Light as Material

Artistic research to give form to volatility

Linde Varossieau

Research report

Explore lab

MSc Architecture, Urbanism and Building Sciences

Delft University of Technology

Linde Varossieau

4606612

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Supervised by Mieke Vink, Susanne Pietsch, and Mauro Parravicini

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To this report belongs an attachment, which documents all results for the fifteen experiments

Images of art works by other people than myself, are not included

Abstract

Light touches, but is untouchable itself. Truly understanding daylight is a matter of grasping light in its subtle, fleeting, ephemeral experiential reality. This project problematizes the relative absence of complex thinking when it comes to light in architecture. Simultaneously, it problematizes the absence of approaches to address this problem. An access to the in-between of light was by asking the question: how is light a material? As a method, artistic practices are used to address light in a non-dual manner. The results are a combination of visual art references, photographic images of fifteen experiments into light, and a description of the visual material in words

The research concludes that light is a volatile material, so it materializes on a fine balancing point between making light explicit and leaving light implicit. Catching a volatile material requires sensitivity to light's situatedness, by making its many variables explicit. Firstly because the source of light has a direction, our orientation towards it depends on time and location. Secondly because the light affects or is affected by the material it travels through or towards. For example, the form(lessness) of the material influences light's behaviour. Thirdly because perception of light is influenced by the orientation and the senses of the eye of the observer.

Overly describing how light is situated, kills light's vibrancy. It is within the associative, the intuitive, and the imaginative where light has space to move. The method of artistic research, including the act of experiencing light, gave space to both processes to be able to materialize light: making light explicit and leaving light implicit.

As a volatile material, the experiments showed that light is both able to make people turn inwards, towards their own internal world, and outwards, towards the external world. The changing between those processes is admirable because it creates a sensitivity for what is outside, while at the same time it addresses imagination for potential change of reality. Light makes people see. Therefore the role of the architect is to use light to make experiences of introversion and extraversion. For this, the architect requires both sensitivity to light's context, and acceptance that light never fully crystalizes. Therefore, the architect is helped with artistic practices and the act of experiencing light: here light becomes a volatile material.

As a reflection, the research methodology of artistic research is evaluated. Both the empirical and the unpredictable character of artistic research turned out to be valuable. The act of experiencing as both a research method and as a result which implies continuity of use, illustrates the character of artistic research well. The different processes within artistic research were juxtaposed: experiencing light, making visual material, documentation, association, thinking, intuition, interpretation. They work next to each other, continue through each other and grow over each other, with no beginning and end.

Keywords: *Light, volatile material, artistic research, experiencing light*

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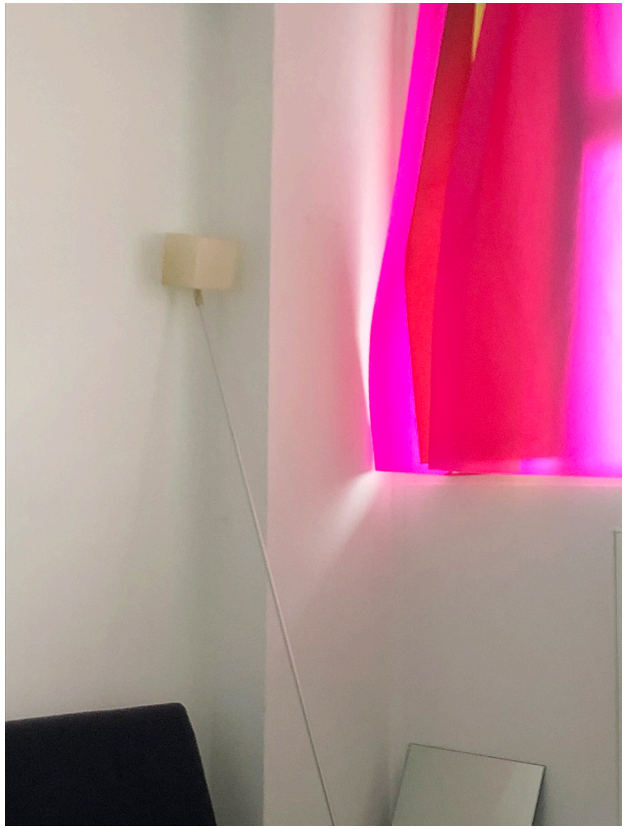

Fig. 1. Linde Varossieau, *Light touching*.

Introduction -
Catching a volatile material

This research is part of my architectural graduation project about natural light. Light fascinates because it is grounded in architecture while being airy and ethereal. It plays a fundamental role in the experience of touching and tender spaces. My interest in the phenomenological qualities of architecture creates a wish to become more sensitive to light. The graduation project aims to develop tools for the architect to work with light: How to see light? How to visualize light? How to feel light? As a point of departure this research investigates the dual character of light: light touches, but is untouchable itself.

By touching another substance, light reveals the world around us: through light we see. In architecture this happens where air and mass meet: the moment when the curtain in my room catches the light as shown in figure 1. The light's dynamics brings the room alive. Not only does light bring to life that which can be sensed by our eyes. For example, light's temperature activates our sense of touch, and light is the raw material in the process of photosynthesis. Light touches all around us because light facilitates life.

Nevertheless, while being so fundamental for the world we are in, light is untouchable at the same time. Light is literary 'in the air'. We surrender to the light, as something which is larger than us. However, in our language, light is embodied. We talk about light touching, light striking, light shining, and light illuminating. Those words imply a body of light, both assigning it material substance and suggesting movement. It implies the following duality to light: light's tangibility and light's intangibility.

A metaphysical approach to light reveals light's dual character too. Light is energy. It's generated when electrons return to a more stable position in their atoms and release energy.[1] This radiant energy acts on our sense of vision by stimulating the human retina.[2] Both the quantum theory by Planck and the electromagnetic wave theory by Maxwell explain the characteristics of light.[3] The first one approaches light in terms of photons, particles which emit and absorb light. While the latter does so in terms of electromagnetic waves which transmit the radiant energy.[4] Therefore, light behaves both as a particle and as a wave, suggesting light's duality. Truly understanding daylight, as one of architects' design concerns and tools, one can take from the above, is a matter of grasping light in its subtle, fleeting, ephemeral experiential reality.

[1] Mark S. Rea, *Lighting Handbook: Reference and Application.* 8th ed. (New York: IESNA, 1995), 3.
[2] Rea, *Lighting Handbook: Reference and Application.* 3.
[3] Rea, *Lighting Handbook: Reference and Application.* 3.
[4] Rea, *Lighting Handbook: Reference and Application.* 3.

Fig. 2. Vilhelm Hammershøi, *Sunbeams or Sunlight. "Dust Motes Dancing in the Sunbeams"*.

Fig. 3. Vilhelm Hammershøi, *Interior. Strandgade 30.*

Problem Statement

In architecture we generally communicate about light in terms of contrast, especially in architectural drawings. The counter space created by hollowing a volume allows light to enter. The places where light is not able to reach, is shadow. The space is dark, or light. The plan is drawn in black, and white. Diagrams based on quantitative data calculated by simulation models show where light is present, and where it is not. This absolute approach to light doesn't reflect the moments in which light touches us in lived space.

In Vilhelm Hammershøi's painting *Sunbeams or Sunlight. "Dust Motes Dancing in the Sunbeams"* (figure 2), sunbeams come inside the interior space through the window, and hit the floor. The orchestrated light has a clear presence, it stands out due to a high contrast between light and darkness: the painting celebrates light. In another painting by the same artist, *Interior. Strandgade 30* (figure 3), the light doesn't ask much attention: the incoming light is softer and reveals less contrast. However, light is just as present as it is in the other room because the light is still influencing the perception of space. The incoming light creates a specific atmosphere by interacting with the placement of the windows, the dimensions of space, and the texture and reflectivity of walls. Awareness of light in this painting is not created by the heavy contrast of light and darkness, but by the tones in between the contrast.

In the binary approach of light, information is lost. Deleuze addresses this in his theory on crystallization. Crystallization is the process of going from the amorph stage to a distinct stage.[5] This happens when two categories assemble and have a symbiotic relationship.[6] Therefore, naming both categories is important to locate the plane of thinking. To reach crystallization however, the relations between both categories are most important: the in-between of light's binary opposition. The thinking of architect Aldo van Eyck on the duo phenomenon resembles this theory.[7] He includes imagination, as the power to unfold the relations in-between a binary: *"Imagination is the mirror where conflicting polarities find back their lost reciprocity."*[8]

The visual arts and philosophy are sensitive enough to read the complexity of light, but architecture still wonders about what the in-between of light means. This project problematizes the relative absence of complex thinking when it comes to light. This problem extends to and reflects the practice of architecture, where this subtleness is very often absent or merely a result post-factum, for example a render made by an external firm. To dive into the complexity of light in architecture, the duality of light's tangibility and intangibility will be explored using the following research question:

How is light a material?

[5] Hanjo Berressem, *Gilles Deleuze's Lumionous Philosophy.* (Edinburgh: Edinburgh Univeristy Press, 2020), 13.
[6] Berressem, *Gilles Deleuze's Lumionous Philosophy*, 13.
[7] Hilde Heynen et al., *'Dat Is Architectuur': Sleutelteksten Uit de Twintigste Eeuw.* (Rotterdam: Uitgeverij 010, 2001), 345.
[8] Heynen et al., *'Dat Is Architectuur': Sleutelteksten Uit de Twintigste Eeuw,* 345.

Hypothesis

In order to counter the problem of light as duality in the conception of architecture, notions from other disciplines are sought. In this research, philosophy and visual art serve as starting points to explore the possibilities for addressing light otherwise. When light is treated as a material to answer the research question, light is given shape. Transforming the light from an amorph state to a distinct one, is a process of crystallization which demands the unfolding of light's in-between according to Deleuze. Following Aldo van Eyck's theory on the duo phenomenon, this research aims to use imagination to unfold the in-between of light.

In addition to Deleuze's and Aldo van Eyck's thinking, the philosophical work of Stoppani on dust is a valuable reference. By thinking in particles and in dynamics, her work challenges the conventional ways of thinking and doing in architectural production. Scientifically, light behaves as particles. Those particles move to find balance: light is a dynamic concept. Dust is composed of particles too, and dust is a dynamic concept too.[9] Therefore light and dust share behavioural characteristics: they are light-weighted, they travel, they are mobile, they change, they invade, they are omnipresent, they are open, they are formless but take on form.[10] The continuously changing form of dust doesn't approve of form being a fixed shape over time. Instead, dust proves Bataille's notion of *informe,* as dust handles form as a verb.[11] Therefore, the dynamic character of dust questions the static character of architecture.[12] Since dust and light share behavioural characteristics, it is expected that time and form(lessness) are important parameters of light's tangibility. Additionally, it is expected that when projecting light on architecture, the binary opposition of dynamic and static appears, both in light and space.

This hypothesis derived from theory is expected to be confirmed by the visual arts. The thinking and doing of visual arts serve a thinking on time and form(lessness) in addition to the theoretical reference on dust. Troiani and Ewing affirm the making and interpretating of visual material is valuable, because it is a situated practice by which it acknowledges the subjective view of the architect.[13]

[9] Teresa Stoppani, "Dust revolutions. Dust, informe, architecture (notes for a reading of Dust in Bataille)," *The Journal of Architecture* 12, no. 4 (2007): 437. https://doi-org.tudelft.idm.oclc.org/10.1080/13602360701614714.

[10] Stoppani, "*Dust revolutions. Dust, informe, architecture (notes for a reading of Dust in Bataille)*," 437.

[11] Stoppani, "*Dust revolutions. Dust, informe, architecture (notes for a reading of Dust in Bataille)*," 441.

[12] Stoppani, "*Dust revolutions. Dust, informe, architecture (notes for a reading of Dust in Bataille)*," 437.

[13] Igea Troiani and Suzanne Ewing, *Visual Research Methods.* Bristol: Intellect, 2019, 2.

[14] Troiani and Ewing, *Visual Research Methods,* 2-3.

[15] Troiani and Ewing, *Visual Research Methods,* 3.

[16] Juhani Pallasmaa, *The Thinking Hand: Existential and Embodied Wisdom in Architecture.* Chichester: Wiley, 2010, 15.

Thereby it brings specificity and distinctiveness to the findings, approaching the in-between of light.[14] They call this situated method 'critical visuality', a visual research method which uses vision to examine architecture and space both intuitively and intellectually.[15] The empirical character of this method is valued too by Pallasmaa. He emphasizes the importance of making and experiencing visual material, to obtain information which can not be obtained by theorizing purely.[16] He sees the body and mind as integrated entities.[17] So imagination is an embodied capacity.[18] Therefore, to imagine, the architect should involve in a doing process which incorporates the body.[19] It is expected that the empirical character of this method, the thinking and doing of visual arts, approaches the in-between of light.

The use of artistic forms in both a thinking and doing process, comes with the embrace of unpredictability. Borgdorff refers to this process as artistic research. [20] It takes place in the associative, so it has an open end: one question develops into the yet unknown following question.[21] This method resembles Savransky's theory on how to approach problems. According to him, problems are continuous and never ending.[22] He criticizes the planned thinking of a problem as an obstacle to overcome, after which it is solved.[23] Instead, the creator has to embeds itself in the problem, rather than approaching the problem from a distance.[24] The described unpredictability of artistic research is valuable because it engages with the complexity of problems. It allows the researcher to employ intuitive and embodied knowledge. Thereby artistic research makes tangible what was beforehand inaccessible.

[17] Pallasmaa, *The Thinking Hand: Existential and Embodied Wisdom in Architecture,* 12.

[18] Pallasmaa, *The Thinking Hand: Existential and Embodied Wisdom in Architecture,* 17.

[19] Pallasmaa, *The Thinking Hand: Existential and Embodied Wisdom in Architecture*, 15.

[20] Henk Borgdorff, *"The Production of Knowledge in Artistic Research," in The Routledge Companion to Research in the Arts*, ed. by Michael Biggs and Henrik Karlsson, (London: Imprint, 2010), 44.

[21] Borgdorff, *"The Production of Knowledge in Artistic Research,"* 44.

[22] Savransky, "Problems All the Way Down," 14.

[23] Martin Savransky, "Problems All the Way Down," *Theory, Culture & Society* 0, no. 0 (2020): 1. 10.1177/0263276420966389

[24] Savransky, "Problems All the Way Down," 14.

Method

To dive into the in-between of light, the research combines processes of interpretating and making of visual material, as prescribed by the method of 'critical visuality', inherently an artistic research practice. The research intertwines intuitive thinking and doing processes with associative thinking.

The doing process entails the making of spatial experiments and documentation by means of photography. The spatial experiments serve this research on light well because they are scale 1:1, so light is experienced first hand. Photography is relevant to the topic of light too. Photography observes reality through a lens, and captures its light on photosensitive material by playing with parameters such as exposure time and focal length. Additionally, it's a spatial act. The photographer's relation to the inhabited space determines the transformation of the space to a two-dimensional image.

The thinking process involves juxtaposing associations on the spatial experiments by reflection, imagination, speculation, and relating to works of art and architecture which focus on light. These associations are guided by parameters derived from the article by Stoppani on dust: time and form(lessness), to be able to address the dynamic character of light. The visual material, both created by my own and by others, will be described and interpreted in words. The doing process and thinking processes influence each other in the associative. From the associations the research continues to develop into more spatial experiments and interpretating of visual material. The method has an open end, to be able to engage within the problem with imagination.

The research plays out in the Dutch coastal context. The light is omnipresent here, because it is reflected by the water. The qualities of the light at the Dutch coast have been recognized before. 'Hollands licht', Dutch Light, knows a history of celebration in painting. The experiments are divided over three locations at the Dutch coast: Meijendel, Ouddorp, and Westenschouwen. The choice of location was based on practical accessibility reasons. The different locations allowed for comparison of horizon, of sand to water to sky proportion, of purity of the place, and of possibility to add to the place.

Fifteen experimental exercises are done to see how light touches, both scripted and non-scripted. The form studies are based on three architectonic elements: line, plane, and volume. For possible comparison, the photos are taken from the same place with the horizon in the middle. The experiments happen in the open air with natural light so there are still multiple factors which influence them. To make those factors explicit, the following parameters are noted down: date, time, location, material, information about the sun: the source of light, information about air: medium through which light travels, information about the camera: eye of the observer. Hereby the experiments show how light is

time dependent (a), how light interacts with material (b), and how light has a source and a direction (c).

(a) Time
The experiments have been executed during the day within the time span of six weeks in spring, to be able to work with natural daylight. Except one experiment which has been executed during the night, to be able to work with the absence of daylight. The several moments in time allowed me to observe different conditions of light.

(b) Material
The research aims to work with the natural materials present here: water, wind, light, and sand. The sand represents the architectonic mass. A child intuitively builds sandcastles. Similarly, sand is the material to build the spatial elements for this research. Additionally, this research works with the material glass because of its translucent character. Glass comes from the location too because it's made from sand. Lastly, this research works with one material which is not coming from the location directly, namely textile. Textile is light, takes on form easily and can be used to project light on. The diverse materials are necessary because they allow me to understand different ways of moving of light: caught light, reflected light, transmitted light, absorbed light and so forth.

(c) Source and direction of light
This research makes explicit the different stages of the travelling light. Firstly the source of the light: the sun and its location depending on the time. Therefore the following quantitative data is recorded: sunrise; sunset; altitude; azimuth; sun position; shadow length at an object length 1.75 m, which is my length. Secondly the medium through which the sun travels: the air and the amount of water it holds due to weather and surrounding. Therefore the weather condition is noted down. And thirdly, the eye of the observer: the camera. Therefore the direction of the camera, its focal length, and its exposure settings are recorded.

The doing and thinking processes ultimately translate in design approaches on light for the architect. The results aregenerated by visual art references, photographic images of the fifteen experiments into light, and descriptions of the visual material in words. The expected research outcome is a step forward in the crystallization of light, the materialization of light, by using imagination to better understand the relation between light's intangibility and light's tangibility. For architectural practice it aims to deliver a vision on light which approaches light's in-between, to be able to work more sensitively with light that touches us in space.

Fifteen experiments into light

Light is situated which brings light conditions. The source of light, the sun, has a direction. How we orient towards the sun is dependent on time and location. The earth turns around in two circles. Firstly, the earth turns around the sun in a year. The earth is tilted in a slight angle, so the distance from the same location to the sun changes over the year, determining a seasonal rhythm. Secondly, the earth turns around its own axis in 24 hours, creating a rhythm in day and night. It's day at the side oriented towards the sun. The sun shines above our heads during midday. In the morning however, the sun is positioned much lower. It casts long shadows and warms our faces from the East side. The evening light does the same, only from the West side. Reddish colours might appear because the light travels a longer distance. It is night at the side orientated away from the sun, the shadow side of the earth. The sun light is absent until the next day, except a bit of light reflected by the moon. These are physical facts we have gotten to know over time, through observations, recordings and measurements. They create an infinitude of subtle light conditions. A changing orientation from a source of light which has a constant direction therefore situates the light.

The light conditions are also dependent on how the light interacts with the material it travels through or towards. The architect Louis Kahn describes how material comes alive by the light:

"*I turn to light, the giver of all presences: by will; by law. You can say the light, the giver of all presences, is the maker of a material, and the material was made to cast a shadow, and the shadow belongs to the light*"[25]

Light affects material. However, material affects light too: it distorts light, it transmits light, it bounces light of, it resonates light, it reflects light, and so forth. For example, the light condition changes heavily depending on the condition of the sky, the medium through which light travels. No cloud provides sharp light. A thin cloud diffuses the light. A thick cloud blocks the light. The surrounding material situates the light.

Lastly the eye of the observer influences the perceived light. It's dependent on how we orientate ourselves to the source of light: our location, the time, and our looking direction. Additionally, it is dependent on our senses, through which we perceive. This is a subjective process. So because perception is dependent on our orientation and because perception is dependent on our senses, perception of light is situated in the eye of the observer.

The experiments situate light in a real world condition because they question and describe the perception of light in a specific moment. The executed experiments are the following, including date and place:

25 Louis Kahn, "Silence and Light," in *Louis I. Kahn - Silence and Light: The Lecture at ETH Zürich February 12, 1969,* ed. Allessandro Vassella (Zürich: Park Books, 2013), 26.

30.04.24 Meijendel 52°08’31.8”N 4°19’17.7”E

• *1. White fabric vertical element, filled with sand*

Experiment to see how light works as a material when falling on a linear object.

08.05.24 Meijendel 52°08’31.8”N 4°19’17.7”E

• *2. Sand pile and its contra shape, a hole*

Experiment to see how light works as a material when falling on a volume out of sand, and its contra volume.

10.05.24 Ouddorp 51°48’04.2”N 3°51’23.0”E

• *3. White fabric screen*

• *4. Moving of white fabric screen*

• *5. White fabric dancing in the air*

Experiment to see how light works as a material when falling on a white plane.

13.05.24 Meijendel 52°08’31.8”N 4°19’17.7”E

• *6. Glass stacking into vertical element, filled with air*

• *7. Glass stacking into screen, filled with air or water*

Experiment to see how light works as a material when falling on translucent material

01.06.24 Westenschouwen 51°40’12.5”N 3°42’10.9”E

• *8. White fabric screen in the night*

Experiment to see how light works as a material when falling on a white plane in a dark surrounding

02.06.24 Westenschouwen 51°40’12.5”N 3°42’10.9”E

• *9. Sand shower, the act of making*

•*10. Sand shower, close up*

Experiment to see how light works as a material when falling on a formless object

02.06.24 Westenschouwen 51°40’12.5”N 3°42’10.9”E

• *11. Black fabric screen*

• *12. Moving with black fabric screen*

• *13. Black fabric dancing in the air*

Experiment to see how light works as a material when falling on a black plane.

02.06.24 Westenschouwen 51°40’12.5”N 3°42’10.9”E

• *14. Seeing through bottom glass jar*

• *15. Seeing through edges of glass jar*

Experiment to see how light works as a material when seeing through a translucent material

In the attachment all results for the fifteen experiments are listed. The following pages expand on one or more photos of each experiment. They are categorized under the design approach they engendered, which is as follows:

a. Light gives orientation when falling on an object with form
Experiment 1
Emphasis: direction of the sun, movement of light and time, form, orientation

b. Light shows how repetition makes space
Emphasis: orientation

c. Light forms a shape and contra-shape in search for balance
Experiment 2
Emphasis: positioning towards the sun, material light travels through and towards, form, size, balance

d. Light disorientates when falling on a formless object
Experiment 9, 10
Emphasis: material light travels through and towards, dynamic shape, formlessness, disorientation

e. Black and white reflect light reversely, changing the experience space: the white object takes up space, the black object creates space as void
Experiment 3,4,5,8,11,12,13
Emphasis: presence or absence of source of light, material light travels towards

f. Light concentrates and radiates in layered transparent material
Experiment 6,7
Emphasis: transparency of material light travels through and towards

g. Light allows the observer to see, and thereby change focus point in space
Experiment 14,15
Emphasis: transparency of material light travels through and towards, looking experience of observer

Fig. 4. Linde Varossieau, *Series of white fabric vertical element, filled with sand; No. 1,2,3,4,5,6,8,9,10.*

Fig. 5. Linde Varossieau, *White fabric vertical element, filled with sand; No.4.*

Light gives orientation when falling on an object with form

Description experiment 1

Experiment 1: White fabric vertical element, filled with sand

To see how light works as a material when falling on a linear object I conducted experiment one. First I sew a socket of unbleached cotton. The length of the socket was 200 cm and the diameter was 17 cm. At the beach I filled it with sand while taking photos of the process. The socket was made of plain weave fabric. Therefore it's a strong, sturdy material which doesn't stretch. The fabric left no gaps through which the sand could escape. So the shape in which the fabric was sewn determined the shaping of the sand: the fabric didn't accommodate to the sand, the sand had to accommodate to the fabric. With every scoop of sand with which the socket was filled, the socket grew vertically in height. It could still stand on its own when it was 1.20 meter high. The object reached a limit equilibrium because when it grew higher it was not stable enough to stand on its own, when the diameter was larger it could have grown higher. It was too heavy for me to lift it up. So it fell down. Now the sand determined the shape of the fabric. It was still possible to form an arch with a height of 80 cm of it. Then I emptied the socket, and a soft, slubby piece of fabric was left.

Light on an object with form: a measuring tool to orientate in time

Every photo of the light on the beach is a depiction of a specific moment in time. This is well described by the work *Saddleback Mountain* (figure 6), which is about the perception of space and light. On every illustration made of her spatial work on light, she stamps 'fragment'.[26] The fragment is an interpretation by someone in a moment of time, and is therefore static. While the artwork itself exists much longer, and the light shows its dynamics in time and form.

Fig. 6. Maria Nordman, *Saddleback Mountain*

[26] Peter Plagens, "Maria Nordman," *Artforum*, February, 1974, 40.

Fig. 7. Claude Monet, *La Cathédrale de Rouen. Le Portail, soleil matinal.*

Fig.8. Claude Monet, *La Cathédrale de Rouen. Le Portail, temps gris.*

Fig.9. Claude Monet, *La Cathédrale de Rouen. Le Portail et la Tour Saint-Romain, effet du matin.*

Fig.10. Claude Monet, *La Cathédrale de Rouen. Le Portail et la Tour Saint-Romain, plein soleil.*

In figure 5, the light and the linear object work as a measuring tool for the specific moment in time. Not only the colour of the light gives a hint to the time, the shadow of the object does so too. The light travels through clear, cloudless, windless, calm air. Therefore the light isn't diffused by water particles in the air. It gives the light a clear direction which allows an object to cast a shadow. Additionally, the light felt on an object with a skin of light coloured fabric, on which a dark shadow is easily distinguishable. Therefore the shadow provides information on the time and orientation to the sun. The shadow on the right side of the object means that the sun is positioned on the left. The camera is looking in a North West direction so the sun is positioned South West. The shadow is not extremely short, which it would be at midday when the sun is at its highest position. The shadow is neither extremely long, which it would be in the evening. Therefore it must be in between midday and the evening. Precise knowledge about the length of the shadow could give precise knowledge about the time. Then the linear object functions as a sundial. Already the light on the object showing a sunny side and a shadow side, gives orientation in time: a moment in which we are thrown back into reality.

Light on an object with form in series: a measuring tool to orientate in passing of time

In a series of paintings, Claude Monet depicted the cathedral of Rouen in different moments of time (figure 7,8,9,10). As it is a series, it shows how light and atmosphere make the static architecture dynamic. At the same time, it makes the dynamic light static by capturing it in a moment of time. A 'fragment' stamp could have been added in every painting, as it is an interpretation by Monet using the method of painting. However, Monet still uses the object of the cathedral to visualise the light, whereas Nordman uses light as the object itself. Experiment one uses a linear object to show the light, which is similar to the approach of Monet. A series of multiple moments in light from experiment one as shown in figure 4, visualises the passing of time.

Light on an object with form: a measuring tool to orientate in space

Without the placement of the linear object, the beach is a space without end. The sand continues endlessly. Until the sand meets the water, where the water continues endlessly. Until the water meets the horizon, where the horizon continues in a sharp, straight line forever. Until the horizon meets the air, where the air continues forever.

With the placement of the linear object, the beach is a space with end. The space is easier to understand because our eyes have something to hold on to. They hold on to an object which breaks the wind, which breaks the dreaming, which breaks the light flowing in the air, which breaks the endless looking. An object to focus our sight on. The light makes the object visible, even accentuates the object with shadow, and therefore allows us to orientate in endless space.

It reminds of Bachelard's description of light emitting from a primitive hut. At the horizon of endless darkness, the light of the shelter gives orientation too, and awaits the observer to bring comfort, intimacy, and warmth.[27]

Role of me in the image: orientation, scale, and focus on the actions

I appear on the images too because I'm executing the experiment. I work as a scale model in the images, my figure gives a human scale to light. Additionally with me in the image, the actions I do become subject of the image. My movement becomes coagulated in a moment in time. The figure of me on the images reminds of the work *Self Portrait as a Fountain* by Bruce Nauman, in which he uses his own body to make sculpturality visible (figure 11).

Fig 11. Bruce Nauman, *Self Portrait as a Fountain.*

[27] Gaston Bachelard, *The Poetics of Space.* (Boston: Beacon Press, 1994), 37.

Fig. 12. Linde Varossieau, *Speculation on white fabric vertical element, filled with sand; No. 4.*

Fig. 13. Linde Varossieau, *Speculation on white fabric vertical element, filled with sand; No. 4.*

Light shows how repetition makes space

Speculations about repetition on the original image of figure 5 resulted in figures 12 and 13. Using photoshop, the fabric object, the figure of me, and the casted shadow were copied from the original image and pasted repeatedly, defining space on the beach.

In the original image of figure 5 the object in the center gives a focus point in endless space. The endless space continues to emit from the object in all directions.

In figure 12, repetition creates a vanishing straight line. The image reminds of the line of wooden pillars vanishing in the sea, often found at the Dutch coast. The human line separates the beach in two opposing spaces. The endless space doesn't spread in all direction anymore, it spreads to the left, and it spreads to the right. In figure 13, repetition creates a curve. It encloses a space, which doesn't spread endlessly anymore.

To read the spaces created by repetition, light is crucial. The lights cast a shadow of the object on the ground. So the objects are not flying in the air, but are situated on the same plane: the ground. This information and the reduction of size of the same object, gives an understanding of the objects distance to the horizon. Therefore light shows how repetition makes space.

Fig. 14. Linde Varossieau, *Sand pile and its contra shape, a hole; No. 1.*

Light forms a shape and contra-shape in search for balance

Description experiment two

Experiment 2 : Sand pile and its contra shape, a hole

To see how light works as a material when falling on a volume out of sand, and its contra volume, experiment two was conducted. Using a small shovel, I replaced sand. I created a hole and a pile of sand next to each other because I scooped the sand from the same place onto the same place next to it. Therefore the shape, the pile of sand, and its contra shape, a hole became apparent.

The camera was about 15 meters away to document the process. The camera was looking towards the North West, the sun's position was South West. At the start of the experiment, the location of the hole and the pile was about eight meters away from the sea shore. During the experiment, the tension rose about whether the rising water would fill up the sand hole and make the sand pile disappear. Eventually, this didn't happen because at the end of the experiment, two hours later, the water was still four meters behind. The hole of sand was about 40 cm deep and had a diameter of 100 cm. On the bottom of the hole a layer of water appeared from the ground. I could sit in the hole of the sand, then I had about the same height as the pile of sand, which became about 70 cm high and had a diameter of 120 cm on the bottom.

Balance in sand and light

Experiment two distinguishes from experiment one because the object consists of sand purely. Therefore experiment two puts more attention to the material sand. On the location of the beach, it's important to address the material sand because of its relation to light. Sand houses a static character in its ability to take shape. Its mass and heaviness address monumentality, which opposes the transient, light weighted, airy character of light. In the contrast, light becomes visible. However, sand houses a dynamic character too, in its ability to change shape. The light particles sand consists of, and sand's formlessness address transiency. Therefore sand behaves not only contradictory, but also similar to light.

In experiment two, no material was holding the sand when shaping it to an object. Therefore the shape the sand took on was determined by its own weight, the sand collected more on the bottom than on the top. It resulted in a cone shaped pile of sand, which addresses sand's static character opposing light's light character. The dynamic character of sand is clearly visible too because it replaces sand into a new shape. The moving of sand is a closed cycle: moving it to one place leaves a gap in the other place. The result is a positive volume and a negative volume: the pile of sand and its contra shape, the hole. Light is moving energy in a closed system too. It can heat up the material it falls upon,

Fig. 15. Linde Varossieau, *Speculation on sand pile and its contra shape, a hole; No. 1.*

while leaving cold traces where it doesn't reach. Light shapes temperature, and the changes of temperature is a balancing act. The comparison of light and sand in this experiment shows how light forms shape and contra-shape in terms of light, in search for balance.

Absence of light in figure 14

Figure 14 is about balance of sand's shape, from which we can draw conclusions on light. So the subject of the image is not light. This has a couple of reasons.

Firstly, the material through which the light travels is cloudy air. The clouds block light, so it's darker. Additionally the clouds diffuse the light. So the object of the sand pile is lighted from all directions. Therefore there is no differentiation between light and shadow visible on the object. No differentiation between light and shadow on the object could have been the result of the positioning of the eye of the towards the source of light too. When the camera would look towards the sun and the object is in the middle of the two, the eye of the observer looks towards the shadow side of the object. It flattens the image of the object because there is no differentiation between light and shadow. However, it can not be the reason in this image, because the camera is looking towards the North West, while the sun is positioned South West.

Secondly, the material of the object on which the light falls affects the awareness of light. The pile of sand is a continuation of the sand on the beach. The object doesn't treat the light differently than its surrounding, so light doesn't stand out by the object.

Thirdly, the interaction between light and the object is difficult to see because the pile of sand is small. This can be changed by placing the camera closer to the object, or by enlarging the pile of sand, as figure 15 speculates upon. Potentially, delicate differentiation between light and shadow appear when changing the size, influencing the awareness of light.

Light disorientates when falling on a formless object

Radiating light moves in formlessness

The previous experiments use an object with form to address light. However, the object is not a requirement to be able to address light. Light is able to radiate too when it moves in formlessness, as *Untitled #5* by Agnes Martin shows (figure 16). Unlike the series of paintings on the cathedral of Rouen by Monet, who needs the object of the cathedral to make the light visible, this works doesn't need an object to make the light omnipresent. She describes herself how light, time and formlessness are important concepts to her work, "*My paintings have neither objects nor space nor time nor anything – no forms. They are light, lightness, about merging, about formlessness, breaking down form.*".[28]

Translating it to space, leads to the work *Green Yellow and Pink* by Ann Veronica Janssens (figure 17). It's a pure experience of light, therefore it's dynamic. Visitors enter a space filled with light and colourful mist. The formless small particles of dust and water in the air scatter the light around. Whereas Nordman still needed the space as a form for the light to be visible, Janssens works with formlessness. Visitors experience lack of orientation. Depth becomes hard to estimate because no form casts a shadow, space is endless, there is no form to hold on to. You wander in space, float in the air: formlessness disorientates.

To see how light works as a material when falling

Fig. 17. Ann Veronica Janssens, *Green, Yellow and Pink.*

[28]Wilson, Ann. "Linear Webs," *Art and Artists,* October, 1966, 49.

Fig. 18. Linde Varossieau, *Sand shower, the act of making; No. 5.*

Fig. 19. Linde Varossieau, *Sand shower, the act of making; No. 7.*

Fig. 20. Linde Varossieau, *Sand shower, the act of making; No. 9.*

Fig. 21. Linde Varossieau, *Sand shower, close up; No. 4.*

Fig. 22. Linde Varossieau, *Sand shower, close up; No. 3.*

Fig. 23. Linde Varossieau, *Sand shower, close up; No. 6.*

on a formless object, the next experiment was to make a sand shower as shown in the sketch of figure 24. The small particles which scatter light is sand dust. The sand has the potential to disorientate the viewer.

Description experiment 9 and experiment 10
Experiment 9: Sand shower, the act of making
Experiment 10: Sand shower, close up

The making of a sand shower was more challenging than the sketch supposes. A square multiplex plate of 1 m by 1 m was painted white. The plate was perforated. The round openings had a diameter of 4mm and were randomly distributed with a distance between each other of approximately 4 cm. The size of the openings was determined by the smallest opening possible through which sand could fall through fluently.

With tape a metal stick was connected to the middle of the plate, enabling to lift the plate high above the head. Five litres of dry sand was added on top of the plate, the sand wouldn't fall through the openings immediately. Lifting the heavy sand from the ground above my head was a balancing act as shown in figure 18. When shaking the plate, the sand would fall through the openings. Therefore I removed the metal stick so I could hold the plate directly to have more control over shaking the plate.

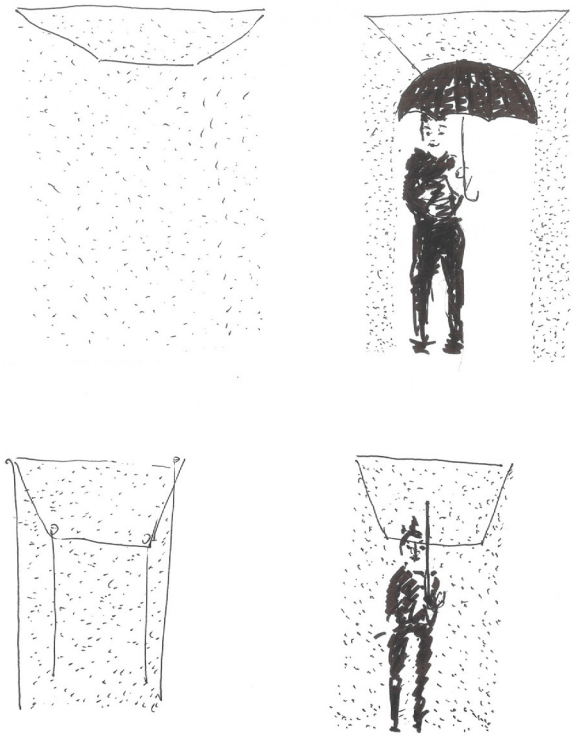

Fig. 24. Linde Varossieau, *Speculation on making a sand shower.*

Fig. 25. Linde Varossieau, *Sand shower, close up; No. 1.*

Still, the sand falling through the holes did not affect the attention to light, because the camera was too far away to capture the little amount of sand well, as figure 19 shows. When a larger amount of sand felt from the side of the plate it did provide attention to light, as figure 20 shows. Against the black background of my clothing, the sand shapes into a changing, formless object onto which the light falls. It captures a moment of haziness and vagueness, disorientation by sand and light in a small part of the image.

To enlarge this moment, the camera was put much closer to the shaking plate in experiment ten. Two people were shaking the plate from left to right, each one standing on one side of the plate.

Controlling clustering of sand for disorientation

The images from experiment 10 show sand falling apart in the air (figures 21,22,23,25). The sand either collides and clusters into an object with form, or the sand diffuses into a formless object. The movement of the sand is influenced by the shaking movement of the plate, the wind, and gravity pulling the sand down.

The openings shape the sand in a linear pattern. While falling down the sand loses this shape. When the openings are closer to each other, the stripes of sand coming out of the plate would be more difficult to differentiate from each other.

The movement of the wooden plate, making small fast movement from left to right, distributes the sand more evenly. A larger movement clusters the sand into a form.

A neutral background, such as the sky or the black clothes, gives more attention to the sand. The background still gives orientation in those photos. However, the formless sand in combination with light, have the potential to reach disorientation. Scaling the experiment up, could lead to an architectural experience in which light disorientates by falling on a formless object.

Fig. 26. Linde Varossieau, *Moving with black fabric screen; No. 6.*

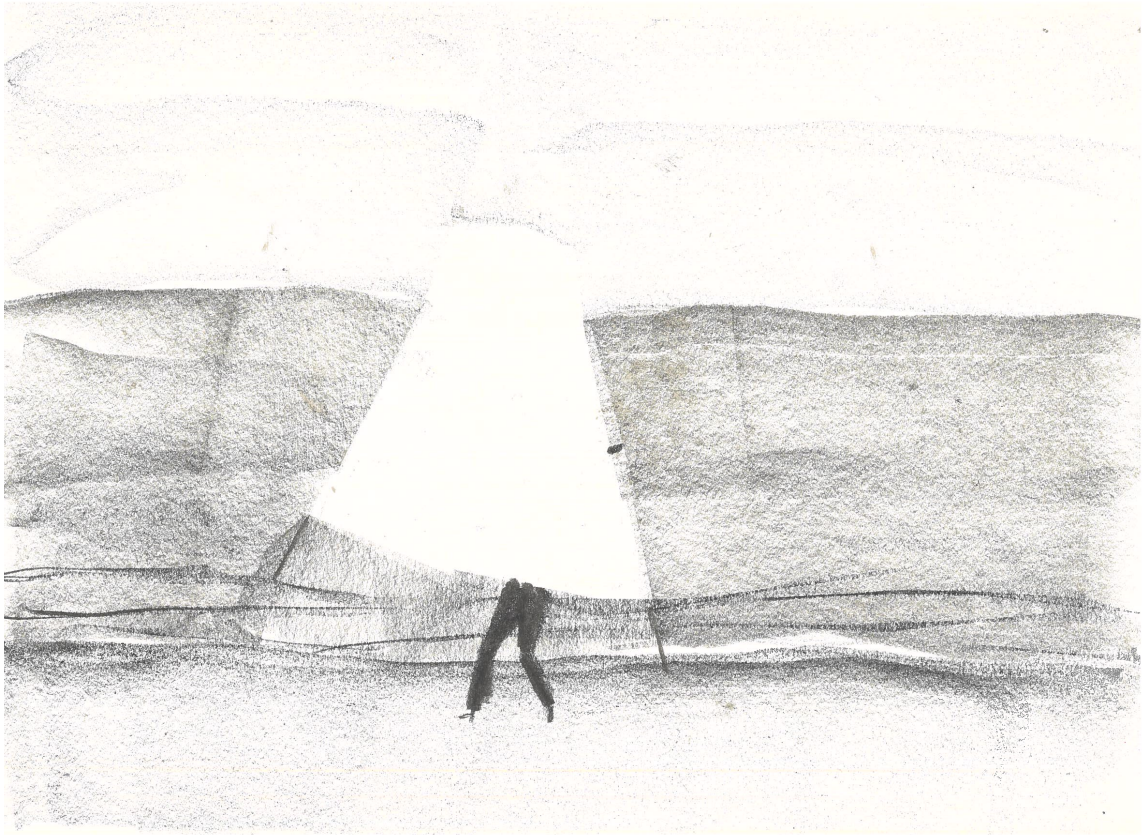

Fig. 27. Linde Varossieau, *Speculation on moving of white fabric screen; No. 3.*

Fig. 28. Linde Varossieau, *Moving of white fabric screen; No. 3*.

Black and white reflect light reversely, changing the experience space: the white object takes up space, the black object creates space as void

Description experiment 3, 4, and 5
Experiment 3: White fabric screen
Experiment 4: Moving of white fabric screen
Experiment 5: White fabric dancing in the air

To see how light works as a material when falling on a white planar object, experiment three was conducted. A plain, white, fabric was cut in a rectangular shape of 2.5m by 1.5m. It was a thick plain weave fabric so the fabric was strong, sturdy, didn't stretch and had a smooth surface. On both sides of the fabric a hem was sewn, such that two metal pillars of 2.2 m could hold the fabric. The screen of fabric was placed on the beach using guy lines. When the screen was placed parallel to the horizon it had to stand the wind blowing into it (figure 31). The screen was standing more stable when it was placed in the same direction as the wind, in an angle towards the horizon (figure 32).

In experiment four, I lifted the screen by holding the metal pillars (figures 28, 29). My movement on the beach was guided by the fabric catching the wind. It reminded of *Das Triadische Ballet* by Oskar Schlemmer in 1922 (figure 30), in which the shape of the costumes determined the movement of the dancers.

In experiment 5, I was holding the textile socket from experiment 1 in the wind. It was not heavy so it was dancing in the air (figure 38).

Fig. 29. Linde Varossieau, *Moving of white fabric screen; No. 2.*

Fig. 30. Oskar Schlemmer, *Das Triadische Ballett, reconstruction by Gerhard Bohner.*

Fig. 31. Linde Varossieau, *White fabric screen; No. 5.*

Shadow shapes the white object, by showing depth

Light shapes the wind in figures 27 and 28. The light had a direction because the sky was clear and the weather was bright. Therefore the light casts a shadow on the textile shaped by the wind. The shadow shows depth so it makes the shape visible. The image catches the light because the white colour of the fabric reflects the light. Additionally, the dark shadows stand out against the white colour, so we perceive shape. The white fabric becomes a three dimensional object which takes in space on the beach.

The orientation of the fabric to the sun, and the smooth surface of the textile from figure 31, results in the appearance of a gradient from light to dark. The shadows have a grey tone. In figure 32, the shadows on the textile have a blue tone, because the wind orients the white fabric such that it partially reflects the blue colour of the sky.

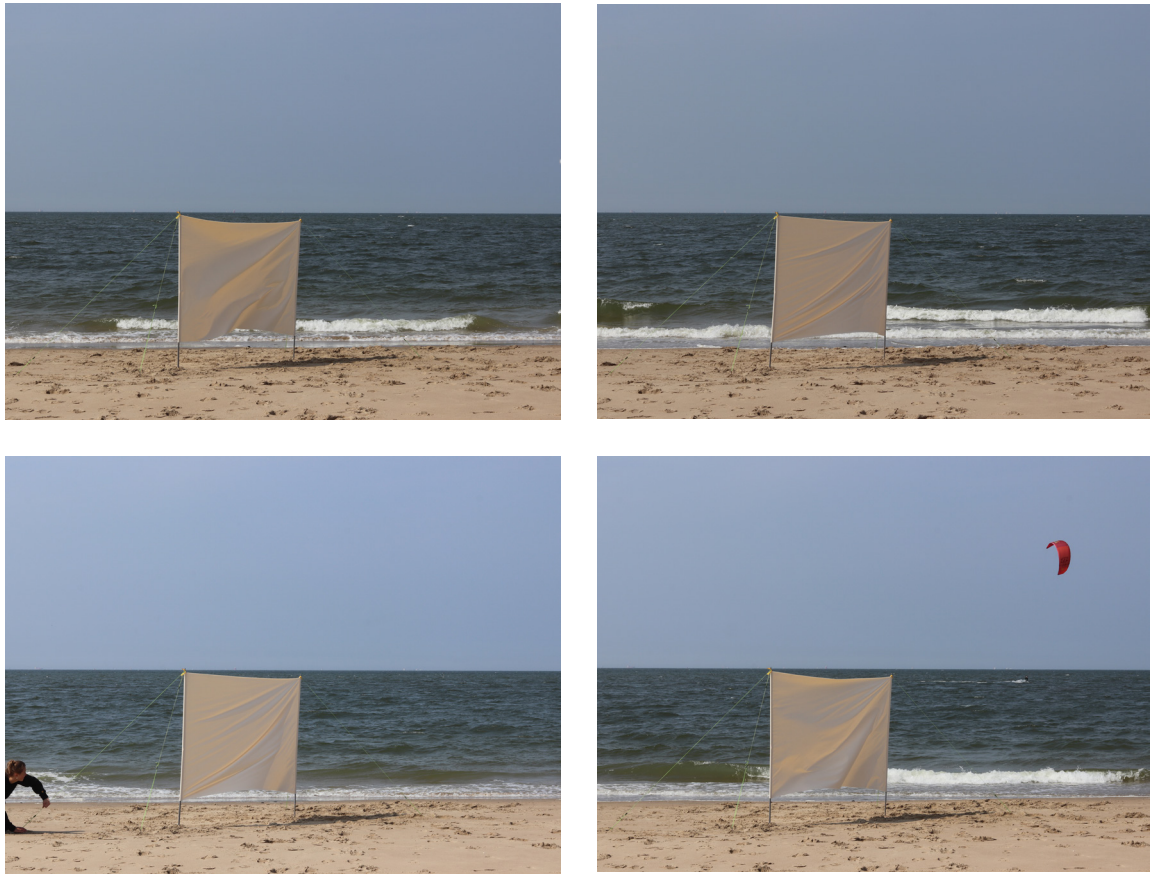

Fig. 32. Linde Varossieau, *White fabric screen; No. 8, 9, 10, 11.*

Fig. 33. Linde Varossieau, *White fabric screen in the night; No. 8.*

Description experiment 8; no light source, no vision

Experiment 8: White fabric screen in the night

To see how light works as a material when falling on a white plane in a dark surrounding, experiment eight was conducted in the late evening. It was a copy of experiment three except for the execution time. The sun was already down, so there was no light source. The limited light in the surrounding was coming from reflecting sunlight of the moon, and artificial light from among others the light-house. Almost no light source resulted in little visi-on: the fabric in figures 33 and 34 is barely visible.

Fig. 34. Linde Varossieau, *White fabric screen in the night; No. 9.*

Fig. 35. Linde Varossieau, *Black fabric screen; No. 4.*

Description experiment 11, 12, and 13
Experiment 11: Black fabric screen
Experiment 12: Moving with black fabric screen
Experiment 13: Black fabric dancing in the air

To see how light works as a material when falling on a contrasting material, a black fabric, experiments eleven, twelve and thirteen were conducted. The previously described experiments with the white fabric were repeated, only the white fabric was replaced by a black, satin fabric. This glossy fabric was less heavy, thick and sturdy. It was chosen because it had an intense black colour. In experiment eleven, the black planar fabric was placed parallel to the horizon, using guy lines to keep it standing (figure 35). In experiment twelve, I was holding the metal pillars instead of the guy lines (figure 26). In experiment thirteen, the metal pillars were removed and I was holding the fabric itself, which was light enough to dance in the air (figure 37).

Absorption of light by dark object results in void, by showing no depth
In figure 35, the light is present in its complete absence. The black fabric absorbs all light. No shadow is visible anymore, and therefore depth neither. The black creates a void without spatial definition, allowing to imagine a continuation of endless space within the textile. Complete absence of light on a black object with form gives a similar experience as what happens when light falls on a formless object, namely: disorientation in space, nothing to hold on to.

Figure 35 reminds of the work *Descent into Limbo* by Anish Kapoor (figure 36). Kapoor's work seems to be a flat dot on the ground, but in reality it's a black pigmented globular hole in the ground. Here the looking experience is dynamic. In the beginning you are looking at a formless void. With time, your eyes get used to the light and the void unravels its shape. It shows how time is necessary to become sensitive to light and perceive space: the circular plane becomes a volume. In figure 35, light is absorbed in a rectangular plane instead of a circular one. A volume might unravel after taking time to see.

Fig. 36. Anish Kapoor, *Descent into Limbo.*

Fig. 37. Linde Varossieau, *Black fabric dancing in the air; No. 4.*

Light shapes the reflecting dark object, by showing depth

In figure 37, the dark fabric reflects the light. The fabric's positioning to the sun and its glossiness make reflection possible. It's a reverse process to the experiments with the white fabric, but it has the same outcome. We perceive the fabric object as a form because the white light provides depth to the dark object, instead of the dark shadow providing depth to the white object.

Fig. 38. Linde Varossieau, *White fabric dancing in the air; No. 2.*

Fig. 39. Linde Varossieau, *Glass stacking into vertical element; No. 2.*

Light concentrates and radiates in layered transparent material

Description experiments 6, 7

Experiment 6: Glass stacking into vertical element, filled with air

Experiment 7: Glass stacking into screen, filled with air or water

To see how light works as a material when falling on a transparent material, experiments six and seven were conducted. Under a cloudy sky, round glass jars of varying sizes were stacked on top of each other (figure 39). In experiment six they formed a vertical object of 1.30 m. For stability, glass jars with a larger diameter were placed on the bottom. The glass jars were connected with metal tape. The higher the vertical object grew, the more fragile it became. The potential breaking of the glass when the vertical object would lose its balance, created tension.

In experiment seven, the glass jars were stacked in multiple vertical objects next to each other. Three columns next to each other formed a screen. The object didn't grow as high as experiment six, so it was more stable. The glass jars were filled with water because the chance of falling was lower (figure 42). The glass jars filled with water break the light differently than the glass jars filled with air.

Fig. 40. Romee van Oers, *Stapelingen*

Light radiates in transparent material

In figure 41, the light is treated in different manners by both the glass jars and the surrounding water.

Fig. 41. Linde Varossieau, *Glass stacking into vertical element; No. 3.*

They reflect the light; the glass mirrors its surrounding and the water reflects the sky. They transmit the light; we can see behind the glass and through a sheer layer of water. They absorb the light; the more volume they have the darker it becomes. Therefore, despite the grey weather, figure 41 radiates light. The vertical glass object connects the sand, with the water, with the sky.

Layering of glass attracts light and emits light consciousness.

The thickness of glass varies when the glass jars are stacked. The glass is thicker when the top of the lower glass jar overlaps with the bottom of the higher glass jar. Less light passes through so it's darker than when the glass jars don't overlap. So the layers of glass, layer the light. The transparent character of glass makes the layering visible. An opaque material doesn't let light through to be able to see how the layer behind treats light. The variety of dark and light moments in the glass due to layering of glass, shatters light.

It reminds of the work *Stapelingen* by Romee van Oers (figure 40). It suggests vertical stacking of transparent cylindrical objects too. Overlaying of paint creates moments of thick darkness and moments of light transparency. The layering of the transparent material addresses light.

Fig. 42. Linde Varossieau, *Glass stacking into screen, filled with air or water; No. 3.*

Fig. 43. Linde Varossieau, *Seeing through edges of glass jar; No. 5*.

Light allows the observer to see, and thereby change focus point in space

Description experiments 14, 15
Experiment 14: Seeing through bottom glass jar
Experiment 15: Seeing through edges of glass jar

A transparent material allows to look through it. To see how light works as a material when seeing through a transparent material, experiment fourteen and fifteen were conducted. In experiment fourteen, a glass jar was hold in front of the camera, with the opening towards the camera. Therefore the camera looked to the surrounding through the round bottom of a glass jar.

In experiment fifteen, the jar was hold in a way such that the camera looked through the top part of the jar only. It is the part of the glass onto which the lit is normally screwed. The thickening of glass created dark patterns in the sky, a play of light. The glass becomes the sky.

Transparent layer affects sight of space
In figure 44, the bottom of the glass influences the viewer's perspective of the surrounding because it is a transparent layer in between the observer and the surrounding. The way the round glass breaks the light beams determines vision of the space it is surrounded by. The same happens in figure 43, where the edges of the glass determine the observer's vision of the sky. The shaping of the glass influences the observer's vision of the space.

Changing focus point to look
In both figure 43 and figure 44, the glass is not sharp while the surrounding is. The observer chose to focus on the background instead of the foreground. When both would be sharp, the observer has to process too much information. Changing between focus point in space stresses the act of looking, which is a choice in light beams entering the eyes.

Fig. 44. Linde Varossieau, *Seeing through bottom glass jar; No. 1.*

Conclusion

I started this research from a curiosity into the dual qualities in light - it's ability to touch us without being touchable. However architecture loses the moment when light touches us, when light is merely approached in terms of contrast. This project problematized the relative absence of complex thinking when it comes to light, and the absence of approaches to address this problem. An access to the in-between of light was by asking the question: how is light a material? As a method I used artistic practices to address light in a non-dual manner. What I found is that light materializes on a fine balancing point between making light explicit and leaving light implicit, which artistic research enables.

Making light explicit

When light is made explicit, awareness of its presence is heightened by which it materializes. This is firstly done in the way we communicate about it. Light becomes a material when we give it a body by describing it with verbs, when we give light material characteristics such as light or dark, when we make light tangible by catching it. We materialize light by giving light explicit material characteristics.

The experiments materialized light and showed that light becomes a material in fleeting form. Light breathes, glows, resonates, travels, and moves. The material form of light is fragile, airy, and vulnerable. Light is a volatile material.

Catching a volatile material asks for delicacy by understanding the many factors light affects and is affected by. The act of experiencing light to make the experiments allowed to enclose myself with light's context. The results of the experiments show how light is situated. Firstly because the source of light has a direction, our orientation towards it depends on time and location. Secondly because the light affects or is affected by the material it travels through or towards. For example, the form(lessness) of the material influences light's behaviour. Thirdly because perception of light is influenced by the orientation and the senses of the eye of the observer. Materializing light requires sensitivity to light's context, by making its many variables explicit.

Leaving light implicit

However, just as a volatile material presupposes, the moment you catch it, it is gone. Overly describing how light is situated, kills light's vibrancy. Therefore processes of making light explicit alone will not be enough to materialize light. Instead, it should be balanced with processes of leaving light implicit to create space for light to move. It is within the associative, the intuitive, and the imaginative where light is allowed to do so. In the experiments, the act of experiencing light fulfills this role. Additionally, the photos themselves fulfil this role: some of which radiate light. Here awareness of light is created without having to anchor light. The method

of artistic research, including the act of experiencing light, gave space to both processes to be able to materialize light: making light explicit and leaving light implicit.

Volatile light to turn inwards and outwards

As a volatile material, the experiments showed that light is both able to orient and disorient. Light orientates because light is situated. Therefore, light gives awareness of a moment in time. For example, when the light reflects on the white cloth or when the glass radiates light, the light gives solitude to its continuous movement. Additionally, light orientates in space, as the vertical element on the beach showed, in which light provides vision and depth. Lastly, light orientates an object by giving it shape with shadow. The orientating light gives trust because the observer knows where he or she is. And light's continuity extends into more trust: the sun rises up tomorrow morning again. So the outward stimulus of light gives safety by which it clears the path for the observer to turn inwards, towards the observer's own thoughts and feelings. Bathing in the surrounding, flooding light: away from reality, towards imagination.

Light disorientates too by which it makes the observer turn outwards from within. This happens when it falls on a formless object, or in its absence of a black void. The disorientating feeling in which you have nothing to hold on to is similar to the inward open, natural flow of thoughts and feelings. The wish for safe orientation sharpens the senses and turns the observer outwards, towards the external world. Disorientation leads to more awareness of the surrounding.

The changing between turning inward and outward by processes of orientation and disorientation is admirable. It creates a sensitivity for what is outside, while at the same time it addresses imagination for potential change of reality. This is what seeing is about: a process of orientation and disorientation, of focusing and not focusing, of centralizing and decentralizing, of sharpness and vagueness, of depth and void, of form and formlessness, of attention to a static moment in time and letting time move. Light makes you see. Therefore the role of the architect is to use light to make experiences of introversion and extraversion. For this, the architect requires both sensitivity to light's context, and acceptance that light never fully crystalizes. Therefore, the architect is helped with artistic practices and the act of experiencing light: here light becomes a volatile material.

Discussion

Time, form(lessness), static, dynamic

The results are in line with the hypothesis. Firstly, the parameters of time, form(lessness), static and dynamic turned out to be important parameters of light's tangibility. The experiments situated light by making the context of light explicit. Hereby they gave attention to a moment in time, and showed how the light was shaped by the material it travelled through or felt upon. A series of photos of light showed the dynamic character of light, and the passing of time. A single photo depicts a moment in time, making light static. As light is situated, every moment in time gives a different light condition, which is most clearly visualised in the difference between a white cloth during the day and during the night. The shape and material of the object light felt upon determined whether light created void or depth with shadow. An object with form contributed to orientation, an object with formlessness contributed to disorientation.

Empirical character

Secondly, the empirical character of the method, artistic research, approached the in-between of light. Light is situated so experiencing light and its context gave insight into light's complexity. The experiments contextualised the light by collecting data and writing about the effects of the time and location of the source of light, the material light travelled through or towards, and the eye of the observer. However, the results are also limited to the context of the experiments. For example, a different location could bring different findings. Additionally, the description of the images probably overlook some factors which situate light. To find out what those factors are, more experiments could be conducted. Describing those with even more precision leads to a deeper layer of understanding light's complexity. However, by definition a full description of lights' situatedness is out of reach. Light is a volatile material, so catching its full context would kill its vibrant character.

Unpredictability

Lastly, the described unpredictability of artistic research turned out to be valuable. The flow of thinking in associations gave rise to new experiments. Additionally, the making of those experiments, housed information which wasn't foreseen. For example, speculation on figure 28 of experiment four, by replacing the white of the fabric to black, didn't give the same intensity of colour when making it in reality. The black fabric of experiment eleven was even more black than expected, such that it created a void (figure 26). It was neither expected that the black reflects the light in white (figure 37). Therefore, acceptance of unpredictability in findings by working with the intuitive, brought new knowledge. Reflection on the experiments and visual associations in descriptions with words, was

important to judge relevancy of the finding.

Act of experience illustrates continuous character of artistic research

Within this artistic research, the act of experiencing is overarching. Experiencing light as a research method contributed to conclusions which stimulate further experience of light, producing a continuous loop. Firstly, experiencing light contributed to make explicit the variables which situate light. As the design approached suggest, the architect can twist those variables to direct the light, evoking an experience of light. Secondly, experiencing light contributed to the conclusion that light shouldn't always be crystalized but can be left implicit too. Thereby it pleas for continuation of its own method, or another method which leaves space for association, intuition and imagination, in order to keep experience of light vibrant. Thirdly, experiencing light contributed to the conclusion that light can make people turn inward and turn outwards. Therefore it proofs its own importance, experiencing light makes people see. The act of experiencing as both a research method and as a result which implies continuity of use, illustrates the character of artistic research well. The different processes within artistic research were juxtaposed: experiencing light, making visual material, documentation, association, thinking, intuition, interpretation. They work next to each other, continue through each other and grow over each other, with no beginning and end.

Further research

Not surprisingly, associations continue endlessly into ideas for new experiments. Future research would document the eye of the observer better. The context is described more precisely when it includes information on the height of the camera, and the distance to the object. Additionally, the photos would be taken with same focal length and exposure settings, for better comparison between the images. Numerous new experiments could be conducted. Firstly, an experiment could be conducted in a different moment in time. Especially the moment when the sun comes up, or when the sun sets in the sea. It creates specific, time related light which is valuable to research. Secondly, to be able to experience disorientating light better, further research envisions to scale up experiments nine and ten, into a larger sand shower. Thirdly, another experiment could replace the sand by light, to make a light shower. It questions what other material has to be added to be able to experience disorientating light: possibly pure light? Or water? Or is sand the best option after all? Fourthly, to see how light affects and is affected by a broader range of materials, further research envisions to broaden the materiality of the objects light falls upon. For example, testing light's reaction on colour change of a translucent material, as has been tested with black and white fabric. In order to do so, experiment seven could be repeated, only now the jars are filled with black and white coloured water. More research on the topic of light as a material unravels the complexity of light even further, serving the architect to work with light more sensitively to reach architectonic qualities in which light touches us.

Bibliography

Bachelard, Gaston. *The Poetics of Space.* Boston: Beacon Press, 1994.

Berressem, Hanjo. *Gilles Deleuze's Lumionous Philosophy.* Edinburgh: Edinburgh Univeristy Press, 2020.

Borgdorff, Henk. "The Production of Knowledge in Artistic Research." In *The Routledge Companion to Research in the Art*s, edited by Michael Biggs and Henrik Karlsson, 44-63. London: Imprint, 2010.

Heynen, Hilde, André Loeckx, Lieven de Cauter, and Karina van Herck. *'Dat Is Architectuur': Sleutelteksten Uit de Twintigste Eeuw*. Rotterdam: Uitgeverij 010, 2001.

Kahn, Louis. "Silence and Light." In *Louis I. Kahn - Silence and Light: The Lecture at ETH Zürich February 12, 1969,* edited by Allessandro Vassella, 25-56. Zürich: Park Books, 2013.

Pallasmaa, Juhani. *The Thinking Hand: Existential and Embodied Wisdom in Architecture.* Chichester: Wiley, 2010.

Plagens, Peter. "Maria Nordman." *Artforum*, February, 1974.

Rea, Mark S. *Lighting Handbook: Reference and Application.* 8th ed. New York: IESNA, 1995.

Stoppani, Teresa. "Dust revolutions. Dust, informe, architecture (notes for a reading of Dust in Bataille)." *The Journal of Architecture* 12, no. 4 (2007): 437–447. https://doi-org.tudelft.idm.oclc.org/10.1080/13602360701614714.

Savransky, Martin. "Problems All the Way Down." *Theory, Culture & Society* 0, no. 0 (2020): 1-21. 10.1177/0263276420966389.

Troiani, Igea, and Suzanne Ewing. *Visual Research Methods.* Bristol: Intellect, 2019.

Wilson, Ann. "Linear Webs." *Art and Artists,* October, 1966.

Figures