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CITY NIGHTSCAPES

HOW ARTIFICIAL LIGHT CHANGES OUR PERCEPTION OF SPACE

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Resumo

Minha tese explora a relação entre luz, espaço e percepção visual. Relaciona-se com a minha experiência de viver no estrangeiro numa cidade completamente diferente da que vivi na minha terra natal, a Lituânia, com uma grande herança histórica, arquitetura não utilizada e abandonada, avaliações e é muito mais iluminada à noite.

A luz continua sendo um componente principal da experiência humana; muda como vemos e o que vemos. Como o dia oferece uma variedade de diferentes imagens e sensações de lugares, usei ferramentas leves para alterar a experiência visual à noite. A noite é definitivamente o momento mais íntimo e auto-expressivo. Portanto, usando luz e conhecimento do processo de percepção estudado, geramos as novas sensações do espaço.

A luz é um fenômeno que possibilita nossa experiência de espaço e esse processo está constantemente conectado à consciência. Embora cientificamente possamos compreender como o olho humano lê e registra a luz e os objetos no ambiente através de cones, uma análise empírica do feedback não leva em conta nossa experiência.

Portanto, os filósofos usam a arte para investigar melhor nossa experiência, pois ela é única para cada indivíduo. A luz permite expor qualidades autênticas de lugar e honrar a relação dos habitantes locais com o espaço público. Isso nos leva a mergulhar no ambiente, a entender suas dimensões e propósitos físicos.

Esta tese propõe uma exploração de lugares autênticos e comercialmente desinteressantes na cidade do Porto, observando e manipulando posteriormente as suas imagens de forma artística. Procura distinguir propriedades tradicionais de design de iluminação que vão além do científico e funcional para o foco principal da nossa percepção.

Para atingir esses objetivos, as teses apresentam possibilidades artísticas de engajar o espaço público noturno e deslocar sua percepção.

Palavras-chave: luz, espaço, percepção.

Resume

My thesis explores the relation between light, space and visual perception. It relates to my experience of living abroad in a city that is completely different from what I experienced in my homeland Lithuania, having a great deal of historical heritage, unused and abandoned architecture, evaluations and is much more illuminated at night.

Light remains a principle component of human experience; it changes how we see and what we see. Since the daytime provides variety of different imageries and sensations of places, I used light tools to alter visual experience at night. Night is definitely the more intimate and self-expressive time. Therefore, using light and knowledge of studied process of perception, I generated the new sensations of the space.

Light is a phenomenon that makes our experience of space possible and this process is constantly connected with consciousness. Though scientifically we can comprehend how the human eye reads and registers light and objects in the environment through cones, an empirical analysis of feedback does not account for our experience.

Therefore, philosophers use art for further investigation of our experience, as it comes to be unique for each individual. Light enables to expose authentic qualities of place and honour the locals' relation with the public space. It leads to immerse ourselves in the environment, to understand its physical dimensions and purposes.

This thesis proposes an exploration of authentic, commercially uninteresting places in the city of Porto by observing and later manipulating its imagery in artistic way. It seeks to distinguish traditional lighting design properties that go beyond scientific and functional to main focus of our perception.

In order to accomplish these goals, thesis present artistic possibilities of engaging the night public space and shift its perception.

Keywords: light, space, perception.

1. Introduction

The intent is the search for the alternative ways to design the areas that are open to the public, using the pre-existing specific features in the surrounding environment. This thesis consists in the exploration and attempts to create a connection between light and visual perception of the public space at night utilizing a phenomenological approach, based on the lived experience. At night new orders of connection to these sites assert themselves and sensorium is transformed. We become more aware of the landscape, memory and movement. My aim is by implementing these powerful connections to express the temporality of places, create new identities and alter the receiver´s perception to interpret new ways of seeing these spaces.

My interest to this topic arose from the experience of living abroad in the city like Porto which landscape is completely different from my homeland. Consisting of deep valleys flanked by steep escarpments with abundant hills providing panoramic city views, which at night becomes exposed by illumination of the streets. Subjectively observed beauty of the city inspired me to start registering it with a camera. While concentrated on separating my works from a prevalent landscape pictures, I urged that my art would be distinguished. Therefore, I insisted to understand how the light changes the individual perception of the surrounding environment. The hunt of the hidden features that made the places attractive motivated the search for solitude and concentration at the night-time.

This investigation departed from continuous observation of the city and setting up the artistic objectives - using light as a medium to produce new perceptions. Two paths begun to evolve. Philosophical study of perception and examination of other artists´ works, and the other part based on my own experimentations in a public space.

First part represented, was constantly changing throughout the different influences found in literature. Varying perspectives were pushing to start my own experimentations. Seeking to connect perception and light it became clear that learnt perceptions do not depend merely on vision but also depend on the mind, which in turn led to investigation of invisible art forms. Soon after, the realization that the light painting is a technique that could be implemented to attain what until then was only present in my imagination. Furthermore, making possible to execute a projection of the mental perception of the light.

Having it in mind, in the following part, the careful planning before going outdoors to execute the light painting images begun. There was always a level of adaptation that would take into

consideration the pros and cons of past images, contributing to an overall improvement in the performance, clarity of the process and transcribing to the real world my perception of the sites used. After mastering the technique, produced projects were analysed and represented as a proper form to achieve the main aim of the research – using light create the new perceptions of the surroundings.

2. Research question

Based on the observation of the night time public space, this thesis proposes to answer the question of how light shapes the perception of these sites. Answering this question, the research is divided into three parts:

1. Describing the visual perception through philosophy and understanding how light affects perception
2. Observing the public space at night, searching for advantages of low light condition sites
3. Studying the artist works, working with the materials of artificial light in the sites

3. Methodology

A literature review includes the definition of visual perception through philosophical perspective of Maurice Merleau-Ponty “Phenomenology of perception”, comparing it with other theoreticians. Later the study of perception is related to the main subject – light and how its qualities shape it.

As the main goal is to create the authentic experience using light in public space, the areas of implementation are studied.

All those methodological steps will be summarised and adapted to create an artwork that can communicate effectively to the audience and create authentic imagery and experience of the public space.

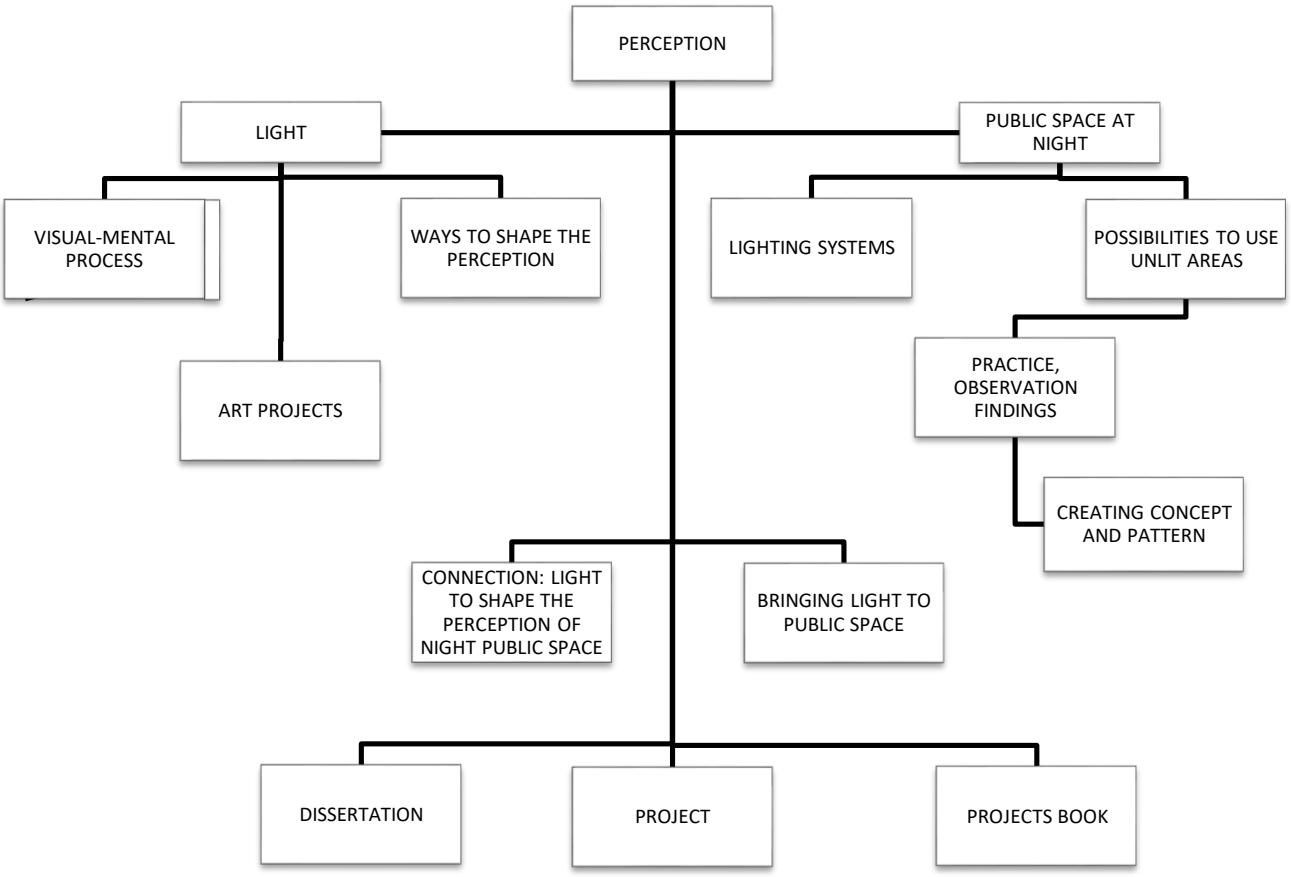


Figure 1 Methodological diagram

4. Perception, Light, Public Space

I. Perception

The process of perception in this thesis is represented through several perspectives has been discussed for a long time in philosophy. The intention of this research is to return the critical thinking about our surroundings and later apply this knowledge for developing the artwork.

This part is represented through two recurring issues in philosophy: one is the investigation of the objects of perception - whether they are ordinary objects or sense data. The other is the investigation of what the subject needs to do in order to perceive.

It is commonly recognised that Maurice Merleau-Ponty's Phenomenology of Perception is the main source for studying this subject. His work is strongly linked to Husserl's whose background upholds

Michael Madary's ideas, laws of perception in Gestalt theory and its purpose in evolutionary psychology.

Michael Madary asserted that "perception is an ongoing process of anticipation and fulfilment." (Madary, 2016) Anticipations represent half of the experience structure, "anticipations of how factual properties (of things you're currently seeing) will appear in the immediate future". Factual properties defined as "properties of external things that can in principle be perceived from many perspectives". Such as volumetric properties, for example, being spherical is a factual property. Fulfilments are the other half of experiences that match what was visually anticipated at an earlier moment. "If you anticipate that there's a drawing on the backside of the vase you are now seeing, then your anticipation is fulfilled if you have a subsequent experience as of the back of the vase with that drawing attached to it - even if that experience is an illusion or hallucination." (Madary, 2016)

If you anticipate that the colour and texture of the back of the object is continuous with its front then your anticipations are fulfilled if you go on to have experiences with the anticipated contents.

Madary believes that external world exists independently of the mind. We perceive the external world indirectly, via senses; therefore, the immediate object of perception is sense data.

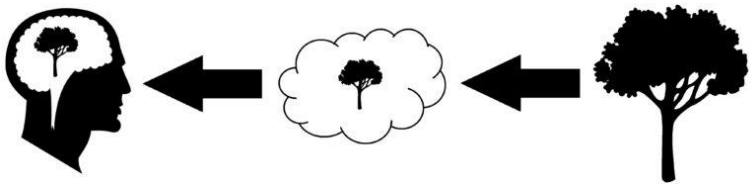


Figure 2 Image illustrating the perception process. Sense data is not a physical thing, it exists in the mind. However, sense data is said to be caused by mind-independent physical objects, free internet source

Continuing within Husserl's framework, the way we see reality is in terms of what he calls the natural attitude where we proceed through our lives with the common natural belief that the reality we inhabit is fundamentally separable from our subjective experience of it. Subject perceives and is conscious of the fact that he perceives an object but without understanding its meaning and essence.

In addition, he distinguishes perception and intuition[1]. In his view, perceptual contents are also fulfilment conditions. Whether an experience fulfils anticipations relies on how its contents have been projected in anticipation, not on how things are in the world outside the experience. When a

[1] Intuition - is the insight into the nature and meaning of object through the experience of it.

thing appears to us, it is precisely that thing, rather than its appearance that we perceive. Giving an example, when we see a tree, we do not simply recognize a collection of sense data that shares external features with previously seen trees; we intuit an essence "tree" that cannot be understood in terms of the features of particular trees.

The object of perception in Husserl's thinking is an actual object, not as a sense data. However, process of perception is not actual fulfilment by experiencing object. Consciousness perceives the act of perception, but the essence of an object is intuited.

During the sequence of moments in which I have an object, for example, a cup in view, I see it as the same object, even though I am looking at it from a series of positions. Not only that, but at each moment I have an expectation about the immediate future: that the cup will reveal its different sides as I move relative to it. Each phenomenal object has what Husserl calls a horizon. It is known to me only in part, but I hold the expectation of a future in which the object is extended in various ways.

Following the idea of horizon and revealing the object's appearance while experiencing it, Gestalt Theory aimed to investigate the processes involved in perceiving this structure (Sternberg, 1996). More specifically, they tried to explain how we perceive parts of objects and form whole on the basis of these. They presented laws of visual perception:

- Foreground and background: The figure-ground principle states that we instinctively perceive objects as either being in the foreground or the background.



Figure 3 ***Foreground-background*****, free internet source**

- Continuation: We follow lines. Elements that are arranged on a line or curve are perceived to be more related than elements not on the line or curve.

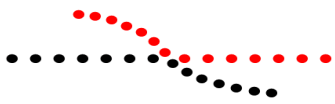


Figure 4 ***Continuation*****, free internet source**

- Closure: We fill in the gaps. This principle states that when we look at a complex arrangement of visual elements, we tend to look for a single, recognizable pattern.



Figure 5 *Closure*, free internet source

- Proximity: Association of near things. Things that are close together appear to be more related than things that are spaced farther apart.



Figure 6 *Proximity*, free internet source

- Similarity: Linking of similar things. When things appear to be similar to each other, we group them together. And we also tend to think they have the same function.

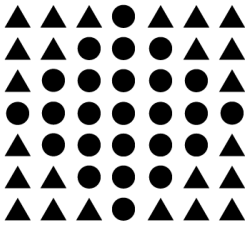


Figure 7 *Similarity*, free internet source

- Symmetry and order: recognition and balance. This principle says that a composition should not provide a sense of disorder or imbalance. Symmetry is a form of order, which helps to make us feel good at discovering regular patterns. This boosts our sense of control, as finding patterns often means being able to predict how things are.



Figure 8 *Symmetry*, free internet source

- Pragnanz: Simple and clear. We tend to prefer and recognize things which are simple and clear. Simple and familiar shapes will be seen first. Primary shapes such as triangles, circles, squares will stand out, even if they overlap. We see the shapes rather than a bunch of lines.

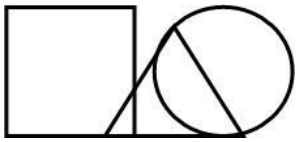


Figure 9 *Pragnanz*[2], free internet source

Nevertheless these separated properties of perception "The whole is other than the sum of the parts." — Kurt Koffka. When we see a group of objects, we perceive their entirety before seeing the individual objects. We see the whole as more than the sum of the parts, and even when the parts are entirely separate entities, we'll look to group them as some whole.

Gestalt theory plays a crucial role in the thoughts of Merleau-Ponty, who introduced the body itself as the locus of the "upsurge the world".

"Our own body is in the world as the heart is in the organism: it keeps the visible spectacle constantly alive, it breathes life into it and sustains it inwardly, and with it forms a system…The thing, and the world, are given to me along with the parts of my body, not by any 'natural geometry,' but in a living connection comparable, or rather identical, with that existing between the parts of my body itself." (Merleau-Ponty, 1962)

Here Merleau-Ponty describes poetically what could easily be the constant interplay between the eye and the world perceived. He describes perception as the background of experience which guides every conscious action. The world is a field for perception and human consciousness assigns meaning to the world.

Through all those theories we notice duality between what the object is and the perception of it. The ordinary object in a world is a raw data that our brain reinterprets and perceives through the living experience of it. Be it a process of anticipation and fulfilment (Michael Madary), intuition and separated identity that we cannot perceive (Husserl) or the laws of perception that contain separated qualities and grouping of those, when we are making sense of the world there is a distinction between what it is and how we perceive it.

Physical characteristics influence how we perceive and respond to information. Our perceptual set involves our attitudes, beliefs, and values about the world. We experience the world through mediated images and mass communication. We choose to select different aspects of a message to focus our attention based on what interests us, what is familiar to us or what we consider important.

[2] Free translation: German word for 'pithiness', which means 'concise and meaningful'.

All these experiences help form our mental expectations of what is happening and what will happen.

Following this part, thesis proposes to examine how we can change our learnt perception by constructing new appearances of the same perceptual spaces using light as a material.

II. Light and perception

To approach the concept of light as the main medium for this work, first an overview of seeing is necessary. The human eye is a receiver of visible light, the narrow band of light that we're able to detect in the electromagnetic spectrum. The lens at the front of eye serves to focus incoming rays of light toward the millions of specialized cells at the back of the eye, which are responsible for collecting and transmitting information back and forth between the visual cortex and other higher-level parts of the brain, including those involved in attention, memory, experience, and biases. The brain's job is to integrate sensory information from the eyes into pieces - lines, shapes, and depth - and construct them into objects and scenes. (Page, 2001)

However, light cannot be seen, it can only be known. When human sees the light they believe that they actually seeing light when the nerves of his/her eyes are but "feeling" the intense, rapid, short-wave vibrations of the kind of wave motion which he senses as incandescence. We, likewise, cannot see darkness. The nerves of eyes which sense notion slow down to the rate of vibration that we can no longer "feel". But we are so accustomed to the idea that we actually see light in various intensities, illuminating various substances to greater or lesser degree that it is difficult for us to realize that our own senses are acting as mirrors to reflect various intensities of wave motion. (Russell, 1994)

The image of the luminous sparks is captured in our brain for just a fraction of a second, and is immediately supplemented by a new image as we move the sparkler. Together the images seem to form a trail of light which is how the fleeting drawing is created, even though it's not actually there; it's a unique after image.
This special phenomenon takes centre stage in the installation 'Aftereal' by Japanese artist Yasuhiro Chida. 'Aftereal' consists of hundreds of elastic wires that move up and down with the help of small motors and light up in the dark with UV lights. The image of the wave-like movements made by the wires lingers in our brain – just like the light drawing created by the sparkler – and it appears as though we are looking at a large landscape of line drawings.



Img 1 Installation *Aftereal* by Yasuhiro Chida installation, Amsterdam Light Festival 2018 - Copyright Janus van den Eijnden (18)-HEADERS2017.jpg

Chida shows us how reality as we experience it is an illusion that we create with our own eyes and brain. This work by producing it, shows that the light has to reflect to maintain the visibility at least from a very thin wire. Without using this technique, the drawing of light can only be seen as an afterimage in our brain or it can be created using camera with a long exposure. Therefore, what remains in an afterimage, it is line and colour.

One of the pioneers to explore the technique of light painting was American visual artist Man Ray. He shaped his elusive identity in the many self-portraits he made. Ray once described himself as an artist who "so deforms the subject as almost to hide the identity of the original, and creates a new form." (Foresta, 2016)

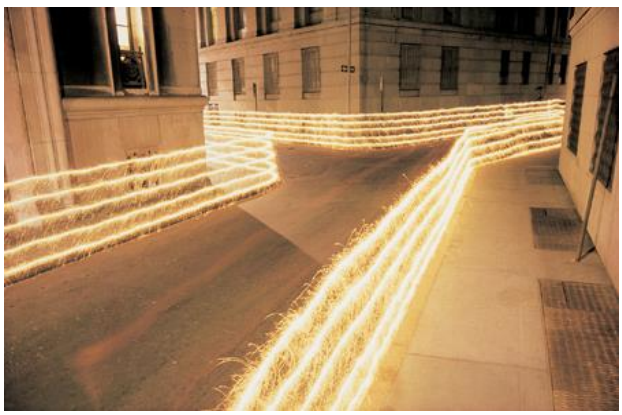
Man Ray's contribution to light painting photography came in his series "Space Writing". In 1935 Man Ray set up a camera to produce a self-portrait. He opened the shutter of his camera and used a small penlight to create a series of swirls and lines in the air. Seemingly random light drawing, as later discovered, was actually Man Ray's signature.



Img 2 Light Painting photography *Space Writing* by Man Ray, 1935

Artist employed light painting technique to change the perception of a self-portrait by drawing his signature in space in front of the camera.

Later from 1976 to 1980 Eric Staller roamed the dark streets of New York City creating light painting photographs. His “Light Drawings” series were one of the very first Light Art Performance Photographs ever created. For one of his works “Ribbon on Hannover Street” he mounted five sparklers on a broomstick and held it vertically, at the length of arm for the 5minute exposure.



Img 3 Light Painting photography *Ribbon on Hannover Street*, Eric Staller 1976

The execution of this work changed the way light manipulated the photograph and at the same time created a new perception of place where his act was taken. The new unseen light structure outlined empty street and the presence of a performer was invisible.

"The city at night was an enchanting place for me. The plazas, bridges, parks and monuments, empty and eerily quiet at night, were dramatic stage sets waiting to be transformed." Eric Staller (Interview lightpaintingphotography.com)

Canadian photographer Christopher Martin often takes pictures of busy cities and experiments with a range of photography techniques. He looks for special moments to photograph allowing him to play with reality by manipulating it with motion blurs and long exposure.

'When you're outside, you can have a truly gigantic studio' Christopher Martin



Img 4 Light Painting photography experimenting with sparklers *Dark Light* by Christopher Martin, 2012

While producing this image he was using steel wool and seeing how it works in practice. With his colleague they took turns being the subject (and consequently light-wielder). While trying to spin a symmetrical circle, his movements created interesting imagery – totally transformed the site - here he stood in a light circle surrounded by sparkles.

Going through these works vision remains the link that mediates our perception of the places we see. Light tools are employed to create the 'afterimages' - the new imaginary and with naked eye unseen designs of the places.

Our brain has built in mechanism that allows visual inputs to be recorded and processed, outputting information almost simultaneously that we then act upon. However, eye cannot read the light painting at the time it is performed, the artist only knows how his drawing would appear and after the viewer would interpret it. The intangible and unseen, light enables the artists to create the new imageries of the places and objects in our environment. Afterwards, our prior experiences, expectations that are not necessarily related to perception actually affect how we perceive these structures.

III. City at Night

Architecture and urban design, since their early manifestations, have been deeply related to technological developments. Before the invention of electricity in the late 19th century and early 20th, buildings, urban spaces and landscapes had a singular reading, that of surfaces, volumes and spaces under natural light.

At night, the only source of illumination available before electricity, were portable oil lamps and candles carried by pedestrians as they travelled. As Robert Louis Stevenson writes in A Plea for Gas Lamps (1881), a traveller had to carry his "own sun"…"day and night swung to and fro and up and down about his footsteps".

The introduction of oil lamps late in the 17th century and gas lamps at the end of the 18th brought light to streets and intersections. This fully transformed the appearance of the urban world and created new spaces and times of socialization.

The technological revolution that gave birth to electricity totally transformed socioeconomic and cultural conditions by extending the hours of work, shopping and entertainment. In architecture specifically, it engendered a whole new reading of the territory and its buildings, that which takes place only at night. This new reading made possible the association of landscapes with new meanings and possibilities.

World fairs, expos, amusement parks and commercial districts, most of them programs associated with leisure served as spaces for experimentation of numerous technologies of illumination and simultaneously of materials for transparent/translucent materials. These spectacular effects and technologies were soon incorporated into the daily life of cities.

From one perspective, lighting increased urban safety through visual control. McLane (1992) explains that at night "the feeling of insecurity in a public space is relative to people's ability to visually dominate the space around them… the better a person's ability to see their environment, the more secure they will feel". For that reason, the illumination of streets and buildings opened up public spaces to new uses and new publics.

Light increased visual value of the city. It is used to highlight key structures and buildings and to facilitate a greater understanding of the broad range of historic buildings and past uses. The night-time environment is painted by layers of light that emphasise the city's history, purposely reducing illumination in less relevant surrounding areas and allowing them to function as a backdrop.

However, from a more critical perspective, lighting the urban environment also served to purposefully erase specific zones of the city at night. Commercial districts became visual poles at the expense of creating abrupt contrasts that erased others, in specific poor or derelict areas which disappeared from public perception after dark.

These areas usually are unused urban space, as forgotten wasteland or gaps between buildings and other constructions. It will always exist as a city is ever evolving and never ceases to develop. Social and technological change will provide further modification, and historical or even modern buildings will lose the original purpose of their use. These spaces have a high potential for reconstruction and repurposing by integrating them into the community, and for creating stunning spaces by distinguishing their specific character. (Graner, 2017) Moreover, it increasingly becoming a solution for problem faced by youth and independent artists alike: the difficulty to find spaces to express their views and showcase their talents.

IV. Night Photography

Throughout history, the night has been, in the words of geographer Tim Edensor, time for "transgression, fantasy and experimentation". Human sensory orders are recalibrated when faced with the reduced illumination levels of the night; it is harder to judge depth and distance, details are obscured, colours muted, and one is obliged to compensate for this loss of visual acuity by drawing on the other senses. Darkness also forces one to question how his/her body is in relation to that which surrounds, challenging one's human sense of bodily presence and boundary.

Night art serves to advance geographical understandings of cities' representation, yet common to that is an almost explicit focus on visual imagery producing a tangible art 'products'(e.g. paintings, photographs, film). Furthermore, there is a tendency to present environment as pre-structured and paradoxically 'retaining subjects with the ability to flexibly inhabit and interpret these landscapes'. (Morris, 2011)

The form chosen to produce this work is long-exposure night photography. It enables slow the art process down, and makes it more laborious and conscious. During daytime the city centres are crowded with people, the numbers thins out at night. It is also a way of de-familiarising the subject matter, and getting around certain clichés about the way city is usually represented in photographs.

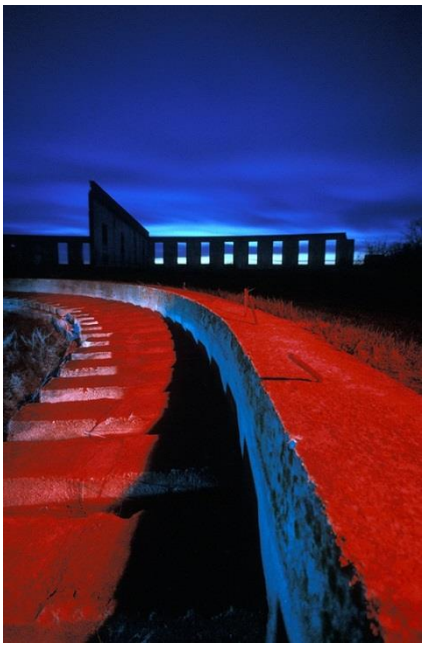
Troy Paiva has been photographing the abandoned night places of the American West since 1989. He considers himself an "Urban Explorer" and his light painting photography is an expression of his passion for investigating the ruins of "Lost America".



Img 5 Lightpainting *Dunmovin* by Troy Paiva California 2007

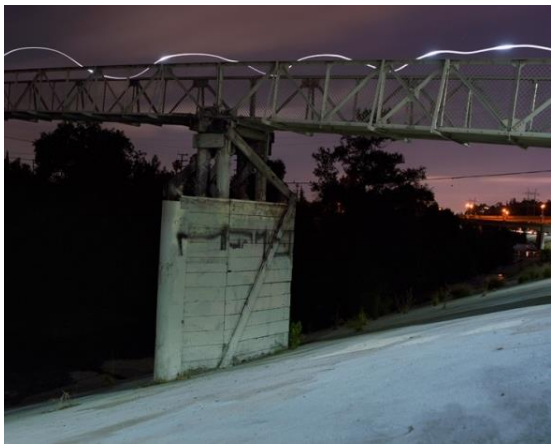
Troy spends much of his time alone, in the middle of nowhere, photographing abandon building and places that America has lost to time. The sense of isolation and loneliness draws Troy to these locations, as he says, “I love the surreal feeling of wandering through an abandoned subdivision, alone, in the middle of nowhere, in the middle of the night. Your senses become heightened and you feel the weight of time.”

Larrie Thomson is a Canadian night photographer and for him night gives the ultimate ability to control light. He believes in working the shadows and understanding where and what the light will do for an image. Shooting by moonlight allows him to be creative and by adding additional light, he can create mood and atmosphere, hide and reveal aspects of his composition.



Img 6 Light Painting photography *Big Valley Roundhouse #1* by Larrie Thomson

The length of a night exposure also causes the lights on moving objects to streak across the image. The series of “Dark Skate” by photographer Lia Halloran are produced in various cities at night. Each work is a self-portrait of the artist who attaches a light to her body and skateboards in the dark and through the long duration of exposure time the line of movement is recorded and the resulting images are the trajectory of the artist's movements over time.





Img 7 *La River Footbridge* by Lia Halloran, 2015 **Img 8 *Lia Halloran Sepulveda Dam* by Lia Halloran, 2014**

Night is the best time to experience those empty, abandoned places. From the works the artists produce and the process - it is all about stillness, and taking time to listen, to feel, and to fully experience the locations they produce their art. Over the years the experience of photographing at night has gone from being an uneasy, adrenaline charged exercise, to one where they feel a strong connection to the places. Working alone, silently, they observe the places without distraction. By waiting for a moment and setting up the gear they become accustomed to the night. And actually see more. “I blend in and become as much a part of the nocturnal environment as the haunting calls of owls and coyotes in the distance, the pigeons nesting in the rafters, and the skunks and rodents that scurry about underfoot.” (Larrie Thomson)

In this part, I focused on how artists working with light are bringing attention to the hidden capacities of the urban places and shape our apprehension of the surroundings. Their works raise awareness when we confront an unusual form or quality of light in an unfamiliar darkness. The artists I discuss here bring to consciousness a wider grasp of the very particular human ways in which the visual system operates in making sense of the world; their work is integrally concerned

with exploring the different ways in which we sense space at various scales, from the body to the landscape.

Where light paintings challenge one to think differently about long-exposure photography. Rather than 'representing texture, space, light and so on, it presents these elements directly for us to experience'. These artworks are often described as 'theatrical', 'immersive', or 'experiential'.

V. Connecting Perception, Light and Public Space

The contemporary city has experienced transformations that have conditioned ways of thinking and perceiving public spaces at night. This perception is between human and urban and in this connection, artistic practice in public space plays a role to examine our sensorial experience.

Among the definitions the understanding of space is: "a continuous area or expanse which is free, available, or unoccupied," or "the dimensions of height, depth, and width within which all things exist and move." Space is specific to different cultures and closely related to the habitat of its members. Empty space in the dark is a wide canvas for possibilities that we do not usually think about, mainly because it is not tangible. Both invisible - space and light - are only known through the language or artistic usage to expose it. Public urban space is accessible and open to everyone and as the night time comes it becomes area for imagination and expression.

Besides seen only as abandon, unused and poorly lit these chosen sites are full of possibilities for artistic experience. And this experience can be registered and produced on a two-dimensional canvas to viewer reimagine it. Our learnt perception of space can be manipulated through different conditions and usage of light. But how we perceive the three-dimensional forms on a two-dimensional canvas?

One of the ways to exploit this perception is using long-exposure photography and paint with light a three-dimensional scene on a two-dimensional execute in image. The process is similar to what the eyes and brain do, Tadin, Professor in Department of Brain and Cognitive Sciences says: our eyes are curved, but essentially a three-dimensional world gets projected - upside down - to a flat retina. The brain has to connect the dots, turn the image right side up, and extract this missing third dimension. Light-painting "tricks" a viewer's brain by representing elements of light, shadow, and contrast to paint the "illusion" of three-dimensional forms. (Tadin, 2018)

"You may know it's an illusion but your brain automatically groups things and lets you know that it is a three-dimensional scene," Tadin says.

We can depict the background environment which appears darker as a two-dimensional canvas and group the lines of light that give the depth to these new constructions. The brain's grouping function as in Gestalt Theory allows us to see lines and intended forms. The image is two-dimensional and comparing it with a traditional painting on canvas – the artistic performance remains three-dimensional. Using light tool to paint in three-dimensional space, even if it is familiar the perceiver is challenged to figure out what is it that he/she sees and register the new memory shaped by it.

All experiences in life, especially in three-dimensional space, are dependent on the unique form of the ever-present body. Built architecture is measured and constructed depending on our bodies. In light painting we actually use our body to construct these imaginary forms. So the body becomes also a tool to express the possibilities of other's body in space.

5. Artistic Approach

The intent of this part is to pursue the development of my artistic practice and to examine the ideas and histories that inform my work. It is based on the lived experience - referring to a representation of the personal experiences and choices, and the knowledge gained from these experiences and choices.

In line with my master program the field of observation is an outdoor public space. Getting to know the city where I am staying during two academic years it evolved from observations and continuous work.

"Don't think about making art, just get it done. Let everyone else decide if it's good or bad, whether they love it or hate it. While they are deciding, make even more art." – Andy Warhol

Observations were registered using a camera, and along my research of artificial light qualities within the city, it was obvious a wide variety of properties within the light.

"Photography is an art of observation. It has little to do with the things you see and everything to do with the way you see them." ― Elliott Erwitt

Further considerations of night time public space conjoined to how usage of light can shape its perception. In my practice exploring how the light materials that are brought to chosen sites help to construct the images that would shift the perceptions. It incorporates analyses and embodiment of the artist's mind, repeating and mastering techniques and patterns, examination of different light materials, physical light properties, and observation of the city, planning and constructing desired

imageries. Nevertheless, the amount of elements used, the imagery does not include the performer, rising the idea between visible and invisible.

a. Observation

Pursuing the investigation of artificial light in public space, the artistic process started by capturing the city at night. Noticing how the light interact with the surfaces, where the minor changes impact the perception of the places and how the time and weather conditions impact it. While walking at night the feeling of solitude provides an increase of awareness, all the senses get sharper even allowing the imagination to flow while experiencing the surrounding architecture.

The limitation of the seen horizon creates a deeper connection to the city, unveiling all the augmented contrasts presented during night time. Curiosity fuels the continuously rush to the next corner, expecting to be surprised of the ever growing architecture, willing to discover the secret energy of the city and urging to find the best angle where the reality meets the expectation dwelling in the imagination.

In the early days of my artistic journey, frustration rode alongside my works. The inability to share my view of the nightscapes that were being captured left me restless, wasn't long after, the realization that Light not only gives the opportunity to see reality it can also corrupt our perception of it, although not fully understanding at the time, this gave the opportunity to create powerful images.

After accidently capturing the light trails of a common city Bus excitement took over. At last the missing link finally presented itself allowing to share truthfully what was until then only in my imagination, implementing this technique in the following captures proved to leave a bittersweet feeling as the lack of experience often made the captures not meeting the expectations.



Img 9 Bus light trail and reflection of the decorated church façade on it, Long exposure photograph *LE01023* Porto, 2017

Soon realized, after several accidentally produced images, the ones with longer exposure would accurately draw my perception of the world, something until then only present in my imagination. The light trails left by the passing by vehicles revealed themselves what until then was the unseen flow of the city.

I started to think of the city as a self-light painter. Registering the evidence of the invisible movement that inhabits the city and takes its action at the very moment the image is being produced. Creating a perception of the city, almost alive, exposing the possibilities of movement, constructions of the unseen.

Sometimes I would walk to bus stop and wait with late passengers, not for a ride, but a bigger ´painting brush´.

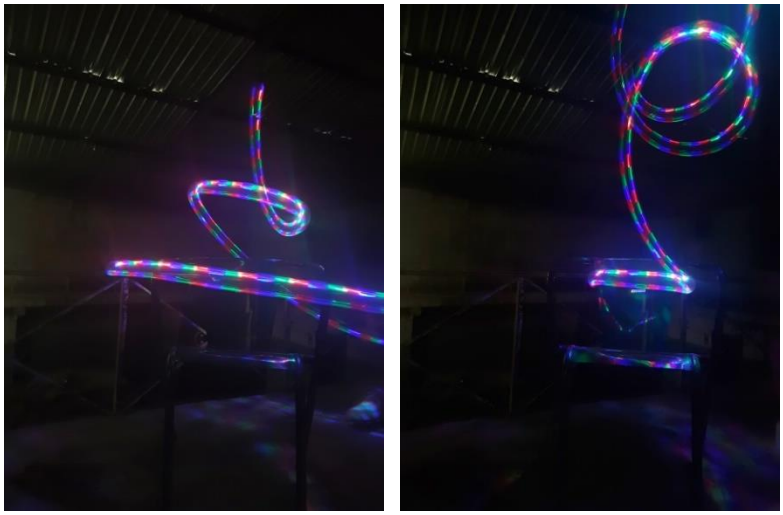
b. Light-painting

Inspired by this finding and how it fulfils my imagery I started creating new scenarios of light painting; therefore, the development of my own light painting tools began.

The first painting inside a pitch dark environment was made inside an artist's work place, using my first tool, a RGB light torch. It allowed to create light trails by myself instead of being dependant of accidental appearance of light.

Using the light torch and moving it in a swirl movement the first capture almost looked like a mystical creature, inspiring to create new imaginary scenarios and improving technique.

From that moment on, the camera was no longer a device of observation, it became a tool to produce artwork.

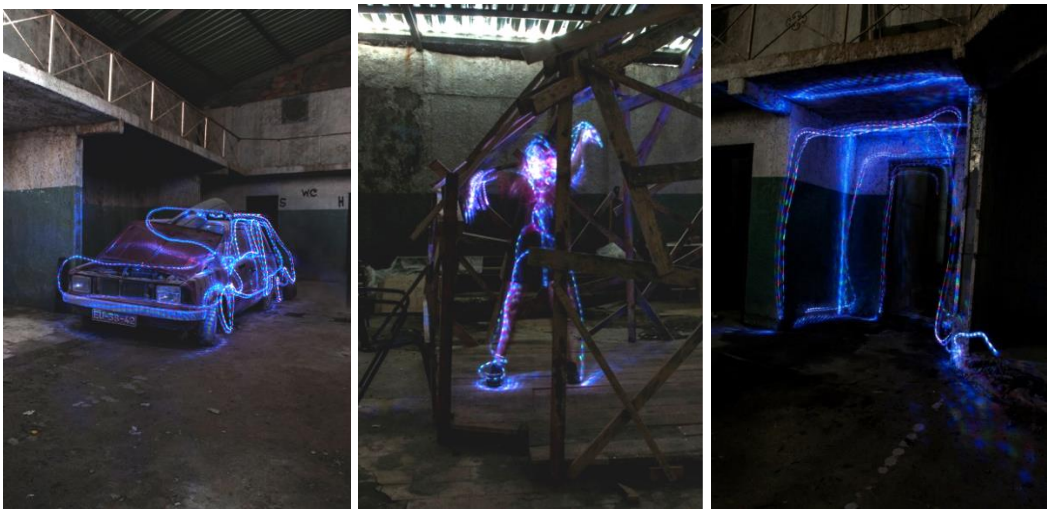


Img 1, 11 Light Painting Photography *L00, L02* Digital photographs Porto, 2017

Inspired of a mystical appearance of light and opportunity this process gave to construct the image, the next day I came back to the same place and used my camera (Nikon D5000) to explore this technique further.

After setting up the shutter speed, running around and outlining the surroundings, the understanding of the three-dimensional drawing had begun.

With this newly discovered technique chosen qualities of the space could be highlighted, the area transformed, giving it a new life.

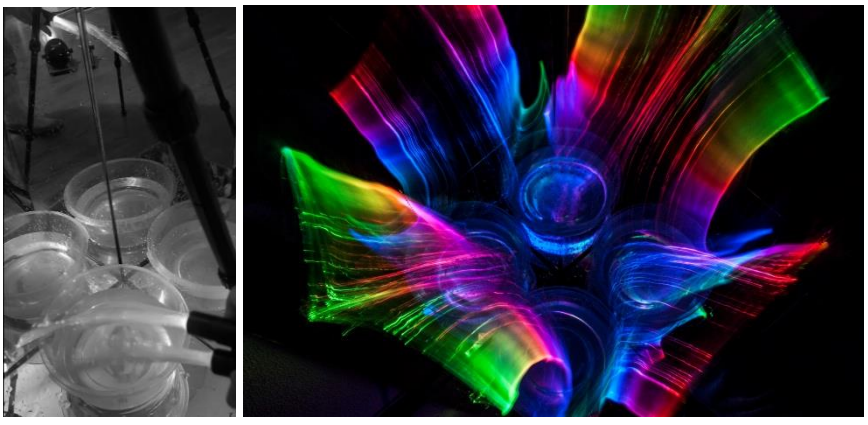


Img 122, 13, 14 Light Painting Photography *LP0004, LP0011, LP0025* Digital photography Porto, 2017

Different ways of expression were found using light to create these images: by outlining existing objects and people in the environment or creating entire forms from scratch. Moreover, the light tool could be used to paint the surrounding surfaces.

This art became a way to express and explore the space by creating unseen structures. The art of light painting started to seem as a form which has depth and meaning beyond what we can easily comprehend. When at the same time started studying visible light and its perception, I discovered a subtle language that goes beyond the intellect or any logic.

Subsequently, trying to figure out other ways to visually freeze light´s interaction with reflecting, refracting materials (glass, water, mirrors), study of physics of light was implemented in the process. For this I set up a home studio and started examining these properties while painting in the dark. The intention to make the abstract and/or invisible apparent to the viewer.



Img 15 (Left) Home studio: bowl with water, mirrors, fibre optic plastic light Porto, 2018

Img 16 (Right) Light Painting Photography *LE0402* Porto, 2018

The images above illustrate the set up (Img 22) used to create the light painting (Img 23). By placing a bowl filled with water near two mirrors on a vertical 90 degrees angle and moving a fiber optic plastic light torch I created abstract paintings.

Even though this technique was not used outdoors, the effect noticed was guidance for choosing the locations for future creations. As for example (Img 27) planning the images next to water.

The phenomenon that inspired to do one of the first paintings outside was the rainbow produced by pointing the flashlight to the glass prism, refracting the light. Relative to the daytime occurrence of the rainbow, bringing it to paint on the walls of the street Calçada da Póvoa.



Img 17 (Left) Glass prism painting process Porto, 2018

Img 18, 19 Light Painting Photography *LP0201, LP0203* Porto, 2018

Using this technique, I projected the light on two-dimensional surfaces, using it as a medium to achieve a temporary rainbow during night time leaving the first temporary light graffiti on the walls and a permanent one in my art journey.

Upon gaining experience and feeling more comfortable with the technique and improved camera settings to produce desired imageries, I used light painting to trace the trajectories of my movements throughout spaces from dusk to dawn. Resembling the light trails left by cars passing by and exposing not only a part of the environment or object, but the whole street with the possible directions that people walk through. The setting up process included scouting the surrounding environment, checking for visibility, light contrast and overall landscape properties. During the painting the constant awareness of the surroundings proved to be the most challenging part, the only way to overcome this difficulty was by repetition and adaptation to the space. By moving through these already learnt paths, I was close to become a habitant of this environment, carrying, lifting

and/or rotating the 1,4 meter LED RBG strip assembled on a DIY rod I was inhabiting my design in this space.



Img 3, 21 Light Painting Photography *LP0401, LP0362,* LED RGB portable light, Porto, 2018

During time, this process got almost to a performance for the late night pedestrians, garbage men, who sometimes got involved into the painting.



Img 4, 23 Light Painting Photography *LP0331, LP0332,* LED RGB portable light, Porto, 2018

Local people were surprised by the final images after seeing me running around with the light rod. They got to see a different perspective of the area which would be impossible without my capture.

c. Mastering technique

In light painting the final composition is not visible until after the shot has been recorded by the camera. Gestures, motion, and movements are involved in the process and are rhetorical composing choices depended on the performer and each composition is unique. Therefore, the composition and patterns of light movement must be pre-planned before activating the shutter. There is always a degree of trial and exploration to see how different illumination tools affect the shot, but even then,

explicit choices must be taken about what materials to use and how to explore the unfamiliar environment.

These choices are made by mentally imagining what the final product would contain and/or how the movement of the light will be exposed in the final image. Unlike drafting with text in a word-based document, it is not possible to revise or edit that particular composition once it has been captured by the camera. However, the learning experiences and composing processes from each image can be built upon to create new light paintings and refine compositions.

Therefore, opposite to majority thoughts, light painting images are barely digitally manipulated. Mostly, tones or contrast are modified during RAW conversion, but the images produced are straight out of camera. With the instant results of digital photography conferring the benefits of being able to apply a fast recursive process of reviewing, amending and repeating until the desired effect is achieved. Often, this process informs the final form, as it allows incorporation of unexpected elements into the piece being created.

Exploration of light painting techniques led to several returns to one of the streets (Calçada da Póvoa, located in the North-East of Porto city). By being poorly lit, it was convenient space for practice. Quiet and during night time almost totally empty - the area became a wide canvas. Countless times walked through paths seemed engraved into my memory, taking steps, remembering the distances and traveling them in the time needed for the desired images.

Considering that it was possible to enter this area in three different ways I started mapping my walks. Visualising the street view in three different colours with 1,4 meter LED RGB strip I executed the collection of images where the painting expressed the curvature of movement coinciding with the limits of street. Similar to the “Google street view” I created a different view that lead through those streets.



Figure 10 Designed map of chosen location, Calçada da Póvoa



Img 24, 25, 26 Light Painting Photography *LM0005, LM0109, LM0207* LED RGB portable light, Porto, 2019

As my artistic ambition evolved so did the technique used, in this paths the goal was to create a mental route that exist in reality and everyone can see and experience it, similar to a step-by-step thought process of routes in our memory (when we imagine the routes in our mind in order to choose one).

The moment when the first draft was analysed the realization that the area was nothing more than a white/ clear canvas ready to receive my imagination, it was no longer Calçada da Póvoa instead it emerged as new type of architectural site.

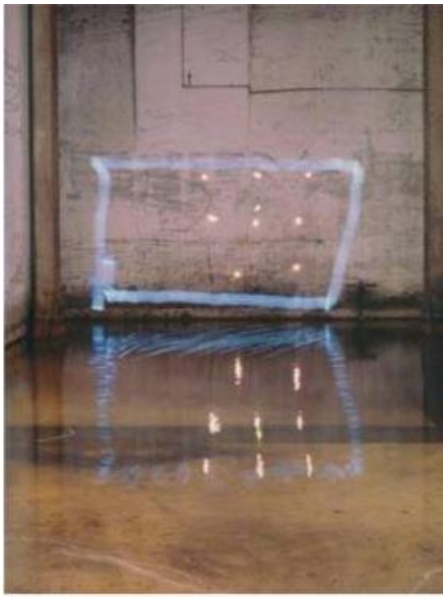
Created coloured walls remained as the primal elements to build the new structures for perceiving the night street image.

d. Designing the pattern

Here I arrived to the point, where the light painting no longer was accidental; I had carefully pre-planned ideas to realise in the sites. The starting point of the process was a research the locations – disused, abandoned, places with dim lighting to express the imagery without having to deal with the distraction of city lighting systems. Open to public but lacking of the interest, remaining of the past habitation. Porto city offered a wide variety of this kind of places.

Marian Drew, the artist in 1999 was commissioned to take photographs of the disused Brisbane Powerhouse before it was re-commissioned as a Performing Arts Centre. The building was abandoned and her concept for the work was to reflect on its historical function, its present state and its future role (Jordan, 2006).

Her strategy was to go into the space and express it organically by registering her movement around it. The torch she carried was used to make gestural marks in front of the camera, making manifest her presence and intervention in the watery landscape.



Img 27 Light Painting Photography *Blue rectangle* by Marian Drew, 1000x1250 mm, 2006

Drew explains that she was using “the light and the drawing as a way of gently claiming back the space for human habitation” (Jordan) referring to the earlier time when it was a functioning power station, but then lapsed into disuse and dereliction.

The presence of her work was an evidence of how she designed the place at the time. Between what it was used to be and what it became in a near future – it was in her hands.

Now my intension grew to extend the life of the composition beyond the image, mastering the designs to create the unique pattern as a signature throughout my works. Simultaneously, using a new light painting tool, two 50 cm red LED light rods, to enhance the existing qualities of these environments. An immersive feeling was created while walking through the composition towards the camera while painting this pattern.



Img 28 Light Painting Photography of the yard of abandoned house with abandon coach and panorama of the city *LP1002*, LED RGB portable light, Porto, 2019



Img 29 Light Painting Photography in old laundry flooded after the rain *LP1125*, LED RGB portable light, Porto, 2019



Img 5 Light Painting Photography in closed Espinho stadium *LP3016*, LED RGB portable light, Espinho, 2019

e. Performance

As the previous experiences revealed, the use of light tools is a great way to express the movement in a night time environment, I employed this technique to colaborate with an artist capturing her body movements while utilizing LED hoola hoop.



Img 31-39 Light Painting Photography Artist movement, LED hula hoop, Porto 2019

During her performance, it was already possible to imagine the creations and the constructs of her movement in the outdoor night place. We went to one of the abandoned sites to explore and create these unique structures. The intension here was mostly to expose how the artist with her dance moves are inseparable from her performance and with it construct these unseen forms in space.

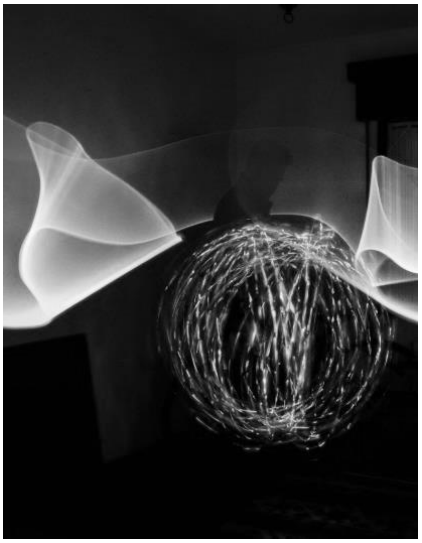
The latest employed technique for my constructions in space is produced by placing the steel wool inside a tool created for the effect, setting it alight, and whirling it around in a circular motion.

The burning sparkles of the steel wool continuously fly out and ending up in the ground, creating bright orange trails of light. Spinning steel wool bounces off the walls of a closed-in space, such as tunnels and walls.
One of the advantages of this technique is the tool that is used is as simple as possible to get and easily transportable in opposite to the light rods used previously. This also allowed the painting of bigger structures than before and still maintaining the same level of emersion.

Light Orb is one of best known forms to create using this technique. The centre of the spin must be static. The hand spinning the whisk in the same coordinates, walking around a central point and making circles to create a 360degrees structure. This technique needs a precise hand movement.

Also, in comparison to previous images, this time deriving from the almost static position of the performer it is possible to catch a glare of the performer in the final image, therefore, having a perception of the Light Orb size in comparison to the surroundings.

First technique was practiced at home using a flashlight and later brought to outside places.





Img 40 Light Painting Photography practicing the orb *LT9012* Porto, 2019

Img 41 Light Painting Photography in disused railway tunnel *LSP1005,* Porto, 2019

To explain the process, capturing the movement of my collaborator was needed, doing the circular spins and walking towards the camera. Different from other used techniques, which can be performed and captured without third-parties, using this one, the communication between the camera and performer was necessary.



Img 42 Light Painting Photography documentation in disused railway tunnel, Porto, 2019

Considering that the sparkles can finish earlier or begin to lose its shape, interrupting the long exposure time was needed in order to maintain the clear lines to achieve the refine images. Each capture starts only when the steel wool is already lit and the action of drawing had started.

Sparkles spread all around the environment; order and fire were engraved in the image almost resembling the welding process used to create new objects that our cities depend upon, a new form for exploration appeared. The image got a power to transfer not only the structures created but also its dynamic, pulsating process as intended. Imaginary loop of city construction revealed.



Img 43 Light Painting Photography near disused furnaces *LSP3010*, Porto, 2019

f. Overview

Always challenging myself to reach and create imaginary structures, accessible to the viewer I went through countless trials and errors as any other artist to transmit my views. The new temporal three-dimensional architectural forms spread all over the city, informing about spatiality, depth and landscape of their surroundings, producing a new perception of the public places.

To allow others to explore these constructions, a website was created, constantly growing within time more and more of these architectures emerge in it. In one of the sections can be found a map of Porto to allow exploration and pin-point their locations.

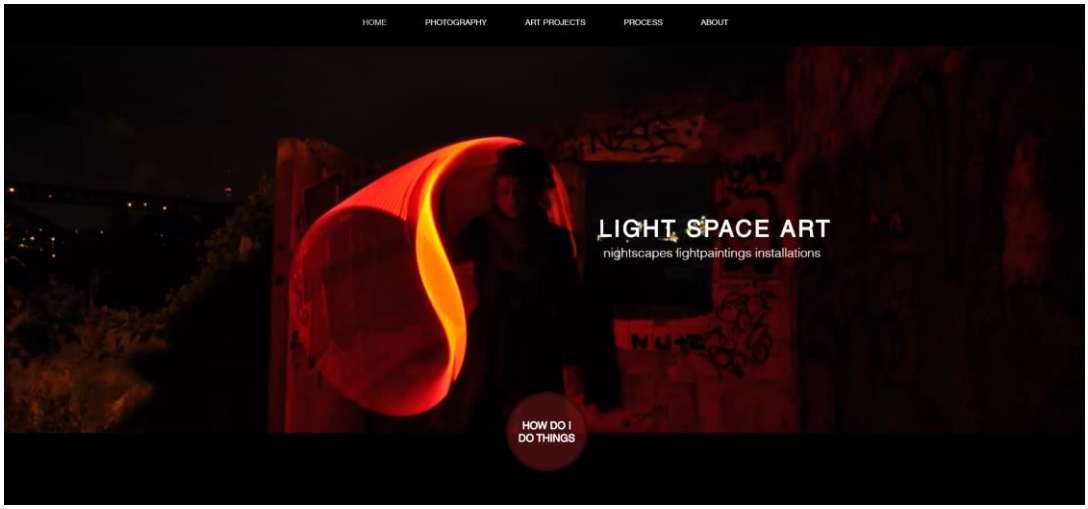


Figure 11 Website *LIGHT SPACE ART* https://monikaseduikyte.wixsite.com/lightspace

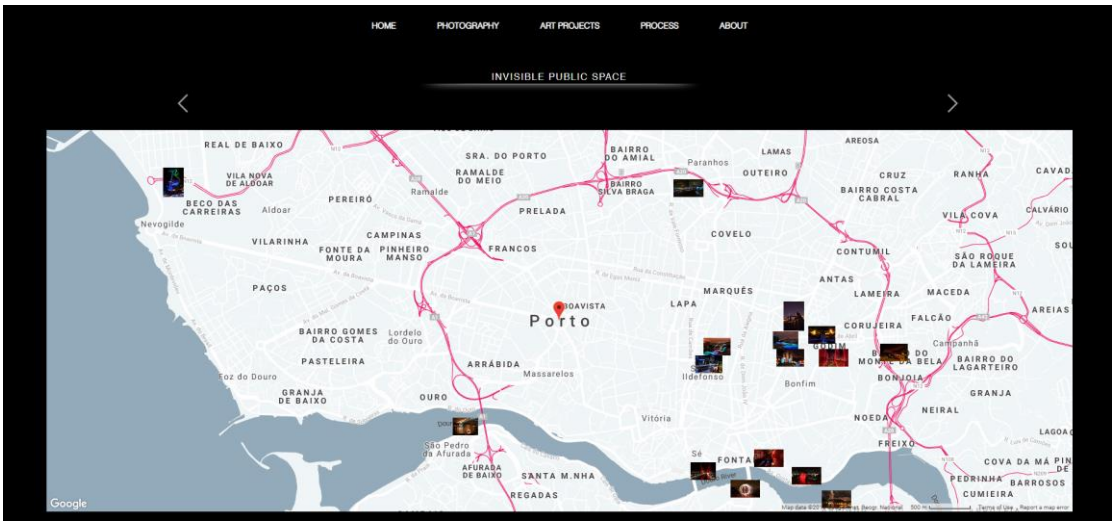


Figure 12 Figure 13 Website *LIGHT SPACE ART* https://monikaseduikyte.wixsite.com/lightspace

6. Final Considerations

In this dissertation I aimed to show how using qualities of artificial light makes it possible to change the perception of the public space. Investigation mainly developed through the personal experiences from observing the nigh-time environment of Porto city. The new objectives to find the hidden possibilities of light bouncing from all the urban surfaces emerged. In the time following, the ways how to use these uncovered qualities and employ it in my art practices were waiting.

Simultaneously, studying the philosophical perspective of perceptual process, my focus shifted to on how actually the mental images are created, rather than reality outside of experience.

Using a camera with a long exposure allowed me to register the unseen light movements. Soon after, I started imitating the light left by the vehicles. Drawing the light trajectories of my movement through the paths taken. The images evidenced the new structures built in the city. Mastering this technique, later allowed the redesign of the nightscapes. Using urban space as a wide canvas I studied and practiced this process as a traditional drawing technique.

Even the immateriality of light was playing the main role, the physicality of surroundings was important to create imagery that would question reality. Furthermore, the movement of the body performing these new forms was relevant. Depending on its spatial capabilities to use the light tools and draw in three-dimensional space.

Getting accustomed with the landscape, by endless repetitions through the night, the body almost merged with it. And conjoined with the highest contrasts between dark and bright blurred the real surroundings into the background.

Careful planning, observation, repetition of the techniques led to the construct of a new powerful level of perception.

Although along my master program the process was a rather never ending frustration of trials and errors, at the end it got to a form of the discipline that can be continuously studied and applied to change the perception of any given space.

Now with the great enthusiasm, I'll go to draw the next one.

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