VISION
BEYOND
VISION

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VISION BEYOND VISION

The visual brain and its implication in architectural perception.

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ACKNOWLEDGMENT

We would like to express our gratitude to our primary professor, Marilyne Andersen, and Mikhael Johanes, who guided us throughout this project. Their pertinence and encouragement helped us bring together our scattered ideas and research into one tangible project.

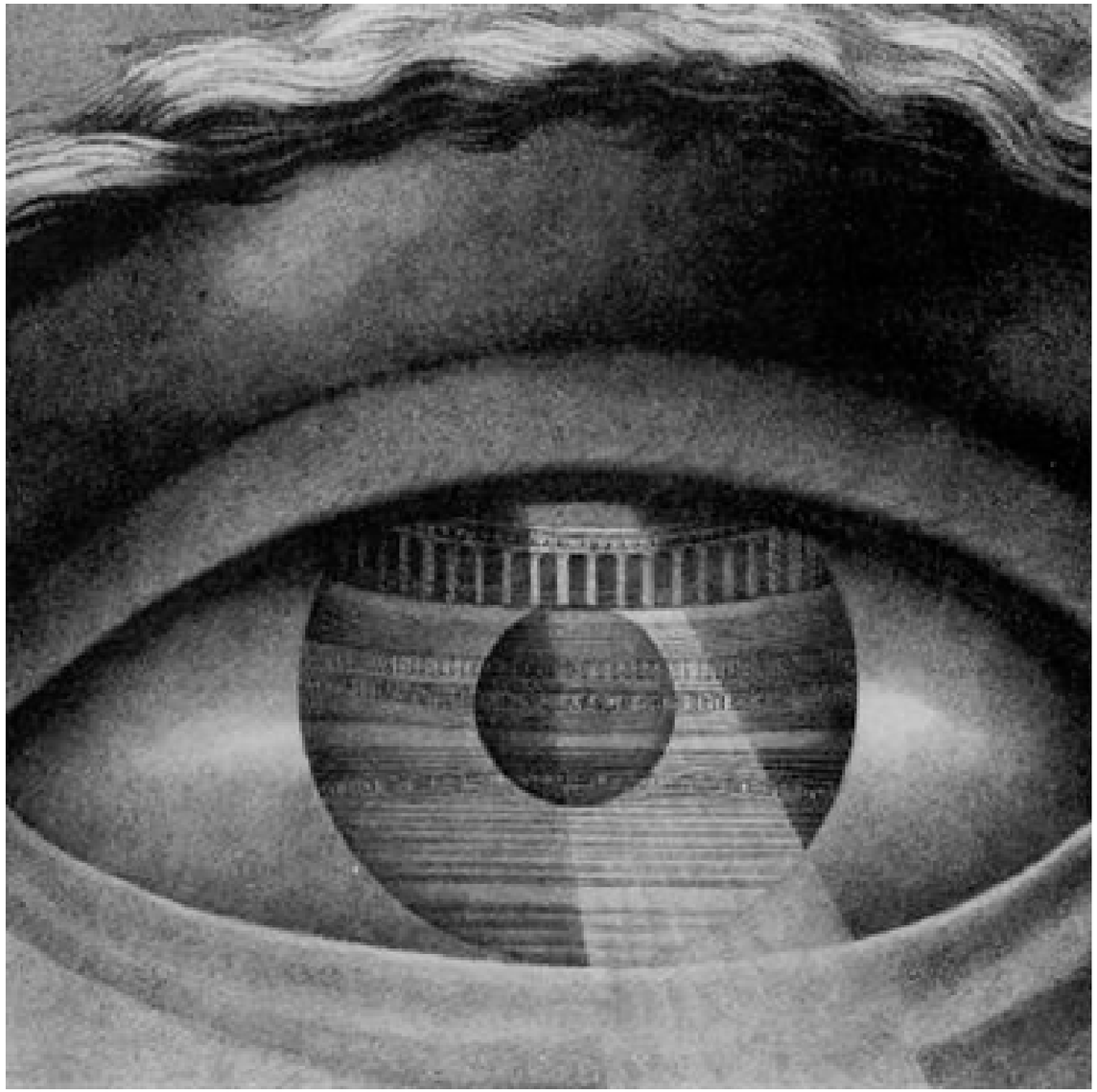

Fig. 01. The eye is the boundary between the physical world and the mind.

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PREFACE

This thesis is

…an attempt to a better understanding of the role of vision in our architectural experience.

…a promotion of a more embodied architecture.

…not a manual on the usage of precise design elements.

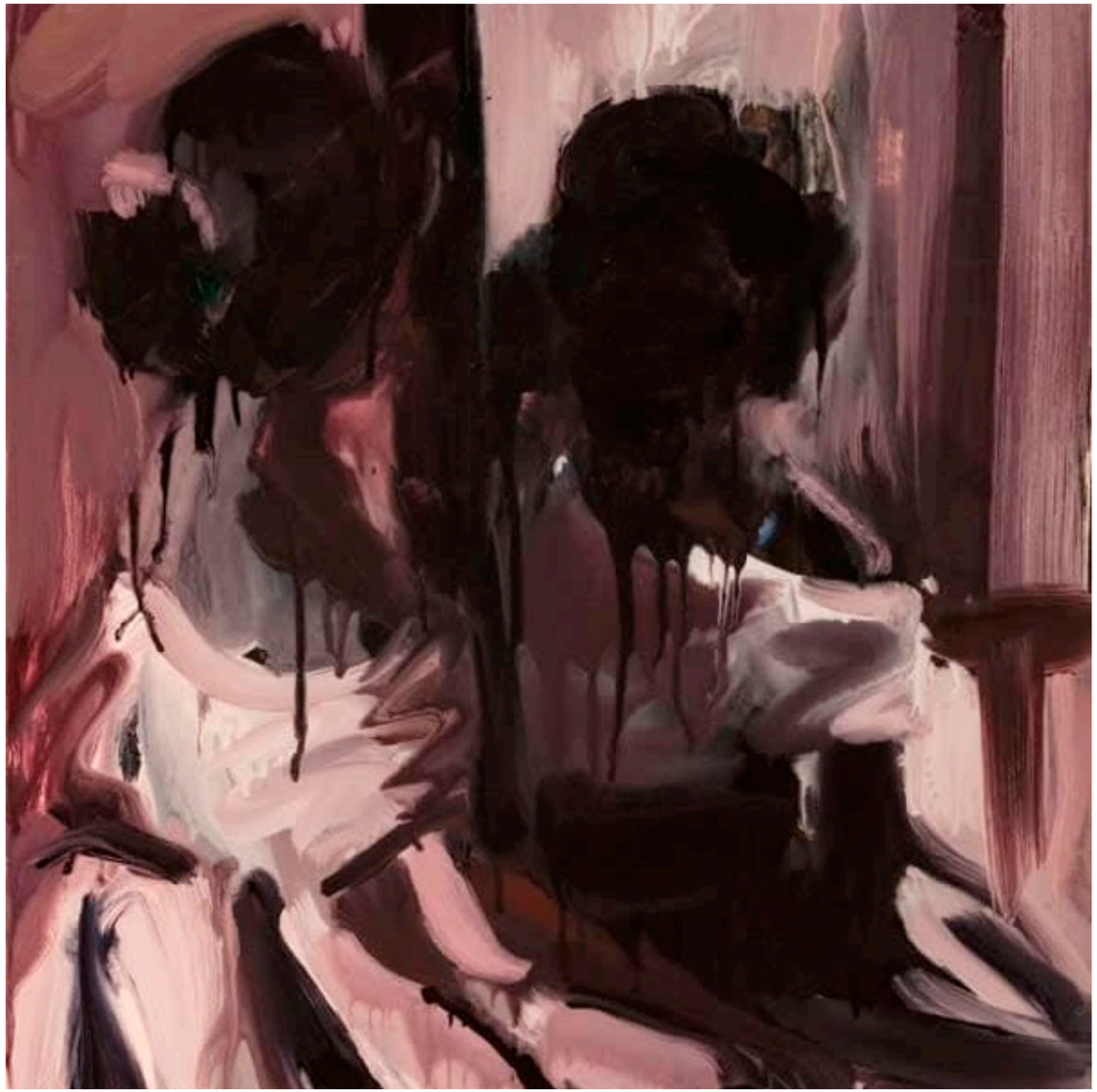

Fig. 02. Vision doesn't always have to be sharp and precise to convey emotions to the viewer.

ABSTRACT

This theoretical research focuses on the place of vision in architectural practice. It is the most used sense and yet is highly criticized by theoreticians these past decades. It is believed that we use vision only for aesthetic and ego-centered reasons . But when looking at vision from a physiological and neuroscientific perspective, we know that it is much more than that.

The goal of this work will be to identify elements of vision that allow us to experience architecture on a deeper perceptual level. And to begin a reflection on the impact these may have on architectural practice. To do so, we will look at architectural representations that use specific visual tools to induce a certain effect in the viewer.

By the analysis of those representative tools, it wants to guide designers towards more embodied experiences. An embodied experience based on more multi sensorial experiences influenced by the sight of the user.

Our main attempt aims to sensibilize on the role of the visual design in the experiential quality of a building.

Fig. 02. Untilted, Laura Lancaster (2018)

INTRODUCTION

This thesis started from a reflection on the future of architecture. A future that we hope will promote living environments to be more sensitive to our physiological needs.

Architects through time and place have developed instincts and knowledge in their field. It helped to design buildings suited for human necessities. But this quest to increase life quality through better design has been shaken by many other factors – industrialization, mass production, profitability– human basic needs were no longer central subjects of architectural design.
However it has been shown that we spend about 90% of our time inside a built environment [1]. How can we still not always consider human well-being and experience as the primary concern in our designs ?

Interdisciplinary researches with the field of psychology and physiology have the power to give a strong theoretical basis to architectural practices. Which could help confirm some instinct that architects have developed through time and find other cues to better biologically suited environments.

[1] *Sarah Robinson, J. P. (2015). Mind in architecture, Neuroscience, embodiment, and the future of design.*

Fig. 03. Nowadays there is a quest for multisensorial experiences. Far from this visual dominance.

INTRODUCTION

I.

"What comes to mind when you encounter the term "sensory design"? Chances are it is an image: a rain room, a funky eating utensil, a conspicuously textured chair. But the way things actually feel, smell, even taste, is much harder to capture. This difficulty points to how deeply ingrained the ***tyranny of vision*** *is."*

Alice Bucknell

II.

"We urgently need a diagnosis of the psychosocial pathology of everyday seeing"

David Michael Levin

Modern architecture is nowaday intensively criticized for being not sensitive to human primary needs[2]. One solution exposed toward the design of a more embodied architecture is the awakening of our sensory system. However, always associated with this reflection was a very strong critic of the dominance of the vision. Architecture seems to be dehumanized because of the overuse of vision.

Even though we knew that part of this statement was grounded, we felt this statement to be quite paradoxical. How could architecture go against our physiological needs when it uses one of our biological systems as its main tool? And moreover the one that delivers 80 percent of the information we need to perceive the world.

To understand the concepts that are associated with the notion of vision nowadays, we decided to look deeper to diverse accusations that were laid on our sense of sight. One particular choice of word caught our attention. Architecture was accused to be under the *tyranny of vision.* [I]

Tyranny
"arbitrary, unreasonable, or despotic behaviour" [3]

When looking at this definition, it seemed obvious to us that there was a problem in the association of those terms with vision. [II]

How can the notion of arbitrariness define an extremely complex biological system responding to a number of fixed variables?

Why is vision associated with a despotic system when in fact it is only a subsystem under the control of an even more complex operation?

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[2] *Sarah Robinson, J. P. (2015). Mind in architecture, Neuroscience, embodiment, and the future of design.*

[3] *https://www.collinsdictionary.com/dictionary/english/tyranny*

Fig. 03. Alenation, Wedad Alnasser (2015)

AN OCULARCENTRISM PARADIGM

At this stage we understood that the cultural definition of vision in architecture may have taken a turn for the worse [4], and it has certainly moved away from its role in our perceptual experience.

If we want to understand the cause of this physiologically maladaptive architecture that we are trying to counter nowadays, it seems interesting to focus on the real impact of vision on architecture.

Why has it become so negative? How can we try to counter this phenomenon since vision will always be at the heart of the architectural experience and also at the center of the creation of any architectural project?

To do so we shall discuss the place that sight took in our modern society, to understand its meaning nowadays in occidental cultures.

[4] *Pallasmaa, J. (2012). The Eyes of the Skin : Architecture and the Senses. John Wiley & Sons.*

AN OCULARCENTRISM PARADIGM

I.

"Plato regarded vision as humanity's greatest gift, and he insisted that ethical universals must be accessible to"the mind's eye". Aristotle, likewise, considered sight as the most noble of the senses 'because it approximates the intellect most closely by virtue of the relative immateriality of it's knowledge. "

Juhani Pallasmaa

II.

"The dominance of visual metaphors continues to this day in contemporary academic discourse: in conceptualising we seek insight and illumination; we speculate, inspect, focus, and reflect; and when we speak of points of view, synopsis, and evidence, we may forget or be unaware of these concepts' sight-based etymology."

Donncha Kavanagh

III.

"The fundamental event of the modern age is the conquest of the world as pictures"

Heidegger

Fig. 04. The sense of sight is usually considered as the most important sense in our everyday life.

The well-known concept of the 5 senses was defined by Aristotle more than 300 years before Christ. He had identified the 5 common senses that are now rooted in commun knowledge: sight, hearing, touch, smell and taste. They were all considered to be independent systems. Each of them carrying specific information about the world around us. Because of their very different characters and individuality it was not hard to grant them different importance.
Since ancient Greece vision has taken the leading role among the senses. Philosophers such as plato and Aristotle were considering sight to be the noblest sense, the sense of wisdom, knowledge and purity. [I]

This connotation given to vision is still inscribed in today's society. From a linguistic point of view this fact is unmistakable, the vocabulary we commonly use in the field of knowledge is full of terms that fall within the lexical field of vision. [5, II]

The hierarchisation of the senses may have varied over the centuries but it goes without saying that the 20th century has had a huge impact on the importance we lay on sight.
With the range of new technology promoting the use of vision, the sight became the sense of the privileged. We are now constantly surrounded by a constant flow of visual images. The image became timeless and global. Some correlation between the rise of this culture of image and the development of "western ego-consciousness" [6] seems to exist. [III]

[5] *Kavanagh, D. (2004). Ocularcentrism and its Others : A Framework for Meta-theoretical Analysis. Organization Studies, 25(3), 445-464.*

[6] *Pallasmaa, J. (2012). The Eyes of the Skin : Architecture and the Senses. John Wiley & Sons.*

Fig. 04. The sense of sight, Philippe Mercier (1744-1747)

AN OCULARCENTRISM PARADIGM

I.

"The narcissistic eye views architecture solely as a means of self-expression, and as an intellectual-artistic game detached from essential mental and societal connections, whereas the nihilistic eye deliberately advances sensory and mental detachment and alienation."

Luis Alfonso de la Fuente

II.

"The problems arise from the isolation of the eye outside its natural interaction with other sense modalities, and from the elimination and suppression of other senses, which increasingly reduce and restrict the experience of the world into the sphere of vision. This separation and reduction fragment the innate complexity, comprehensiveness and plasticity of the perceptual system, reinforcing a sense of detachment and alienation."

Palassmaa

Fig. 05. The imagination of the architect tends to be centered on a personal intellectual and obsesive game.

This globalisation of the image has also affected the architectural world, which did not escape these technological and societal changes.

During the last decades the focus of architecture was too often the search for meaningful forms. Building that would have strong and iconic shapes, and which would talk more about the architect's obsession than the actual usage. The focus of those projects were mainly on the visual and aesthetic impact of the building. The projects needed to be visually strong, to conquer the world of images which had become hyper-competitive. The architect's signature could usually be recognised in a fraction of seconds. This gave rise to the individualistic style of "star architecture". In the world of image and architecture, the goal was to get this visually "wow effect". The creation of an objectified architecture.
Modern architecture had become the mixture between a narcissist architecture and an architecture of Heidegger's nihilism. [7, I]

In the quest for an iconic architecture which focused on the power of the aesthetical visual experience, the vision ended up "annihilating" the sensibility to the other senses. [8, II]

[7] *Fuente Suárez, L. A. de la. (2016). Towards experiential representation in architecture. Journal of Architecture and Urbanism, 40(1), 47-58.*

[8] *Pallasmaa, J. (2012). The Eyes of the Skin : Architecture and the Senses. John Wiley & Sons.*

Fig. 05. The city of the Captive Golbe, Rem Koolhaas (1972)

VISION AS AN EMBODIED EXPERIENCE

In this chapter, we will explain why we think that the role of vision should not be minimized when creating embodied architectural experiences.

As sensory systems are part of a whole, they work together to create our global spatial comprehension. Vision plays a crucial part in our perception, even though it is considered mostly for its aesthetic purpose in architecture.

Vision is a fragment of an extremely complex biological system who ties us with our surroundings.

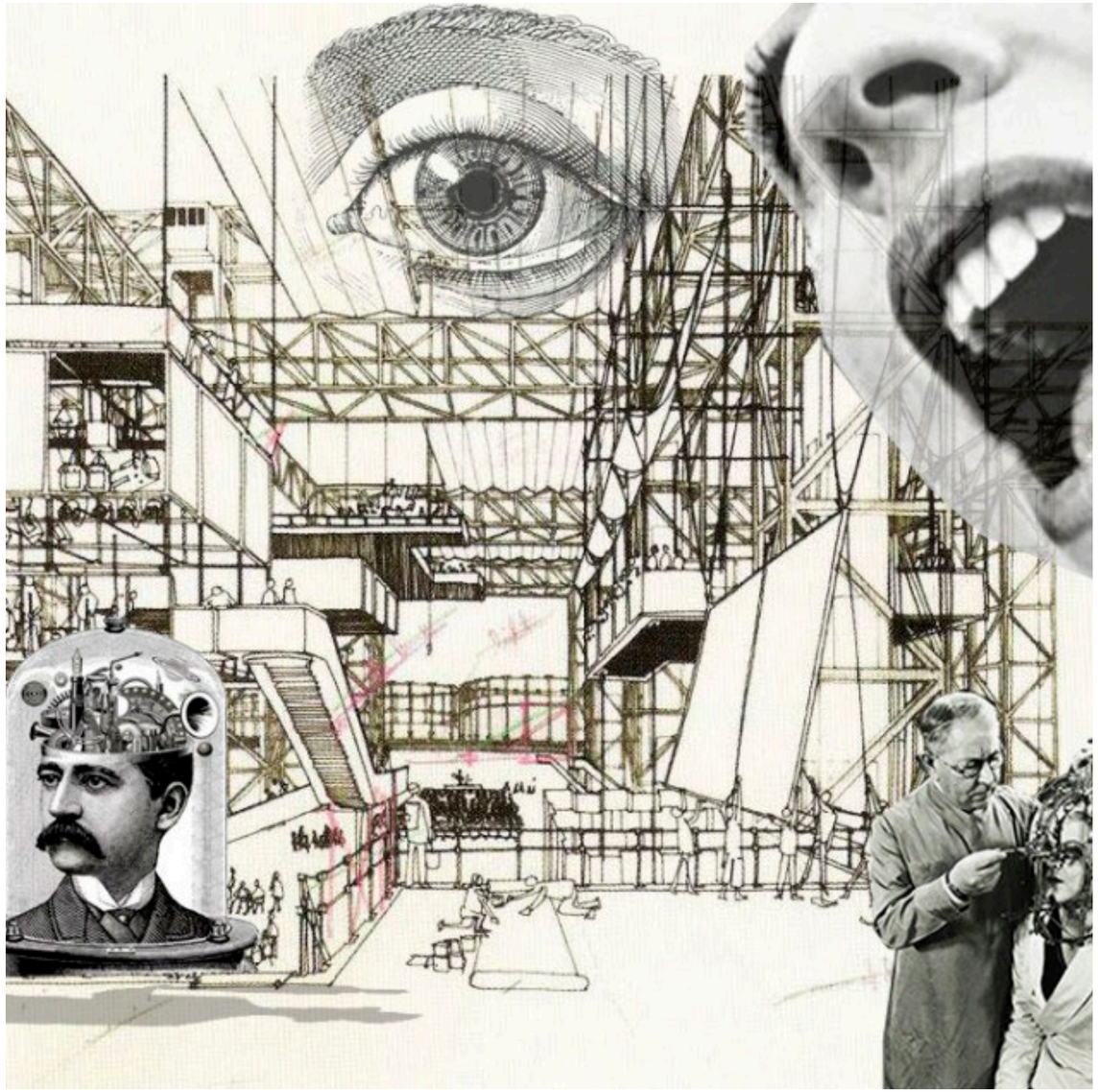

Fig. 06. Reflection on the integration of the sensory systems into experimental architecture.

VISION AS AN EMBODIED EXPERIENCE

I.

“Changes in the environment change the brain, and therefore they change our behavior. In planning the environments in which we live, architectural design changes our brain and our behavior”

Fred Gage

In neuroscience and cognitive psychology the link between the different sensory systems became clearer and clearer. Researchers proved that they work together to make us experience and understand the world around us. But in architecture, the segregation between the senses has not stopped getting worse. They are more likely to be considered individualy.

Luckily, we are in a generation where a global consciousness on the importance of the building for our mental well-being is arising. The theories putting human experiences at the center of the design process are getting more and more common. The study of phenomenology, and neuro-architecture are good examples of methodologies that could bring us towards a better understanding concerning the impact of the environment on our lives. [I]

As we have seen, there seems to be a lot of inconsistency between how our bodies function and how this aesthetical architecture is designed. We strongly believe that a better understanding of our physiological functioning could help us design in a more suitable way for human perceptions. [9]

As we have discussed, when vision is treated as an independent system it has a distancing effect. It becomes a simple window to the external world, without involving us on what is happening outside. But when sight is used as a unit in a whole system, it has the capability to connect us deeply with our surroundings. That is what we mean by embodied experience.

In the following pages we are going to explore the concept of visual perception. By digging into its functioning, we are hoping to get more insights on the way vision influences our spatial perception. But also how this perception is influenced by the collaboration of our sensory systems.

[9] Mallgrave, H. F. (2018). From object to experience : The new culture of architectural design. Bloomsbury Visual Arts.

Fig. 06. Untilted, BraneSpace/Iaac (2017)

THE VISUAL SYSTEM

If we want to pretend to be able to talk about the visual perception of a space as well as its role in an architectural experience, it seems essential for us to look at the physiological functioning of our visual system.
It would be impossible to claim a global understanding of the visual system, the complexity of its composition is extreme and all its secrets are still far from being solved. A plethora of researchers in cognitive science, neuroscience and psychology are already involved in the task. We do not aim to provide any answers from a biological point of view, we want to look, as futur architects, at the biological issues inherent to the physical human experience. As we hope that architectural design will, in the future, come closer and closer to a physiologically well adapted response to our needs.

We are going to draw up a global understanding of the functioning of our visual system, from the capture of light by our eyes to the interpretation of the image by our brain.
This theoretical part will allow us to identify a series of elements having a primary role in our visual field and their implication in the spatial interpretation of our environment.

We will divide our explanation into 2 parts. The first part will highlight the first steps of the visual field input. From the spatial information that is transmitted by the eye to the primary visual cortex. The second part will discuss the processing of those primary informations and their role in spatial perception.

THE VISUAL SYSTEM
FROM THE RETINA TO THE PRIMARY VISUAL CORTEX.

Our vision is only based on light. Light brings energy by it's variation of wavelength that functions as input for our vision. Neuroreceptors are covering the inner side of the eyeball. This eye section is called the retina, and works as a light receptive layer. It serves to capture the light and convert energy of the light into neural impulse, used by the brain to create visual representation. The primary light-sensing cells of the retina are the cones and the rods. Both of them have differing characteristics that play an important role in our complex visual system. [10]

As we can see in the table [I], cones and rods are both used in the light intensity detection. Communication and comparison between the intensity of light perceived by cells located side by side allows contrast-related information to be obtained. With their high sensitivity to light, rods are more used in low-light situations compared to the cones that have a lower sensitivity. However, our cones are much more accurate and precise, allowing for a much higher resolution for daytime vision. [11]

Their positioning in the eye also varies highly. Cones are present in greater density in the centre of our retina. This change in the proportion of cones and rodes in this light-sensitive tissue explains the difference in our visual field resolution. Only a small portion of what we see is an ultra high resolution render. [12]

Once the photoreceptor has transformed the light input into neural electro signals they will be sent through the optical nerve, which is the main neural pathway to the primary visual cortex, located at the back end of our brain. Primary informations about the scene are then extrapolated from those stimuli. We find in our visual brain a lot of, so called, selective cells. They are more receptive to certain specific stimuli. As for example, line orientation, direction of motion, selective colors. [13] At this stage, visual input from the retina is mostly used for line, edges and surface recognition.

I.
Properties of Visual Pigments

	Cones	Rods
Color Sensitivity	Yes	No
Sensitivity	Low	High
Acuity	High	Low
Adaptation	Low	High

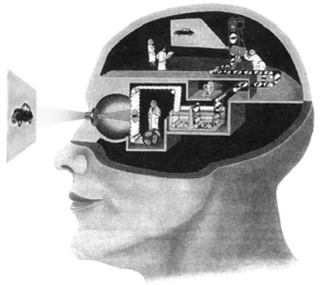

Fig. 07.

[10] Amthor, F. (2016). Neuroscience for dummies (2nd edition). John Wiley & Sons, Inc.

[11] (2021) Photoreceptor Cell. Wikipedia https://en.wikipedia.org/wiki/Photoreceptor_cell

[12] Johnson, J. (2010). Designing with the mind in mind : Simple guide to understanding user interface design rules. Morgan Kaufmann Publishers/Elsevier.

[13] Zeki, S. (1999). Inner Vision, An exploration of art and the brain.

THE VISUAL SYSTEM
FROM THE RETINA TO THE PRIMARY VISUAL CORTEX.

II.

"The relationship between the physiology of single cells and some of the creations of modern art is compelling and therefore worth studying"

Semir Zeki

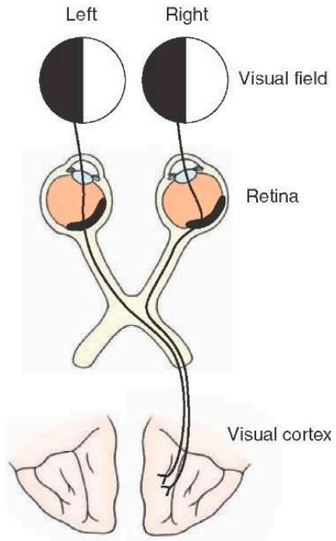

Fig. 08.

From these systems we identified a few elements that we thought to be noteworthy in an architectural context. [II]

The ***intensity*** of light and the ***contrast*** seemed to be crucial elements for us. As they are at the center of our vision and also used as an extremely important qualitative aspect of any architectural project.
Another crucial element is the detection of ***color***, as it also takes a big part in the design process. Nowadays a lot of new discoveries are made on the physiological impact of colors.
Lastly the geometrical aspect of architecture is a game between ***lines*** and ***planes***, which are manipulated to create a particular effect.

Elements that were cited above all came directly from light stimuli. But it might also be relevant to stop on some physical aspects that also have important impacts on our vision.
Our ocular muscles allow us a wide range of movement with our eyes. Although our eyes usually do the movement from 15 to 20 degrees from the front axis, our head movements tend to take over for more rotation [14]. Our attention is driven by diverse phenomena but it will bring our vision to particular ***framing***. In architecture the design tends to be conceived on a particular perspectival view point. The framing is furthermore crucial.

The last element we want to add is the notion of ***sharpness***, as we realized that our visual field has different sharpness levels. It is particularly important when talking about our lived experience. This accuracy level will change depending on the motion of the subject, considering that architectural experience is never static.

[14] (2021) Muscles oculomoteurs. Wikipedia. https://fr.wikipedia.org/wiki/Muscles_oculomoteurs

Fig. 07. Homunculus. https://qph.fs.quoracdn.net/main-qimg-8f24c74a6ed-3781963c385af11e42825

Fig. 08. The visual cortex. http://what-when-how.com/neuroscience/visual-system-sensory-system-part-3/

Our Brain functions as an incredibly powerful information processor. His task will be to organize, interpret and integrate the inputs he receives. [15]

A common idea in the past was that the retina was sending a complete image to a visual area of the brain, in order for this brain region to be able to process the globality of the visual field. Nowadays we know that visual processing is far more complex. Depending on the kind of stimuli, the information will be sent to different brain areas, and for different kinds of stimuli we find multiple specialized cells.

Our hypothesis is that by trying to understand broadly the different areas which serve a specific aspect of our visual perception, we could identify some important part of this particular perception. In order to get some cues about our biological preferences on visual inputs. Helping designers to create more multi sensorial experiences, giving inputs on visual aesthetics and its physiological impact and sensibilizing the role of the design in the navigational quality of a building.

Information gathered and processed in the primary cortex will then be sent to the secondary visual cortex. As we saw already in the primary cortex (V1) the different types of stimuli were processed by diverse cells located in different regions. Those individual information were then transmitted further in the visual brain into specialized parcelles. [16]

Two different pathways are leaving the primary visual cortex. Both are used for distinct types of visual information. Usually called under the name of the “Where and What system”

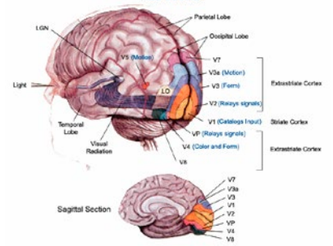

Fig. 09.

[15] *Amthor, F. (2016). Neuroscience for dummies (2nd edition). John Wiley & Sons, Inc.*

[16] *Mallgrave, H. F. (2018). From object to experience : The new culture of architectural design. Bloomsbury Visual Arts.*

Fig. 09. Visual Cortices, Magda Xantopol (2016)

Fig. 10. The dorsal and ventral stream, Selket (2007)

THE VISUAL SYSTEM
INTO THE VISUAL PATHWAYS

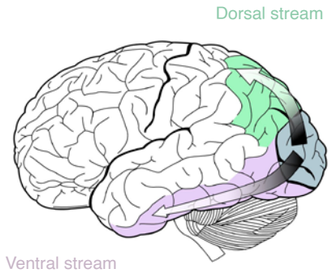

Fig. 10.

DORSAL STREAM - “WHERE”/ “HOW” SYSTEM

This brain region will serve especially for ***motion*** detection. From our own motion creating a change in our visual framing, to an object’s motion in our visual field. It’s allowing us to understand movement. Certain cases of damage to part of this stream could imply a constant stroboscopic perception, which is caused by an incapacity to asset continuous movement. This Pathway is particularly important in the spatial comprehension of our surroundings, which explains its common name: “where”system.
This system is known to be highly important to define our choice of activation such as putting cereals in a bowl or catching a flying object. Its importance for visually driven behavior has been demonstrated, and have led some researchers to prefer the notion of “how to” system.

When talking about architecture the notion of motion is extremely important. When experimenting architecture we encounter different types of motion, even when we are not consciously aware of them. We obviously have to capture the movement of other users in the space. Which could give us important behavioural clues.
But we are also impacted by our own movement in space. The speed at which we are moving while looking can have a big impact on our perception, especially on our ***peripheral vision***.
And even when we stand still, we nevertheless face movement in our visual field. Those smaller movements of our eyes are influenced by our ***visual attention,*** which allows us to put the subject of attention in the higher resolution part of our visual field.

VENTRAL STREAM - “WHAT” SYSTEM

Neurons from this brain region are known to be particularly receptive to patterns and colors. This cortex area serves mostly for ***form recognition***. To do that it combines the information on contrast, colors, line orientation that it had gathered, with pre-existing knowledge of forms and concepts. The relation between our visual imagery and our cognition and memory is central to the perception of our environment.

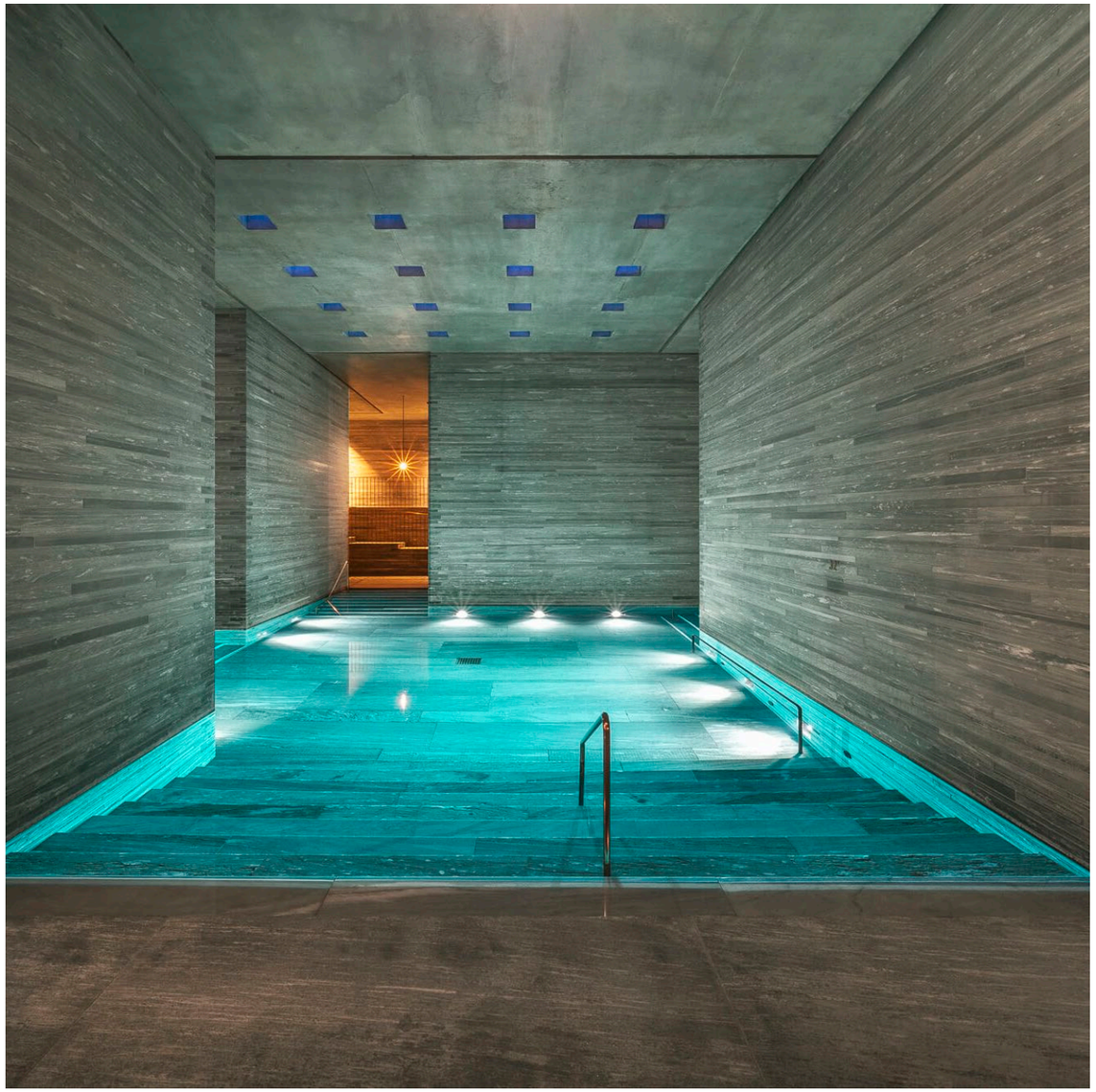

Fig. 11. Architecture has many tools to play with our sensorial experience of space.

THE VISUAL SYSTEM
INTO THE VISUAL PATHWAYS

CROSSTALK

Even though the function between the “where” and the “what” system are clearly different and well defined it doesn’t imply that both are working as completely independent systems. The communications between them are multiple and always turned on. One result of this communication which has catched our attention for its implication in architecture is the perception of ***depth***. Information from the primary visual cortex, the dorsal stream and the ventral stream are taking part in this perception.[17]

To this point we mainly talked about the internal functions and system of the visual brain. But he doesn’t function only by itself as an independent processor. Our sensory systems are all interconnected. They communicate to provide a ***multi sensorial*** understanding of our surroundings.
Our visual system is not an exception. Thanks to the nervous system, mirror neurons, cognition and memory, visual images can communicate with our other senses.
It goes even further than the 5 traditional senses defined by Aristotle. Sensory systems could include proprioception, thermoception, equilibrioception and even nociception.

It is crucial to mention the impact of our visual system on ***emotion***. We have seen that ***cognition*** and ***memory*** are playing an important role in our visual perception. As emotions are closely linked to our memory system, they are without a doubt playing an important role in our interpretation of a visual image. Vision can, both, rise within us strong emotional impulse and serve as a tool to interpret emotion.

[17] *Amthor, F. (2016). Neuroscience for dummies (2nd edition). John Wiley & Sons, Inc.*

Fig. 11. Les thermes de Vals, Peter Zumthor (1996)

REPRESENTATION IN ARCHITECTURAL PRACTICE

The criticism of visual ocularcentrism and critical visual information influencing our spatial perception have been stated. They will now serve to explain our methodology for the next phase. Where we will try to assess how vision can be used to bring forward a more embodied architecture in our modern society.

Vision, as we said, is of most importance in the work of architects. It is through it that the designs come to live. To make the ideas and the concepts emerge, designers need a way to communicate them to others tiers in their work environment, may it be clients, buyers, constructors, or colleagues. They will use the tool of representation to share their mental images and a fragment of their imagination. Architects, with the help of representation, bring their project in the physical realm to be understood by others. Part of the project transmission is done through speech, and writing but the most commonly used tool has always been drawings and models. Spatial representations are easier to understand through their form put on a paper or a screen, it allows everyone to have the same visual image.

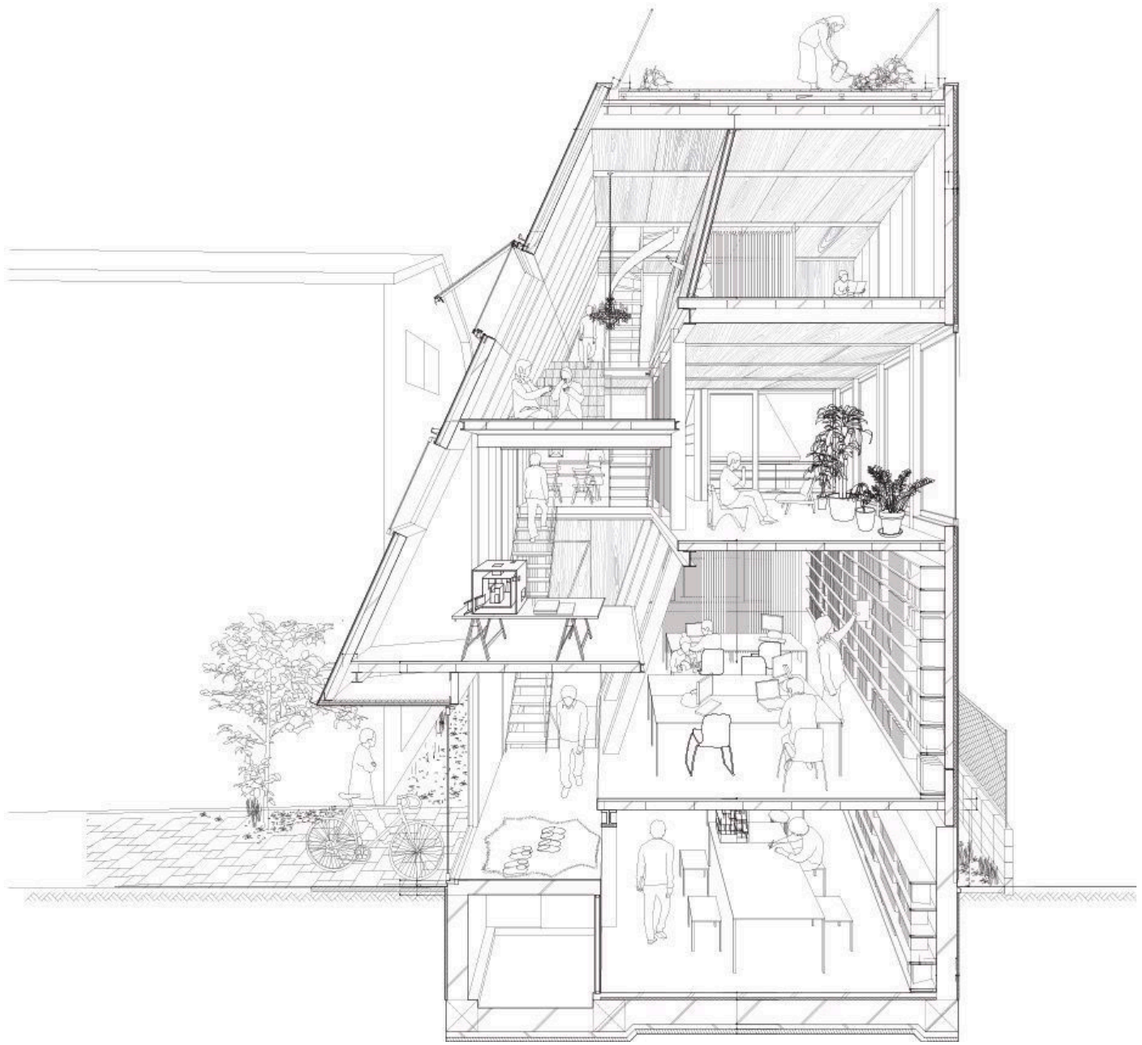

Fig. 12. Traditional representation methods can be addapted to show qualitative aspects of architecture.

REPRESENTATION IN ARCHITECTURAL PRACTICE

I.

"[...]The world is as many ways as it can be truly descirbed, seen, pictured, etc., [...] there is no such thing as the way the world is."

Nelson Goodman

The focus of this thesis being vision, representations are at the core of the subject. They are one of the main architectural tools and relies completely on vision. Therefore, we will try to analyze which kind of embodied perception can be awakened by representation tools, and thus intrinsic to vision. To do so we will make a selection of architectural representations that speaks about specific aspects of the visual fields that we highlighted in the previous chapter. We are hoping to confirm that visual cues serve a broader role in our experience of architecture.

Architectural representations can take many forms. Their purpose is always to communicate certains informations about the space but their approach can vary widely. Either by the types of representation or by the medium. The most commonly used types of representations remain: plans, sections, perspectives and axonometric views. But many alternatives can be found.

Each of these representation types have the possibility to transmit qualitative or quantitative arguments about the designs they describe. The beauty of representation is the liberty over what element to show or to hide. Architects find themself with an intricate set of variables with which they can play to better describe what they want to communicate. [I]

As we chose to use representation to better understand the impact of visual variables in the architectural experimentation process. We are going to focus, in this particular work, on the relation between those visual variables and the desired effect.

Fig. 12. Atelier Bow Wow House, Bow Wow (2005)

REPRESENTATION IN ARCHITECTURAL PRACTICE

THE EYE'S VIEW POINT

I.

"[p]erspective makes the single eye the center of the visible world. Everything converges on to the eye as to the vanishing point of infinity. [...] In time, the modern individual (the 'I') came to be centred on, if not abbreviated to, the eye ('I' = eye)."

John Berger

II.

"Perspectives are more qualitative than quantitative. The experiential qualities of an environment or object can be perceived directly from a perspective."

William Kirby Lockhard

III.

"Descartes's philosphy, and his cartesian geometry, is thought to have objectified the subjective view of the world, so that the individualised, inhabiting, embodied viewer was forced into the position of passive, disembodied observer"

Perez-Gomez

Fig. 13. Representations methods are evolving according to the philosophy of the age.

In ancient Greece, perspective was a great matter of philosophical and mathematical reflexions. But it is during the Quattrocento, in Florence, that perspective has been mathematically understood. Filippo Brunelleschi has given rise to one of the most widely used methods of representing architectural experience. It gives the ability to transmit the exact proportions of a spatial form on a flat surface.

In our case what is more important than the geometrical characteristics, is that the eye is put at the centre of the image.[I] Representation becomes a precise two dimensional reconstruction of the real space as it would be seen by our eye. In this direction, we think that perspectives have a strong potential for qualitative arguments about the architectural space experience. [II]

In plans and sections, the viewer is left out of the picture. But in perspectives, we see the objects from the position of the eye in the space represented. This brings forward the concept of the self in the methods of representation. The eye is the point of observation. Since the eyes are the boundaries between the physical world and the mind, we can situate ourselves in the space that is depicted.[18] This is for us a strong statement that must follow the representation that we are going to select for our study, as it is coherent with our questioning about the relationship between eye, body and space.

But traditional perspectival representation still lacks something quite important in our specific study. They represent a very static approach of the world, static from a physical and temporal point of view. The forms represented are purely geometrics and arranged to see the world through mathematics, and they usually tend to represent a realistic instant which speaks about one particular experience of architecture.

This very cartesian way has objectified the vision of the world which is, in reality, something truly subjective.[III] The next step for us is to extend the classical vision of the perspective to explore something more embodied through perspectives and views in a qualitative way.

[18] *Gibson, J. J. (2014). The Ecological Approach to Visual Perception : Classic Edition. Psychology Press.*

Fig. 13. The School of Athens, Raphael (1509-1510)

Fig. 14. The use and atmosphere of a space can be transmitted without being a perfect retranscription of space.

REPRESENTATION IN ARCHITECTURAL PRACTICE

FOR AN EXPERIENTIAL REPRESENTATION

I.

"The uncommon angle makes us more aware of what we had merely fogotten"

Christian Metz

II.

"These efforts to mirror a building before it is built, I would argue, only push architects further away from (rather than close to) understanding and representing the ephemeral and invisible qualities found in the eventual buildings and spaces that makes them truly fulfilling"

Mathranraj Ratinam

Architecture surely is something that we look at but, more importantly, something that we live in and that we use for many different reasons. When we talk about an embodied architecture in this thesis we mean an architecture that engages cohesively the different perceptual systems of our body.

As we speak of emphasizing this embodied part of architecture, representation must also have a way to express spatial experience. We are going to talk about a particular kind of representation, which is called experiential representation. While we try to show an architectural object through representation, we must be aware that it will create a very precise experience for the viewer.

There is an infinite amount of experiential representation. Especially since some can speak of an experience that has already been lived, and others of one imagined. The latter is the most used in architecture and those representations are intimately linked to vision as the drawings are made from a mental image of the designer. They can be used to generate ideas for the project or to convey an intention. [19]

Representations are often seen as something external and independent from the human being. But when depicting something that may be real, as architecture does, we must also take into consideration our physiological and cognitive mechanisms. Therefore, representations become experienced objects. [20, I]

In architecture one strong tendency is the wish to represent the projected building in the most realistic way possible. This tendency grew bigger and bigger as the new technological advances allowed us to achieve an increasingly impressive level of realistic detail. [II]

[19] Fuente Suárez, L. A. de la. (2016). Towards experiential representation in architecture. Journal of Architecture and Urbanism, 40(1), 47-58.

[20] *Pallasmaa, J. (2012). The Eyes of the Skin : Architecture and the Senses. John Wiley & Sons.*

Fig. 14. Three Apéritifs Glasses, Le Corbusier (1960)

REPRESENTATION IN ARCHITECTURAL PRACTICE

FOR AN EXPERIENTIAL REPRESENTATION

I.

".An architect's early design sketches, tentative and evocative, can often give remarkably accurate idea of the overall impression the final building is intended to make, and they usually do this without much regard to many of the details. (...) Their power is that they limit what is being portrayed and therefore dramatize certain architectural aspects while muting or altogether silencing other. "

Allen and Oliver

Fig. 15. To disconnect form a realistic representation allows to give new spatial informations.

By focusing on experimental representation, we made the decision to put those incredibly realistic renderings aside.

An embodied experience is composed of a multitude of different variables. The experience will be different depending on the user, and the same individual is confronted with a slightly different experience with each of his visits as he will pay attention to new things every time. With a realistic visual, a complete experience is depicted, all the elements have been carefully selected to paint a special atmosphere. [21]

Experiential representations are more abstract, they usually don't talk about a complete experience. By selecting a particular element of a scene, it will direct the viewer's attention on one part of the perceptual experience. The isolation of one phenomena will allow it to be brought to light and not lost into a whole. [1]

This type of representation caught our attention because of its inherent qualities. It has the power to involve the observer and his imagination, which is for us a primordial element in an embodied experience. It also showed a great advantage in our search for a correlation between visual elements and spatial perception, since this kind of illustration is selecting particular elements of the visual field to emphasize certain impressions.

Therefore, we will select a number of experiential representations and identify the elements selected by the artist to see what their particular approach conveys. As we tend toward an architecture more sensitive to our physiological functioning, we decided to use the knowledge on visual fields and visual interpretations for our analysis of the illustrations.

[21] Fuente Suárez, L. A. de la. (2016). Towards experiential representation in architecture. Journal of Architecture and Urbanism, 40(1), 47-58.

Fig. 15. The Desk, David Hockney (1984)

REPRESENTATION IN ARCHITECTURAL PRACTICE
THROUGH MEDIUM

I

"If an experience is the way something is presented, to represent is to capture, in a specific medium, some of the many aspects or qualities that an object may possess."

Luis Alfonso de la Fuente

Representations can convey many messages. It can be done by the way the subject is represented, the chosen technique and mediums. Here we are talking about the diversity of mediums that are used to produce the representation.

As time went on, architects and artists always used technological advances to their advantage to represent architecture. The number of mediums grew ever bigger. It goes from drawings, to digitalization, passing by photography and many more. Those mediums are sometimes also mixed together in a composite manner.

In our opinion, the mediums have become too worn on this ocularcentrism in architecture. But it does not mean that they cannot serve as a canvas for an experiential representation. On the contrary, a great number of extremely interesting exemple already exist. [I]

In our research for experiential representations, it was important for us to select representation using diverse mediums. We didn't want to privilege one particular type of medium. As different mediums may have intrinsic qualities to awaken certain things within us than others. We wanted to have a wide range of experiences to address as many different aspects and experiences of vision as possible.

With this many options to choose from, we nevertheless put the constraint to the use of two dimensional and static representation.

Fig. 16. In the field of painting the technics are multiple and each can convey different type of atmosphere.

Fig. 16. The Starry Night, Vincent Van Gogh (1889)

MATRIX OF STIMULI

With all this stated, we propose a selection of representations that trigger spatial experiences revealed by our visual perceptions. The interpretation of the images are based on our personal opinions and perceptions.

We didn't intend to do an analysis of the image nor to explain the intent of the artists. We used our own interpretation of each illustration to dig deeper in the understanding of our visual system and start a reflection on the impact it could have on architectural practice.

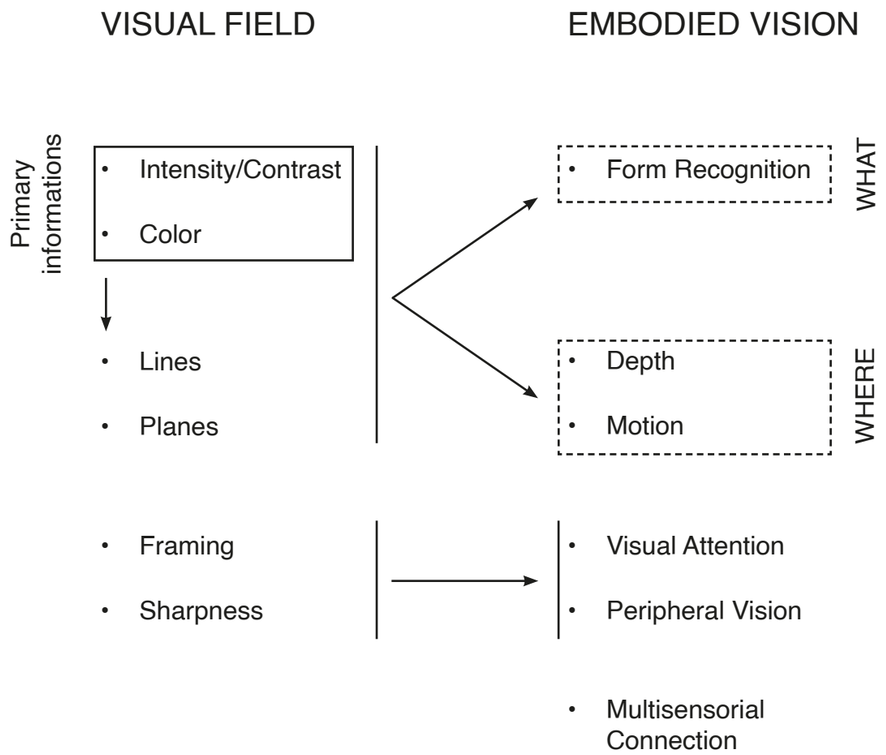

Fig. 17. Categorization of visual informations and interpretations.

MATRIX OF STIMULI

We will focus on the correlation between visual cues and their impact on an embodied experience through the use of representations.

To categorize the illustrations we selected, we defined a matrix, displaying two axes. One related to the visual elements of a scene and the other highlighting the impact of those elements on image perception.

For the first group we will use the visual elements, seen in the preceding chapter : *The visual system - From the retina to the primary visual cortex*, as variables available for the representation of a scene.

-Framing
-Sharpness
*-Contrast (Intensity)**
-Colors
-Lines
-Planes

* (as they work complementary in the representation we decided to linked them both into one element.)

For the second group we will use visual perceptions, defined in the chapter : *The visual system - Into the visual pathways*

-Visual attention
-Peripheral vision
-Motion
-Form recognition
-Depth
-Multisensory connections

In the preceding chapter we had also identified elements such as: cognition, memory and emotions. But in this work we decided not to include the emotional aspect in our categories as it was for us linked too much to a visual cultural symbolism and personal experiences.

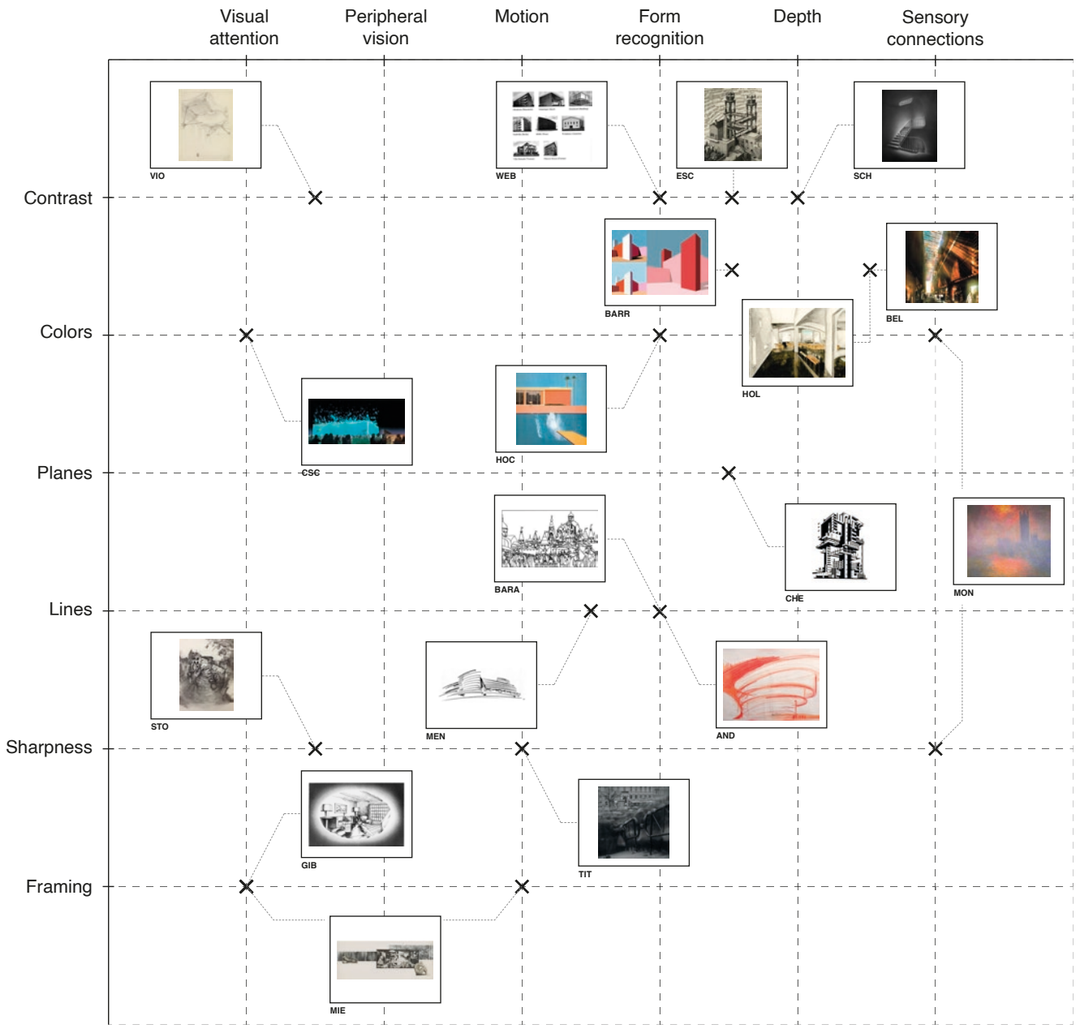

Fig. 18. Matrix displaying the chosen representations.

MATRIX OF STIMULI

The matrix was used to identify for each of the representations which primary visual information was used and which embodied experience it wanted to share.

Framing: It is the only variable that the user can physically have an impact on, by the ***motion*** of our eyes and body. It serves to guide our ***visual attention*** and in the same way our ***peripheral vision***.

Sharpness: Outside of our ***visual attention*** point, we have our ***peripheral vision*** which has a lower resolution rate. The sharpness of an object will also change depending on various ***motions***.

Contrast: Stong contrast help catch our ***visual attention*** and give us information on the spatial position of objects which help us to understand the ***form*** of the objects and the ***depth*** of a scene.

Color: An aditional variable in ***form recognition*** and ***depth*** that is also strongly related to pre-existing knowledge. Due to physiological functionning, it is highly related to our emotional and ***multisensorial*** state.

Lines: Our brain has the ability to recognise lines orientations that help us with the process of ***form recognition***.

Planes: Their use plays with high contrast and our pre-existing knowledge to give us cues on ***forms*** and ***depth***.

By doing so, we used representation as a starting point for a reflection on design elements that can influence our spatial perception and experience.

This graph allowed us to understand some correlations between visual informations and lived experiences. Inspired by those representations, we created cards *(see inside back cover)* talking about these observations. We used them to dig deeper into the functioning of our visual perception giving us cues to understand its relation with a more embodied way of experiencing space. And in the meantime, explore which aspects of our perception are intrinsic to us humans and which of them are more interconnected to personal background and culture.

CHOSEN REPRESENTATIONS

Lines // Edges
Form recognition

AND. *Sketch of the Art Museum in the city of Foshan*
Tadao Ando (1941-)

Lines // Edges
Form recognition

BARA. *Panoramic view of the city center of Pskov*
Alexander Baranov (2020)

Colour
Intensity // Contrast
Form recognition
Depth

BARR. *Houses Cuerámaro*
Luis Barragan (1948)

Intensity // Contrast
Form recognition
Depth

ESC. *Waterfall*
Maurits C. Escher (1961)

Framing
Visual attention
Peripheral vision

GIB. *The ego as seen by the left eye.*
James J. Gibson (2014)

Colour
Form recognition

HOC. *The splash*
David Hockney (1966)

Sharpness
Colour
Multisensory
Depth

MON. *Houses of Parliament Claude* Monet (1904)

Intensity // Contrast
Depth

SCH. *Treppe*
Simon Schubert (2020)

Sharpness
Visual attention
Peripheral vision

STO. *Charcoal drawing*
Zoe-Louise Storer (2015)

Colour
Intensity // Contrast
Multisensory
Depth

BEL. *Aldar Central Market Project, Foster and Partners*
Bellini and Daglio (2008)

Surfaces
Form recognition
Depth

CHE. *Neo-Gothic Utopia*
Yakov Chernikhov (1930)

Colors
Visual attention

CSC. *PTW,Beijing*
CSCEC + PTW + CCDI (2004)

Colour
Contrast
Multisensory
Depth

HOL. *Chapel of St. Ignatius*
Steven Holl (1926-27)

Lines // Edges
Form recognition
Motion

MEN. *Sketch of Schocken Department Stores*
Mendelsohn (1926-27)

Framing
Visual attention
Motion

MIE. *Museum for a small city*
Ludwig Mies van der Rohe (1969)

Sharpness
Visual attention
Motion

TIT. *City of Shadows*
Alexey Titarenko (1992)

Intensity // Contrast
Visual attention
Peripheral vision

VIO. *Composition in masonry and iron*
Eugène Viollet-le-duc (1863)

Intensity // Contrast
Form recognition

WEB. *Matrix of stimuli*
Weber and Vosskoetter (2008)

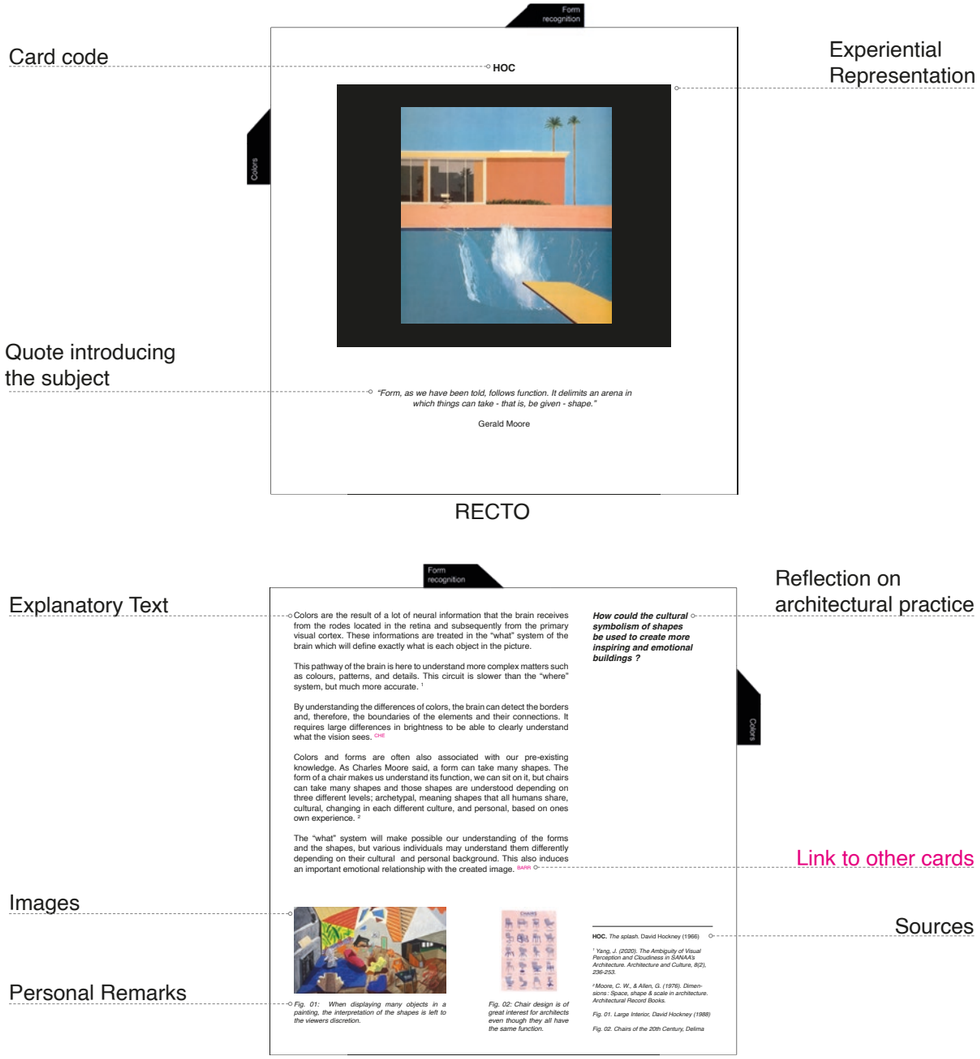

Fig. 19. Explanatory diagram of the cards.

CHOSEN REPRESENTATION

We created flying cards exhibiting each representation. Those cards can be found in a folder inside the back cover of this booklet. In them, we explore the relation between the visual elements of each representation and the message they convey with theoretical inputs. *(see Fig. 19.)*

The goal of these fragments is to teach us about our visual perceptions based on neuroscientific facts, physiologic facts and architectural theories.

It was important for us to build those cards as individual fragments so each of them can be read separately. But as the informations of each card are compiled, it gives a wider comprehension on the functioning of our visual perception. Links between the cards serve to create bridges between different visual perceptions that are interconnected. They also promote a more interactive lecture.

By asking an open question on each card, we hope to open a broader discussion on the methodology of today's architectural practice.

CONCLUSION

In this work we identified different types of visual processing that gave us indication about how we perceive our environment and how we experience it. We verified this statement by analysing experiential representation through perspective and views.

During this analysis, we focussed on specific aspects that were represented in each image based on our personal understanding.

The interpretation of the image is left to the viewer, since there is no single correct reading of an image. We are not trying to assign one particular method or medium to one particular perception, as a diverse approach may reflect the same experience.

CONCLUSION

In our search for experiential representation, we observed certain tendencies that are worth mentioning:

One of the most important quality that was found in all of the experiential representation selected, was their ability to trigger the viewer's imagination. Different approaches have been noted. Either by the careful selection of elements displayed, which gave a huge space for the viewer's mind to wander. Or by the use of more complex graphical elements, that could refer more to our memory and emotions.

By looking at representations following the first approach mentioned above, we realized that the use of primary informations captured in our visual fields are enough to determine the general aspect of a scene, and sometimes the lesser the number of information the more powerful the forms appear. We suppose that, as the stimuli are almost directly processed by specialized cells, the images comprehension tend to be more straightforward. Illustrations targeting less stimuli in the visual fields were clearer in the precise experience they wanted to convey.

On the other hand, the more elements were displayed, the more "complete" the transmitted experience was. With more stimuli, more parts of the visual brain are activated making it longer to process. We noted that representations focussing on multisensorial connections tend to follow this logic. They often mix elements such as colors, intensity of light and contrast. A single primary element would have more difficulty to convey the sensorial message.

Paintings for exemple, thanks to the materiality of paint and the liberty it offers, is an extremely interesting medium for this kind of work, notably to awaken our haptic sense.

CONCLUSION

Based on the correlations we observed between visual elements of a scene and its perception, we made a few observations:

We realized that a general scanning of a scene is an extremely fast process. To enable this speed, form recognition has to be activated by very primary visual information, such as lines and planes. Therefore, those simple geometrical informations are extremely important in the primary and global comprehension of space.

As we have observed motion plays a crucial role in our visual system. From our own motion which serves to understand our surroundings to the analysis of external object's motion. In architectural practice the impact of these different types of movement is equally important.

For the representation of the viewer's motion, we found the exploration of framing very interesting. We particularly enjoyed the temporal experimentation allowed by the medium of collage, which could be a good two dimensional alternative to video and timelapse.

Sharpness as for it, is very efficient to represent movement and therefore the visual attention of the viewers. An interesting element for us was the conscious choice to leave elements less detailed or even forgotten in the representation. Less defined elements and more blurred information could awaken our imagination and encourage our mind to wander in space.

Lastly, we realized that our visual system is quite sensitive to the notion of visual illusions. We encourage a reflection on those illusions which can teach us a lot about our visual perception, and the impact that our environment has on our visual perceptions.

Fig. 20. "Vision and the tactile sense are fused in actual lived experience." Pallasmaa [22]

CONCLUSION

This project made us realize the power that this broader understanding could have on visual perception in our experience. A clear and precise perception would lead to a very efficient environment which could be understood very rapidly and without many distractions for our view field. Whereas a disruption of our perception could trigger our imagination and our envy to discover the space. The possibilities of these perceptual games are endless but if not well thought and understood they could have a bad repercussion on our lived experience.

On the basis of the new knowledge acquired on the visual system we tried to open the reflection on a possible integration of physiological elements in architectural practice.Our intention with this project was not to propose a new project methodology but rather to open up a horizon of exploration that could help us move towards a more biologically aware architecture.

A future development of this work would be to look deeper into the cultural and personal impact on visual perception. To better understand the role of our personal experience, and of the cultural symbolism of visual elements, on our architectural experiences. What place takes the neural plasticity in our perception of our surroundings?

[22] Pallasmaa, J. (2012). The Eyes of the Skin : Architecture and the Senses. John Wiley & Sons.

Fig. 20. The lonely metropolitan, Herbert Bayer (1932)

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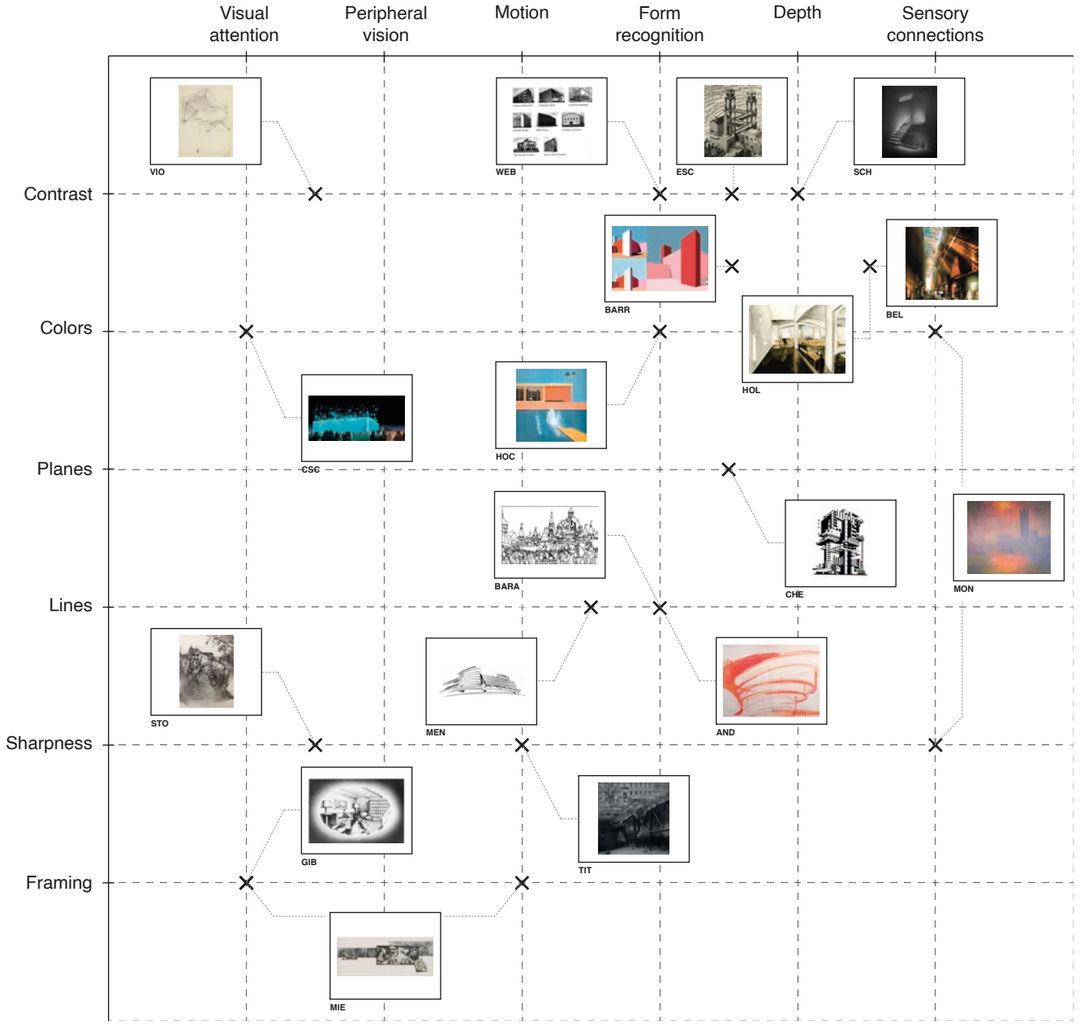

"I believe in the future resolution of these two states, apparently so contradictory, that are the dream and reality, in a kind of absolute reality, the surreality [...] it is to its conquest that I go "

André Breton