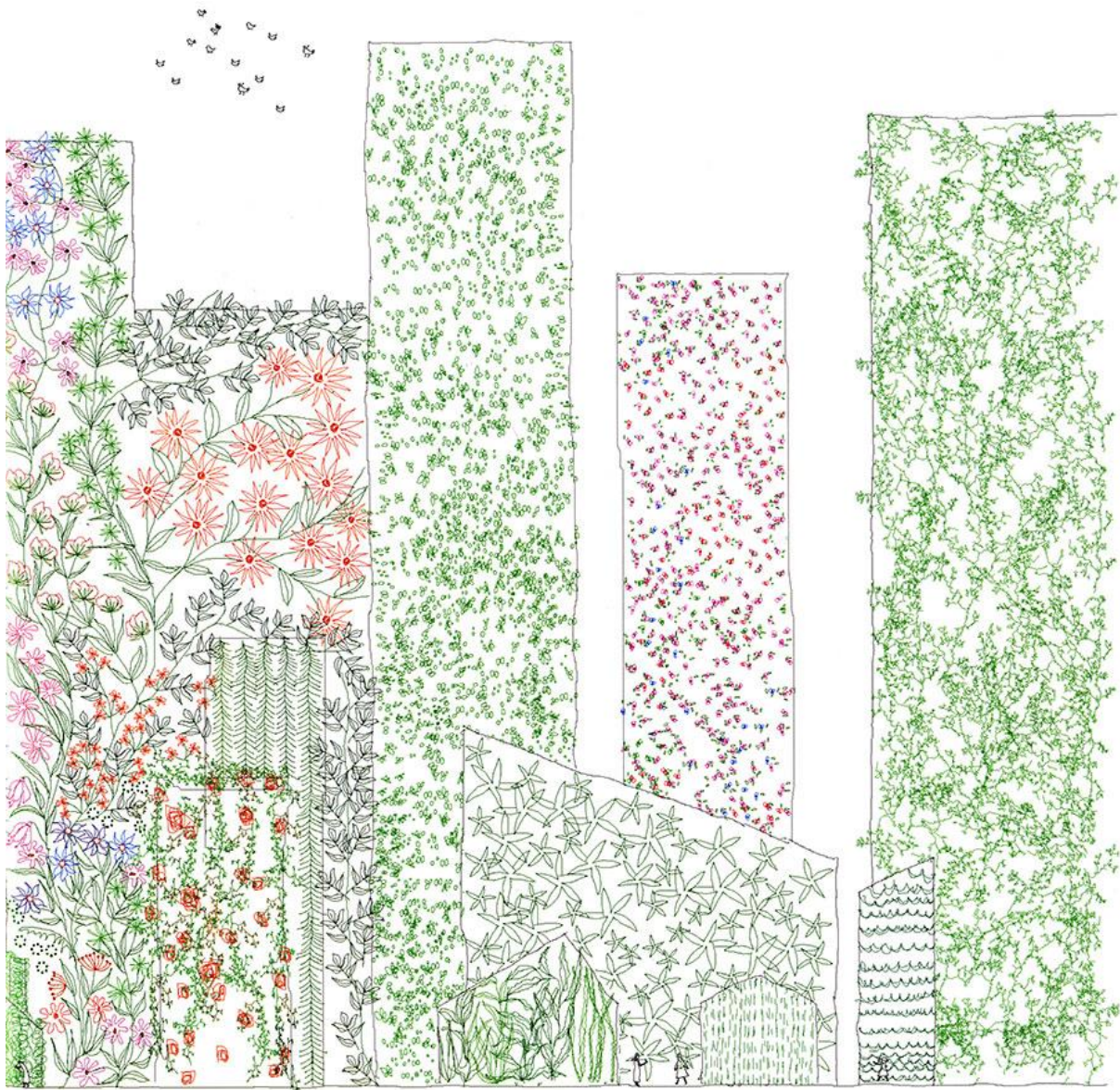


Fig. 16: Drawing by Jun'ya Ishigami (openhouse, 2012).

4.1 Materiality

This section presents modern materials that were transformed in order to obtain physical qualities similar to those of natural materials. This transformation allows the identification process with the natural environment and the human condition.

Steel

Weathering steel or ‘corten’ steel has experienced a considerable increase in popularity in the last decades. It has been originally developed in the 1930’s to avoid the need for coatings. The material weathers naturally and forms consequently, a protective layer of rust on its surface. Exposed to the outside climate, it takes a few months for it to obtain this orange-red warm colour and rusty texture. The result has a significant impact on the way it is perceived. Like natural materials, time, age and the local climate are inscribed in its physical structure, allowing man to identify himself to its own condition as a *mortal* and to the natural environment (*earth & sky*). Artist Richard Serra particularly values this material, and a lot of his sculptures are made of it. Interested in the perception of space and time, it now becomes clear why he worships this material. The images below are examples of his sculptures composing the exhibition “The Matter of Time” at the Guggenheim museum in Bilbao.



Fig. 17 & Fig. 18: “The Matter of Time”, Richard Serra (Switich, 2013).

Concrete

Concrete is the most used material in the world. Often perceived as monotonous and lifeless, a few architects nonetheless succeeded to materialise it in a meaningful manner. Architects Louis Kahn and Carlos Scarpa are great examples on this matter. While the ratio of the different aggregates forming this composite material is thoughtfully determined to reach the ideal appearance and tactile quality, it is in the way that it is cast that Kahn and Scarpa achieve to “humanise” that material. In Scarpa’s *cemetery for the Brion family*, the concrete bears the rough marks of the wooden planks which were used as shuttering (see image below). This has two advantages. First, the visual and tactile properties of wood are transferred into the concrete, giving it a more welcoming appearance and again, showing the marks of time. The aging process inscribed on the wooden planks and resulting of the specific climate and location it has grown is now inscribed in the concrete. The second advantage is that man’s influence is also perceivable in the material since the planks are cut in dimensions suitable to the human scale. As a consequence, the physical influences by man are transferred into the concrete. In Kahn’s *Salk Institute*, for example, the holes that allow bores to hold both sides of the shuttering became part of the material’s character. In both buildings, the methods of casting provided to this anonymous and flat material an authentic character. The methods allow man’s identification with his own human condition (as a *mortal*) and with his natural environment (*earth & sky*).

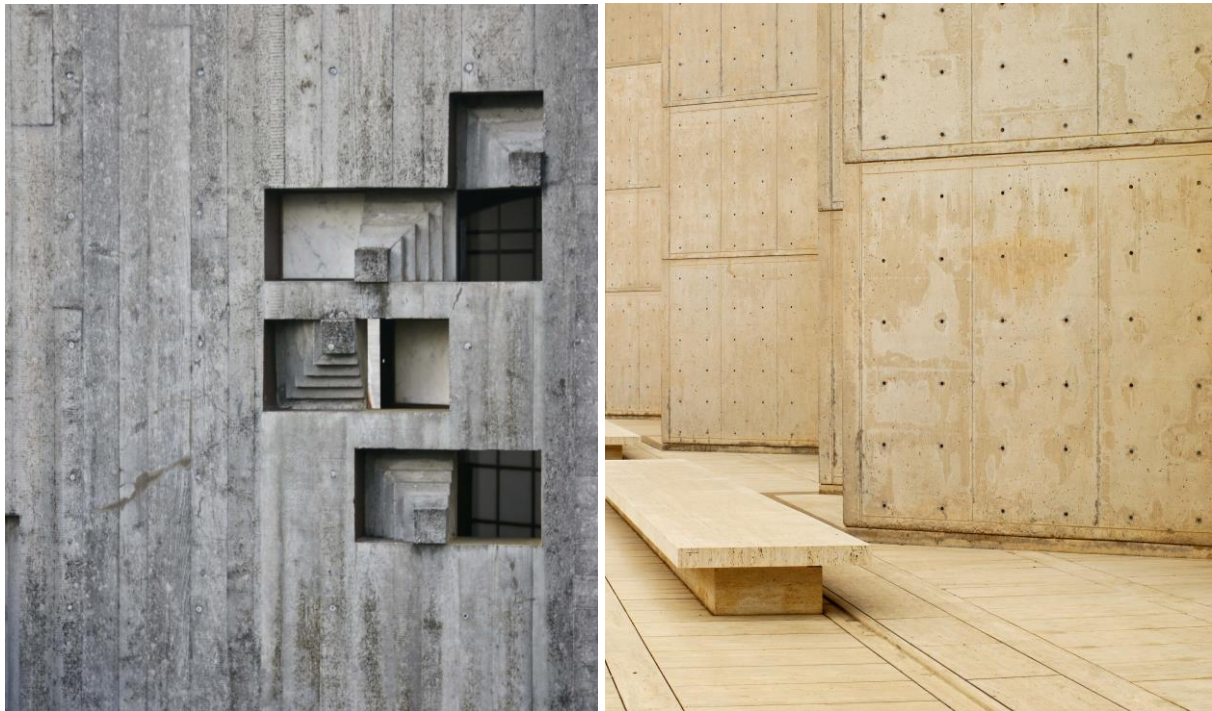


Fig. 19: Brion Cemetery, Carlos Scarpa (de Córdova, 1968) & Fig. 20: Salk Institute, Louis Kahn (Nielsen, 2007).

Glass

When experiencing the built environment and thinking about which qualities glass embodies, thoughts lead soon to functional features. That is to say, glass allows visual connection with the outside world while protecting the interior from the unpleasant climate. This is in conflict with the essential purpose of the opening as a way to relate with the outside “world”. The experience would be more meaningful if it was done through an authentic void instead of a transparent sheet of glass. In other words, man would rather see, (but also) breathe, hear, touch, smell and perhaps taste the outside world. Transparent glass, from a phenomenological point of view, limits the experience of the inside-outside relationship by making it only visual.

Designed by Zumthor, the façade of the *Kunsthhaus Bregenz* in Austria is made of frosted or etched glass. While achieving most of the features of standard transparent glass (that is, to illuminate the interior space and isolate it from the outside climate), Zumthor’s etched glass façade create an enclosure, allowing a separation between interior and exterior worlds. The identification process, this time, lays on the capacity of the material to let light through. The materiality of the panels change continuously along the day and embody as such the *continuum of time* and the sense of uniqueness of the elements described in the previous chapter. Man’s identification of his human condition as a mortal is thereby possible. The permeability of the material allows, furthermore, the identification with the outside climate (*sky*) since the weather is perceivable from the inside. However, the identification with the natural landscape (*earth*) is missing.



Fig. 21: Kunsthhaus Bregenz, Peter Zumthor (Kroll, 2011).

The Fourfold in Harmony



Fig. 22: Koshino House, Tadao Ando (Deviant Art, 2011).

The last example of this section is a way to remember that a meaningful architecture is an architecture that embodies the meanings of the fourfold, that is, an architecture that gathers simultaneously the meanings of *mortals*, *divinities*, *earth*, and *sky* as shown previously. Tadao Ando's architecture achieve this by incorporating into his work an essential element of the natural environment: light. His concrete recalls Kahn's approach at the *Lake Institute*. Both reveal the detailing of the shuttering through the joints and bolt-holes, yet, the character of both concrete are not similar. As Weston (2003) describes it accurately: "Whereas Kahn makes a point of stressing the wall's thickness, with results that seem weighty and manifestly constructed," (p.193) Ando's concrete is "fine and delicate like the wood and paper surfaces of traditional Japanese buildings" (p.190). Weston (2003) shows that this is achieved by incorporating a blue sand in the concrete that "help to "dematerialized" it slightly" (p.190). Moreover, Ando himself, explains that the wood

shutterings are made by specialized carpenters “who refer back to the ancient craft tradition of wooden houses” (Weston, 2003, p.190). As a result on the experience of space, the light dematerialises the concrete surface, and a unique tension between materiality and immateriality is achieved. In the continuity of time, the material succeeds in gathering the opposite meanings of the environment: a subtle balance between abstract and concrete qualities, between *mortals* and *divinities*, *earth*, and *sky*, materiality and immateriality. Ando’s concrete achieve meaningful harmony (see image below).

Conclusion

The examples of this section directly address the materiality of materials, that is, their physical properties. Through the transformation of the material’s structure at the production phase, it is possible for them to be materialised in a way that they allow the identification with the natural environment (*earth and sky*) and with man’s human condition as a *mortal*.

4.2 Symbolisation

The second method enunciated by Norberg-Schulz (1979) to concretise the meanings of the environment into architecture, is the method of symbolisation. The term of symbolisation will first be defined, followed by examples to illustrate how the method has been applied with modern materials.

The Concept of Metaphor

The method of symbolisation is neurologically explained in the concept of metaphor. Architect and author Harry Francis Mallgrave (2010) argues, that the concept of metaphor is ingrained in the classification of human’s thinking-process. Through neurological shortcuts or pattern-making, the billions of neurons of the human brain can be ordered in a very wide range of combinations. These combinations trigger memories (experienced through the senses) and allow the analogy between things²⁷. The author takes the example of the first womb-like huts that were built with an entrance in the shape of a vagina. This idea that architecture can be shaped in a way that it allows the analogy with something else is not always acknowledged. Mallgrave (2010)

²⁷ Mallgrave (2010) makes the link with the other meaning of metaphor: the “creative tool for the arts, a powerful juxtaposition or “transfer” of ideas, as its Greeks etymology indicates” (p.179).

explains that the idea that the forms of the TWA terminal in New York (see image below) could symbolise the act of flying is considered by Rudolf Arnheim as being too superficial. Arnheim calls it an “intentional and consciously applied symbolism” (p.182). Zumthor (2006) is also reluctant to this method. For him, a building should simply be what it is and not a symbol.



Fig. 23: TWA terminal in New York, Eero Saarinen (Yossi Milo Gallery, 2011).

Even though the opinions on symbolic architecture diverge, the metaphorical process plays a fundamental role in the way the brain perceives the world. This is beautifully illustrated by Weston (2003) in the example of John Ruskin, who in Venice, noticed that “the richly variegated floors of Venetian churches” (p.106) reminded him of “the ‘rich tessellation’ of reflections in the city’s canals” (p.106).



Fig. 24: The floor of St. Mark's Cathedral in Venice (Bramblett, 2013) & Fig. 25: Venice's water reflections (Monguinhas, 2006).

Symbolisation of the natural environment

Japanese and Spanish Catalan architects, Jun'ya Ishigami and Antoni Gaudí are both fascinated by nature²⁸. While they are from two different generations and cultures, they both employed the method of symbolisation to concretise the meanings of the natural environment into their architecture. In Gaudí's *Sagrada Família* and in the *Kanagawa Institute of Technology* by Ishigami, the analogy with a forest is clearly perceivable. Ishigami achieved that by imitating the trees of a forest, giving his columns a different diameter and placing them irregularly in the plan (see image below). Gaudí's imitation of trees goes even further. While his columns are placed in a regular and symmetrical order, their diameter is thick at the lower level and get thinner the higher they get. He gives them a tactile quality by carving into them, and at the top, they gracefully split into "branches". Finally, the natural light of the ceiling beautifully calls to mind the sunrays penetrating through leaves of trees (see image below). Symbolically, the architects imitate the structure of trees to concretise the meanings of the natural environment in their buildings, allowing, therefore, the identification process to take place.

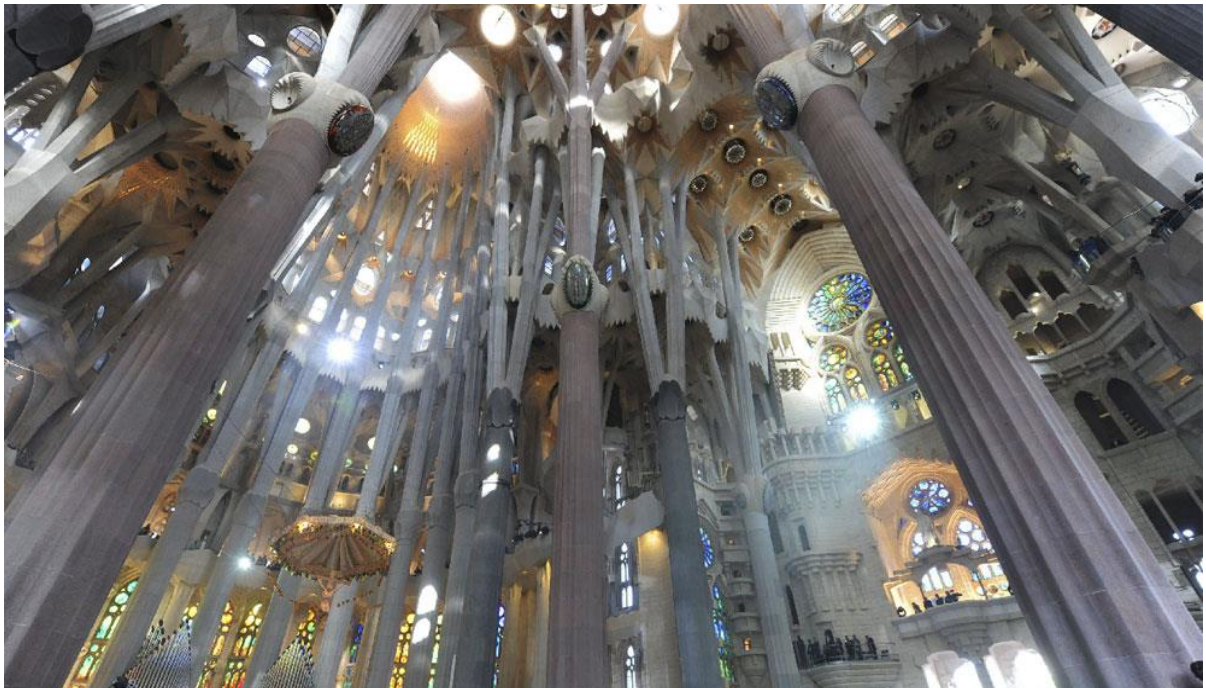


Fig. 26: Sagrada Família, Antoni Gaudí (Infantine, 2015).

²⁸ Ishigami is influenced by his Japanese traditions wherein the relation to nature is fundamental. Gaudí was often exposed to nature in his childhood and consequently nurtured a passion for it.



Fig. 27: Kanagawa Institute of Technology, Jun'ya Ishigami (Wallpaper, 2009).

Conclusion

The examples of this section address the articulation of materials. Through the similarity of structure, their shape allows the analogy with other *things* by triggering experienced memories. Through the method of symbolisation, materials can be shaped in a way that they gather the meanings of the environment. They can consequently, contribute to a meaningful experience of the building.

4.3 Conclusion

The methods of *symbolisation* and *concrete displacement of things* can be applied on materials in order to concretize meanings of the environment by allowing the identification process to take place. Respectively, this is done by shaping the material into a past experienced phenomenon of the environment or by having a direct impact on the physical properties of the material.

V. CONCLUSION

In the first chapter, a phenomenological frame has been established from which materials could be analysed. Norberg-Schulz's approach, on the basis of Heidegger's writings on the *thing* and *dwelling*, explains man's relation to architecture. To understand his environment and feel "at home", man concretises the experienced meanings into his buildings. He does so through the *concrete displacement* or *symbolisation* of the structure of these meanings into the structure of his buildings. When experiencing a building meaningfully, man can identify the different meanings of his environment through the similarity of structures. And so, the problem of alienation originates from the failure of the modern built environment to gather and make the meanings of the environment structurally identifiable to man. Materials, just like buildings, are *things* with a meaning and structure. As such, they can also gather the meanings of the environment and accordingly contribute to the meaningful experience of a building. For this research paper, the environment has been defined as consisting of Heidegger's fourfold of *mortals*, *divinities*, *earth*, and *sky*. Hence, the following question had to be addressed: to which degree do the physical properties of materials allow man to identify himself to his environment (consisting of *mortals*, *divinities*, *earth*, and *sky*)?

From this phenomenological frame, the second chapter differentiated modern and traditional materials. By comparing their physical properties with the structures of *mortals*, *divinities*, *earth*, and *sky*, it has been demonstrated that modern materials, the way they are produced nowadays, do not allow man to identify himself with his natural environment (consisting of *earth* and *sky*) and with his human condition as a *mortal*. As shown, the problem lays in the absence of physical marks that embody the continuum of time and the historical testimony of these materials. As a consequence, their structures are not similar to the structures defining *mortals* and nature (*earth* and *sky*). Nonetheless, the immateriality of modern materials allow them to embody *divinities*-related meanings, that is, abstract phenomena (of man's environment) expressing eternal values. The current scientific and rational approach described in the introduction, therefore, takes abstract meanings into account. This approach, as such, is not completely discredited (even from a phenomenological point of view) but incomplete since it does not take into consideration meanings related to man's natural environment and human condition. By understanding the differences between traditional and modern material in the context of their architectural experience by man, the research question - how can modern materials, just like traditional materials, contribute to a meaningful experience of architecture - was finally able to be addressed in the last chapter.

Through the two methods enunciated in the phenomenological frame, a few architects achieved to transform or shape modern materials in a way that they embodied the missing meanings of the environment described in the previous paragraph. The first method consists in a *concrete displacement* of natural qualities into the physical properties of modern materials. This transfers the physical marks, which embody the continuum of time and historical testimony, and which were originally lacking in the structure of these flat and anonymous materials. The second method (the method of *symbolisation*) consists in imitating the structure of other *things* of the environment, by articulating modern materials in a way that they allow the analogy with them. Both methods fulfil the need of having similar structures allowing the identification process to take place.

This study has been limited to the materiality of a building, and accordingly, to the need for objects of identification. To have a complete understanding of the problem of alienation, other aspects of architecture should be addressed along with the need for orientation, as explained in the first chapter. This paper, nonetheless, presents a methodological phenomenological frame from which these aspects can be analysed.

The phenomenological approach is a relief to understand the feeling of alienation towards the modern built environment and to counterbalance the domination of the scientific approach. The latter is important but insufficient in leading to a meaningful architecture. Qualitative criteria have to be integrated to the quantitative criteria into every stage and domain involving the built environment. For architects, the ambitious challenge is to harmonise the opposite meanings of the environment under one roof, leading accordingly, to an architecture of belonging rather than one of alienation.

BIBLIOGRAPHY

- Benjamin, W. (2008). The work of Art in the Age of its Technological Reproducibility. 2nd version. In Jennings, M.W. Doherty, B. and Levin, T.Y. Belknap (Ed.), *The work of Art in the Age of its Technological Reproducibility, and Other Writings on Media* (pp.19-55). Cambridge. (Original work published in 1989).
- Calvino, I. (1974). *Invisible Cities*. Harcourt Brace Jovanovich. New York.
- DiMaggio, P. (1997). Culture and cognition. *Annual Review of Sociology*, 23, pp. 263-287.
http://cogweb.ucla.edu/Abstracts/DiMaggio_97.html (Retrieved on January 05, 2016)
- Gómez, A. P. (1983). *Architecture and the crisis of modern science*. MIT Press. Cambridge.
- Heidegger, M. (1971). Building Dwelling Thinking. In Hofstadter, A. (Ed. & Trans.), *Poetry, Language, Thought* (pp.141-159). HarperCollins. New York. (Original work published in 1954).
- Heidegger, M. (1971). The Thing. In Hofstadter, A. (Ed. & Trans.), *Poetry, Language, Thought* (pp.161-180). HarperCollins. New York. (Original work published in 1951).
- Heidegger, M. (1977). The Question Concerning Technology. In Lovitt, W. (Ed. & Trans.), *The Question Concerning Technology and Other Essays* (pp.3-35). Harper and Row. New York. (Original work published in 1954).
- Mallgrave, H. F. (2010). *The Architect's Brain: Neuroscience, Creativity, and Architecture*. Wiley-Blackwell.
- Mori, T. (Ed.). (2002). *Immaterial Ultramaterial: Architecture, Design, and Materials*. George Braziller, Inc. Cambridge.
- Norberg-Schulz, C. (1979). *Genius Loci: Towards a Phenomenology of Architecture*. Rizzoli. New York.
- Pallasmaa, J. (1996). The Geometry of Feeling, a Look at the Phenomenology of Architecture. In Nesbitt, K. (Ed.), *Theorizing a new agenda for architecture: An anthology of architectural theory, 1965 -1995* (pp. 448-453). Princeton Architectural Press. New York. (Original work published in 1985).
- Pallasmaa, J. (2005). *The Eyes of the Skin: Architecture and the Senses*. Wiley-Academy.
- Patterson, T. L. (1994). *Frank Lloyd Wright and the Meaning of Materials*. Van Nostrand Reinhold. New York
- Steinberg, M. (2002). Surface. In Mori, T. (Ed.), *Immaterial Ultramaterial: Architecture, Design, and Materials* (pp. 23-27). George Braziller, Inc. Cambridge.
- Tschumi, B. (1996). Architecture and Transgression. In Tschumi, B., *Architecture and Disjunction* (pp.65-80). MIT Press. Cambridge. (Original work published in 1976).
- Weston, R. (2003). *Materials, Form, and Architecture*. Laurence King Publishing. London.
- Zumthor, P. (2006). *Atmospheres: Architectural Environments, Surrounding Objects*. Birkhäuser. Basel
- Zumthor, P. (2005). *Thinking Architecture*. 2nd ed. Birkhäuser. Basel.

VISUAL REFERENCES

- archaic. (2015, August 9). *Classics: Can Lis // Jørn Utzon*. Retrieved January 1, 2016, from archaic: <http://www.archaic-mag.com/classics-can-lis-jorn-utzon/>
- Artemel, A. (2013, August 9). (Archizoom, Producer) Retrieved January 1, 2015, from Architizer: <http://architizer.com/blog/archizoom-retrospective/>
- Bramblett, R. (2013, July). *St. Mark's Basilica*. (M. M. Photograph, Producer) Retrieved January 1, 2016, from http://www.reidsitaly.com/destinations/veneto/venice/sights/st_marks.html
- Brueghel, J. (1618). *The Sense of Sight*. Museo Del Prado, Madrid, Spain. Retrieved January 1, 2016, from http://www.wga.hu/frames-e.html?/html/b/bruegel/jan_e/index.html
- de Córdova, M. F. (1968). *Brion Cemetery*. San Vito D'Altivole, Italy. Retrieved January 1, 2016, from https://kantateposts.s3.amazonaws.com/uploads/post/picture/2735/thumb_Carlo_Scarpa__1906-1978_wpid789-chairs-3.jpg
- Deviant Art. (2011, January 15). *Koshino House - exterior 2. Tadao Ando*. Retrieved January 1, 2016, from Deviant Art: <http://freedux.deviantart.com/art/koshino-house-exterior-2-193519673>
- Friedrich, C. D. (1822). *Mondaufgang am Meer*. Germany. Retrieved January 1, 2016, from https://commons.wikimedia.org/wiki/Caspar_David_Friedrich#/media/File:Caspar_David_Friedrich_-_Mondaufgang_am_Meer_-_Google_Art_Project.jpg
- Hawthorne, C. (2014, October 13). *Florida Polytechnic University, Designed by Santiago Calatrava*. (A. Karchmer, Producer) Retrieved January 16, 2016, from Architect Magazine: http://www.architectmagazine.com/design/buildings/florida-polytechnic-university-designed-by-santiago-calatrava_o
- Infantine, M. (2015, June 4). *LA SAGRADA FAMILIA BASILICA: A PILGRIMAGE*. Retrieved January 1, 2016, from University of Notre Dame: <http://blogs.nd.edu/oblation/2015/06/04/la-sagrada-familia-basilica-a-pilgrimage/>
- Kengo Kuma & Associates. (2000, July). *Nakagawa Machi Bato Hiroshige Museum of Art*. (A. Photograph, Producer) Retrieved January 1, 2016, from Kengo Kuma & Associates: <http://kkaa.co.jp/works/architecture/nakagawa-machi-bato-hiroshige-museum-of-art/>
- Kengo Kuma & Associates. (2002, April). *Great (Bamboo) Wall*. Retrieved January 1, 2016, from Kengo Kuma & Associates: <http://kkaa.co.jp/works/architecture/great-bamboo-wall/>
- Kessler, N. (2001). *Milwaukee Art Museum by Santiago Calatrava*. Retrieved January 1, 2016, from Pinterest: <https://s-media-cache-ak0.pinimg.com/736x/79/70/1d/79701d1a6e9d1637406f3576eafa4b0c.jpg>

- Kroll, A. (2011, January 27). *AD Classics: Kunsthaus Bregenz / Peter Zumthor*. (F. U. Kradeki, Producer) Retrieved January 1, 2016, from ArchDaily: <http://www.archdaily.com/107500/ad-classics-kunsthaus-bregenz-peter-zumthor>
- Livre d'or nachoua. (2000, February 1). *Ksar Soltane in Tataouine*. Retrieved January 1, 2016, from Livre d'or nachoua: <http://www.nachoua.com/Tataouine/ksar-soltane.jpg>
- Monguinhas. (2006). *Venice's Water Reflections*. Venice, Italy. Retrieved January 1, 2016, from <https://s-media-cache-ak0.pinimg.com/736x/04/ff/48/04ff4871f1be620d66071ed5e22c3ad8.jpg>
- Mori, T. (2002). *Immaterial Ultramaterial: Architecture, Design, and Materials*. Cambridge: Harvard Design School in association with George Braziller. Retrieved October 2015
- Neue Nationalgalerie. (2014, October 2). *Neue Nationalgalerie: David Chipperfield - Sticks and Stones, an Intervention*. (D. von Becker, Producer) Retrieved January 1, 2016, from Neue Nationalgalerie Staatliche Museen zu Berlin: <http://www.smb.museum/en/museums-and-institutions/neue-nationalgalerie/exhibitions/exhibition-detail/david-chipperfield-sticks-and-stones-eine-intervention.html>
- Newman, B. (1951). *Cathedral*. Stedelijk Museum, Amsterdam, Netherlands. Retrieved January 1, 2016, from <http://thinkingmuseum.com/2013/09/02/teenage-kicks-at-the-stedelijk/>
- Nielsen, G. (2007, November 9). *Salk Institute for Biological Studies, La Jolla. Louis I. Kahn*. Retrieved January 1, 2016, from Flickr: <https://www.flickr.com/photos/watnielsen/2445203292>
- openhouse. (2012, May 30). *a magical land : art & architecture : the drawings and fantasies of junya ishigami : japan*. Retrieved January 1, 2016, from openhouse: <https://openhousebcn.wordpress.com/2012/05/30/openhouse-barcelona-japan-a-magical-land-art-architecture-the-drawings-and-fantasies-of-junya-ishigami/>
- Rosenfield, K. (2015, April 30). *Richard Serra's East-West/West-East Rises in the Qatari Desert*. (N. Garrido, Producer) Retrieved January 1, 2016, from ArchDaily: <http://www.archdaily.com/626191/richard-serra-s-east-west-west-east-rises-in-the-qatari-desert>
- Swittch. (2013, December 27). *Richard Serra at Gagosian Gallery: The Matter of Time*. Retrieved January 1, 2016, from The Hundreds: <http://thehundreds.com/richard-serra-at-gagosian-gallery/>
- Through Vin's Lens. (2013, June 18). *CURVES [GUGGENHEIM MUSEUM IN BILBAO – A FINE EXAMPLE OF FASHION IN ARCHITECTURE]*. (V. Rathod, Producer) Retrieved January 1, 2016, from Through Vin's Lens: <https://throughvinslens.wordpress.com/2013/06/18/weekly-photo-challenge-curves-guggenheim-museum-in-bilbao-a-fine-example-of-fashion-in-architecture/>
- Wallpaper. (2009, March 22). *User Gallery B-E-T-A.NET: Kanagawa Institute of Technology by Jun'ya Ishigami*. Retrieved January 1, 2016, from Wallpaper : http://assets.wallpaper.com/wallpaper/live/galleryimages/17050935/gallery/testuser5_mar2009_22_LFJ_jp300309_6zUcnP_CCWhIN.jpg

Worldarchitecturemap. (n.d.). *Bato Hiroshige Art Museum*. Retrieved from worldarchitecturemap:
<http://www.worldarchitecturemap.org/buildings/bato-hiroshige-art-museum>

Yossi Milo Gallery. (2011). *TWA Terminal in New York, Eero Saarinen*. (E. Stoller, Producer, & Fundacio Catalunya La Pedrera) Retrieved January 1, 2016, from Yossi Milo Gallery:
http://www.yossimilo.com/artists/ezra_stol/images/large-es-09.jpg